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INDIA'S AI JOURNEY

INDIAai

A MEITY, NEGD & NASSCOM INITIATIVE

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Ashwini Vaishnaw
Minister of Railways, Communications and Electronics & Information Technology

MESSAGE FROM THE HON'BLE MINISTER OF RAILWAYS, COMMUNICATIONS AND ELECTRONICS & IT

As we enter the 75th year of India's independence, we can all be proud of the progress we made as a nation. Rising from the ashes of centuries-old colonial exploitation and destruction, today, India is not only one of the largest economies in the world, but also a very powerful country on the rise. Thanks to our strong spirit of innovation, eye for inventions, and the inculcation of scientific temper. Today we are empowering millions of Indians by transforming their lives through the application of cutting-edge technologies, as we have seen from Aadhaar to Mangalyaan.

Technology moves fast and evolves exponentially. We need to ensure that we stay at the forefront in terms of acquiring the knowledge and applying them in the right moment. Especially, as we use and employ Artificial Intelligence (AI) and Machine Learning (ML) for more use cases. With the fourth industrial revolution on the horizon, India is prepared to leverage the opportunities. This comes through the right adoption of AI technologies and by preparing our future generation.

It is a matter of high prestige to point out that our Government has been at the forefront when it comes to AI adoption. The utility of AI has proven its worth in the fight against COVID-19, in taking tele-education, tele-health, tele-law and tele-banking to masses and even to the last person in the row.

As our Hon'ble Prime Minister said, "The march of technology cannot be at the expense of further increasing the difference between societies over access to technology, rather the evolution of technology has to be rooted in the ethic of *Sabka Saath, Sabka Vikas and Sabka Prayas.*" With this vision, MeitY has successfully launched numerous initiatives to improves transparency and service delivery and to propel us towards the goal of becoming a global hub for AI.

I am glad that MeitY, NeGD, NASSCOM and several stakeholders are working jointly on National AI-Portal and has come out with the compendium contains 75 AI use cases, from the Government, Academia, Corporates and Startups, and these initiatives are unique and beneficial for improving the lives of common citizen. I wish the readers will find it interesting and worthy of their time to know about the innovations we've made over the past years.

Rajeev Chandrashekar
Minister of State for Electronics and IT

MESSAGE FROM THE HON'BLE MINISTER OF STATE FOR SKILL DEVELOPMENT & ENTREPRENEURSHIP AND ELECTRONICS & IT, GOI

We live in an era where technology is all pervasive. The pace of advancements in the area of technology is rapid, dynamic and striving to impact every part of modern society. India has been highly receptive to technology and science. With domestic and international revenues standing at $194 billion in FY 2020-21, India's IT sector is a shining example of this tenet. And now, the nation is poised to leverage the potential of another high value emerging technology – Artificial Intelligence (AI). By 2025, India has earmarked to achieve 1 Trillion Dollar Digital Economy and a significant portion of contrition is expected from emerging technologies led by AI.

There is immense opportunity for AI to thrive in India – the complexities across geographies, linguistic variances, and socio-economic differences make for a huge number of case studies for AI to address effectively. This compendium of 75 use cases provides a glimpse into the true potential of AI to solve some of India's pressing challenges in areas like sanitation, healthcare, education and governance.

The Government highly prioritizes the mandate for digital transformation, which include focusing on innovations in public service delivery, high-speed connectivity networks, cyber strategies, quantum computing and AI. These technologies are poised to revolutionize modern governance in a digital era, limit the hindrances posed by intermediaries and ensure last mile reach of services and solutions.

Indian economy and socio-economic sectors too need to keep up with the pace of innovations in the technology sector, especially to counter the drawbacks posed by emerging technologies like bias and discrimination of any kind. The opportunity is ripe for businesses, investments and making manufacturing in India to meet demand of Indian as well as global markets.

This compendium shows the highlights of India's foray into a new era of AI modernity and digitization. Hope readers enjoy reading them, learning from them and continue to innovate for India.

Ajay Sawhney
Secretary, MeitY, Government of India

FOREWORD

India's 75-year-long journey as an independent nation is propelled by groundbreaking innovation in Science and Technology. From the Green Revolution that transformed our agriculture output to giant leaps in space & nuclear technology, India has become a source of great envy for many countries across the world. With the advent of computers and the Internet, we found another niche - a world leader in Information Technology (IT).

As we enter the joyous moment of the nation's 75th anniversary, celebrating *Azadi Ka Amrit Mahotsav,* we are now making successful strides in a new technological arena, Artificial Intelligence. AI has stood out as one of the frontier technologies, which is shaping the business and service delivery for the present and future.

MeitY in partnership with Industry & Academia organized Responsible Use of AI for Social Empowerment (RAISE) 2020, India's first global AI summit in October. The summit was inaugurated by Hon'ble Prime Minister in the august presence of Hon'ble Minister of Electronics and IT. The Hon'ble Prime Minister of India stated during the summit that India aims to become a global hub for AI. To fulfil his vision, MeitY is working on the National Programme on AI, which is at an advanced stage of being finalized. Several AI initiatives namely National Mission on Language Translation Mission (for making use of NLP for Indian regional language translation), PARAM SIDDHI AI (for supercomputing), AI Challenge (for promoting startups), Aarogya Setu, CO-WIN, MyGov Corona Helpdesk (for the fight against COVID-19) etc. have been rolled out and supported by MeitY and its organizations.

To commemorate *Azadi Ka Amrit Mahotsav*, the National Artificial Intelligence Portal, a joint initiative from MeitY, NeGD and NASSCOM, is releasing 75 case studies of successful and impactful AI use cases implemented across India by various government agencies, corporates, startups and academia. These use cases will inspire readers and prompt them to explore adoption of AI.

May the journey into the next 75 years be of immense success and progress driven by technologies such as AI and as always, our focus should always remain on responsible use of AI, democratization of technologies, overall economic and inclusive growth.

Abhishek Singh
CEO MyGov; President & CEO NeGD;
MD & CEO Digital India Corporation

FOREWORD

India's journey as an independent nation has been a spectacle of celebrations and accomplishments. In the past 74 years, our country has made significant progress in the realm of Science and Technology and the last 6 years of Digital India has established several transformational digital platforms and has laid the solid foundation for futuristic platforms. From space technology, nuclear energy, telecommunication, and today with Artificial Intelligence (AI), we have leveraged the great powers of technology to address the challenges and empower millions of our citizens.

AI has been identified as one of the most potent weapons in our fight against numerous challenges, and even in our present war against the COVID-19. The Government of India has been at the forefront in applying some of these cutting-edge AI technologies in areas from e-Governance, agriculture, healthcare, education, finance, and banking to law enforcement. AI-powered tools like MyGov Corona Helpdesk, Aarogya Setu and Co-Win are some examples of how the Government is leveraging AI and data to address big challenges.

The Government, alongside deployment, has also focused on evangelizing and laying the foundation for building a strong AI-ready future generation. The RAISE 2020 Summit, which was a global success has been followed up with initiatives like AI Pe Charcha and Digital India Dialogues, which brings together experts from industry and practitioners to showcase use cases and examples of applications of AI for improving services. To empower government school students with appropriate new-age tech mindset, relevant skill-sets and access to required tool-sets, Responsible AI for Youth Program has been launched and over 11,000 Government school children were imparted training in AI. Recently, the Government has launched ai-for-all.in, an initiative that aims to create a basic understanding of AI for all.

As we enter the 75th year of independence, it is important that we recognize these technological innovations and milestones we have accomplished. The compendium of successful AI implementations will serve as a tribute commemorating *'Azadi Ka Amrit Mahotsav.'* I wish this compendium will become a source of information and inspiration for aspiring AI explorers, AI adopters and AI innovators.

Debjani Ghosh
President, NASSCOM

FOREWORD

ndia completes 75 glorious years of independence. In her platinum jubilee year, there is much to celebrate. The strides made as a skills and technology hub is one of the greatest successes of independent India. The country's IT story is an international success because of one key aspect - reinvention. Not once did India's vibrant IT industry rest on its laurels but constantly sought to revamp itself with the tides of change. From business outsourcing to product engineering and now building emerging technologies, India's IT sector has made way for all these and more, becoming a coveted hub for technology innovation.

Artificial Intelligence (AI) is among the most exciting emerging technologies around, with great potential to leave a lasting impact on society. In the past decade, India has slowly but surely cemented herself as an AI hub, fostering deep tech startups, promoting academic research and enabling digital transformation across every major sector. AI is not only providing immense value to businesses but equally importantly, is addressing social good effectively. Ahead of *Azadi ka Amrit Mahotsav,* it's only fitting to acknowledge the expansive impact AI has had on India's IT industry. It's my honour to present a compendium of 75 use cases of AI spanning healthcare, governance, financial services, education and agriculture among others. From combating the COVID-19 pandemic with verified information disseminated through a virtual assistant to millions of Indians and reforming justice delivery to fighting deepfakes and democratizing NLP for languages, there's something for everyone interested in AI in this compendium.

Compounded with groundbreaking initiatives like the National Language Translation Mission, National AI Programme and efforts to enhance AI infrastructure, there is no doubt in my mind that we will see way more than 75 use cases in the coming years. A robust ecosystem for AI is being built in India, and it is a matter of pride to be part of this revolution.

This compendium is a sign of greater things to come. Here's to great learnings!
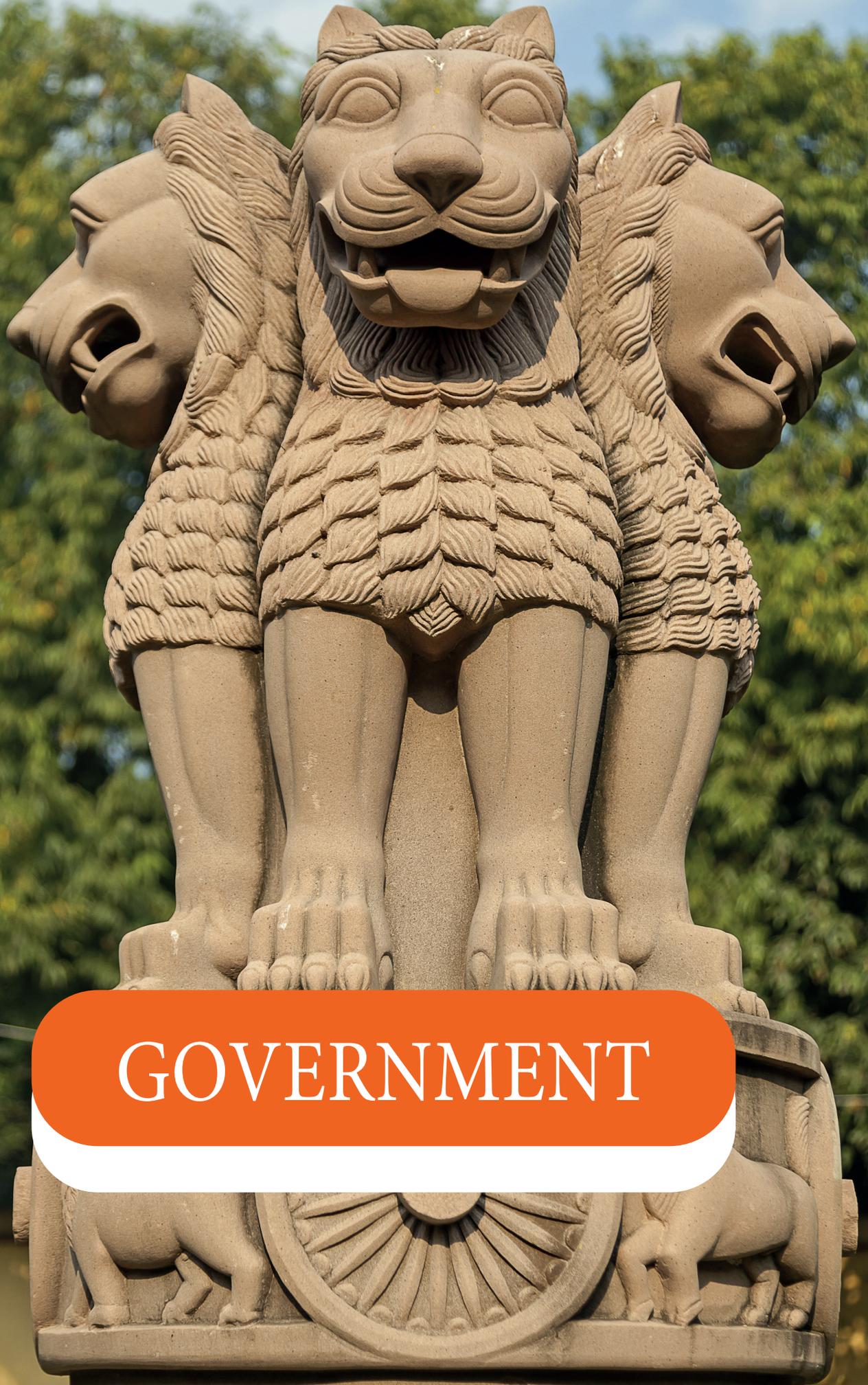
GOVERNMENT

MYGOV, MEITY: INDIA'S AI-ENABLED CORONA HELPDESK - EMPOWERING CITIZENS

Problem

The onset of the global pandemic brought about a panic wave in the country, so the government took it upon itself to curb the spread of rumours and misinformation. The Government of India wanted a solution that would empower citizens with the right steps to take precautionary measures for staying safe during the COVID-19 pandemic. The key objective was to offer a 24/7 helpdesk that answered coronavirus queries and helped prevent the spread of false information. It was also important to handle the scale and diversity of queries being directed from millions of users across the country in English and Hindi.

Solution

Haptik is a Conversational AI company that built the MyGov Corona Helpdesk in record time. This Intelligent Virtual Assistant (IVA) is essentially an AI-powered WhatsApp chatbot that brings accurate information at the fingertips of the users. The chatbot has the following functionalities:

| Help users check symptoms and get a diagnosis. | Provide tips and precautionary measures to stay safe. | Share the latest updates and advisories from the Ministry of Health. | Bust myths around COVID-19. | Share information about the official helpline. |

Impact

Timely and right communications have been a key pillar in our fight against COVID-19. This has been greatly strengthened with the MyGov Corona Helpdesk, world's largest WhatsApp chatbot, that has been handling millions of diverse queries in both English and Hindi. Since its launch in March 2020, the helpdesk has successfully catered to over 60.7 Million users and 240 Million user messages (as on November 26, 2021). Remarkably, the chatbot was deployed in a record time of only **five** days.

C-DAC, MEITY: INDIA'S FASTEST SUPERCOMPUTER PARAM SIDDHI AI

Problem

The National Program for AI was launched by NITI Aayog with the aim to uplift the research and development in AI for social good. The national strategy for AI, termed #AI4All, is focused on promoting inclusive growth using AI. In this endeavour, several strategic collaborations with research institutions, academia and industry partners have been forged, all with the singular goal of developing technology, augmenting Research & Development (R&D) and enhancing ethical standards in the use of AI for social good.

Approach

November 2020 marked a historic step in moving one step closer to the national goal of building AI for social good. India's largest High Performance Computing (HPC) AI supercomputer PARAM SIDDHI AI, commissioned by C-DAC, was ranked #62 in the Top500 list. The biannual Top500 list releases rankings of the most powerful non-distributed computer systems in the world. The supercomputer was developed under the aegis of the three-phase National Supercomputing Mission that aims to provide HPC facilities to 75+ institutions, researchers and academicians – all working together through the National Knowledge Network (NKN). PARAM SIDDHI AI, a machine with 210 AI Petaflops (6.5 Petaflops Peak DP), is based on the NVIDIA DGX SuperPOD reference architecture comprising of 42 NVIDIA DGX A100 systems, connected with NVIDIA Mellanox HDR InfiniBand networking along with indigenously developed HPC-AI engine, software frameworks, cloud platform by C-DAC. Atos is the integration partner, providing the Atos Codex AI Suite to deliver real-time analytics and support AI application development.

Impact

PARAM SIDDHI AI's superior compute capabilities, a mature HPC AI framework and AI libraries in Software Development Kit (SDK) will jumpstart research efforts and support start-ups to execute largescale projects. It will be capable of such large-scale advancements in areas like healthcare, agritech, cybersecurity, robotics and more. With PARAM SIDDHI AI being ranked in the top 100 supercomputers globally, India is marking its dominance as an AI garage of the world.

JAL SHAKTI MINISTRY: IoT DEVICES TO MONITOR RURAL DRINKING WATER SUPPLY

Problem

The Jal Jeevan Mission (JJM), a flagship programme of the Centre, aims to provide assured piped drinking water to every rural household across the country by 2024. Adding a new dimension to it, the Union Jal Shakti Ministry has introduced sensor-based Internet of Things (IoT) devices to monitor the implementation of this programme in more than six lakh villages.

Solution

The JJM in collaboration with Tata Community Initiatives Trust (TCIT) and Tata Trusts, recently completed pilot projects in several remote villages of five States, namely Himachal Pradesh, Uttarakhand, Rajasthan, Gujarat & Maharashtra. The pilots went live in September 2020. These pilots were spread across diverse agro-climatic conditions - including areas in the western Himalayas, desert regions to Gangetic plains (spanning extreme cold of -100°C to severe heat of 480°C). They cover different types of sources including groundwater based borewells, springs in hilly areas, and surface water (river and dams). A key feature of these pilots has been the use of frugal yet sturdy sensors, which makes the solution scalable and sustainable. Several types of sensors have been deployed, including flow meters, groundwater level sensors, chlorine analyzer, pressure sensors, pump controller to measure all the relevant aspects of water service delivery – quantity, duration, quality, pressure, and sustainability – in addition to providing operational efficiencies.

Impact

This approach would not only allow effective monitoring and management on-ground with a futuristic vision to ensure regular tap water to every home, but real-time measurement and monitoring is also critical for rural drinking water supply schemes, with enormous gains in terms of operational efficiencies, cost reduction, grievance redressal. One of the key challenges posed to the team was to develop a robust solution at a fraction of the water infrastructure costs without compromising on quality or functionality. The pilots have led to several outcomes as it has helped identify distribution issues – such as outages, leakages, low pressure, etc. and led to resolution across sites. Several states, including Gujarat, Bihar, Haryana, and Arunachal Pradesh, have already rolled out tenders for IoT-based remote monitoring systems ranging from 500 villages to several districts. Further, states like Sikkim, Manipur, Goa, Maharashtra and Uttarakhand have started the process to roll out this technology.

TAMIL NADU e-GOVERNANCE AGENCY (TNEGA): AI-BASED CATARACT SCREENING APP BY TNEGA

Problem

India has about 4.7 million blind people, and about 66 percent of them lose their eyesight due to cataract. Undiagnosed cataract remains a huge problem especially in rural areas and among low-income settlements in urban areas, owing to the lack of trained professionals and other resources. Therefore, cataract is a major public health problem in India.

Solution

The Tamil Nadu e-Governance Agency (TNeGA) has developed an AI-based mobile app, known as ePaarwai, to address the resource constraints in screening a large number of people for cataract. By simply clicking a picture, the app can be used for preliminary screening of the eye. The app has been designed to detect macular disintegration as well. Any volunteer can join the mission of eradicating preventable blindness.

Impact

Launched with help of Tamil Nadu State Blind Control Society (TNSBCS), the app is being tested in a few districts. The results from the field trials are very encouraging. If these efforts succeed, it would help millions of elderly people in the villages and in urban low-income settlements from losing their eyesight. The app has the potential to create big impact in the state.

MYGOV, MEITY: COMBATTING COVID-19 INFODEMIC WITH AI VIRTUAL ASSISTANT

Problem

In the early months of the pandemic; India, like other countries around the world, was facing a steep increase in COVID-19 cases. By late May, more than 154,000 people had contracted the virus. But, as the country confronted the pandemic, it also sought to curb the spread of rumours. To fight the so-called infodemic, the Indian Government wanted to proactively help its people find accurate information that would better prepare them for the crisis and empower them to reduce their risk of contracting the virus. The Government sought easy-to-use, efficient tools that could keep pace with evolving guidance about COVID-19.

Solution

The Government of India's Digital India Corporation (MyGov) sought to equip its 1.3 billion citizens with a responsible AI tool that provides accurate and useful information on the pandemic. Working together with Accenture and Microsoft, MyGov moved fast to develop an AI-powered virtual agent in days. Referred to as MyGov Saathi (meaning "companion" in English), the agent harnesses the capabilities of Microsoft's Power Virtual Agent and Azure.

MyGov Saathi was embedded on the 'self4society' microsite of MyGov. This persona-based chatbot was tuned to provide customized answers for queries relevant to farmers, migrants, senior citizens, frontline workers and other citizens alike so they all adopt behaviours that minimize transmission and exposure to the coronavirus. As guidance changes, the agent is updated with the most recent data on COVID-19, ensuring latest information is available to users.

Impact

MyGov Saathi is available on online platforms, including MyGov.in, WhatsApp and Facebook. By managing interactions automatically, this virtual agent freed up human experts to focus on the most urgent and complex situations. The AI agent addressed frequently asked questions, with users able to retrieve answers from a menu of options easily. The agent also delivered fact sheets, information on government initiatives, professional and medical advice, and alerts and lists of myth busters to dispel false alarms. MyGov Saathi can handle up to 300,000 users per day and 20,000 concurrent users per minute.

PUNJAB AGRI EXPORT CORPORATION: USING AI FOR IMPROVING THE QUALITY OF SEED POTATOES

Problem

The quality of the potato and its nutritional value highly depends on the quality of seed potatoes that are used to cultivate them. Punjab is known for its high-quality seed potatoes. Punjab produces 27 lakh metric tonnes of potatoes every year. The state also provides to nearly 70 percent of the entire seed potato demand in the Indian market including the states of Bihar, Uttar Pradesh, West Bengal, Gujarat, Maharashtra, Madhya Pradesh, and Karnataka. Yet, only less than 1 percent of all seed potatoes produced in Punjab are currently certified by the Punjab Seed Certification Authority. This makes it extremely difficult for potato growers to differentiate original seeds from counterfeit ones. The spurious potatoes sold in the name of Punjab-grown seed potato severely impact the credibility and the brand value of the seeds. To solve this and to expand the certification process, the Punjab Agri Export Corporation (PAGREXCO) decided to leverage AI-based solutions for Seed Potato Traceability.

Solution

PAGREXCO partnered with Bengaluru based CropIn to enable the traceability of potato seeds in the entire value chain. Their advanced farm data management solution was used to capture several parameters through every stage of production and monitor them systematically to produce superior quality seed potatoes. The PAGREXCO field teams configured the best solutions of practices for each seed variety on CropIn's platform and also received real-time intelligence reports about local weather, crop growth, crop health, potential pest infestations, and crop diseases.

Impact

This helped seed potato growers in Punjab to cultivate superior quality seeds and improve their efficiency. The solution facilitated two-way communication between PAGREXCO and farmers, allowing managers to share important plans, advisories, and instruction videos, and facilitating for farmers to have instant access to the PAGREXCO team. Capturing farm data at critical points established end-to-end traceability to the life cycle of seeds. Following tests for quality assurance and certification by PAGREXCO, unique QR codes are printed on each of the seed potato packets during the packaging and warehousing process. This enabled buyers to trace the origin of the seed potatoes and determine exactly where the seeds are coming from, how the seed potatoes were cultivated, and whether they are PAGREXCO certified or not. Farmers registered under this platform also received timely reminders and alerts for critical field activities, periodic weather alerts, prompt pest, disease alert resolution, and active on-field support from PAGREXCO extension team.

TELANGANA EMERGING TECH DIVISION: REAL-TIME DIGITAL AUTHENTICATION OF IDENTITY (RTDAI) IN AUTHENTICATING PENSIONERS

Problem

Getting the annual life certificate is a cumbersome task for pensioners as they have to travel long distances to a government establishment for submitting proof of liveness and establishing identity. This manual process, mandating physical presence of the old pensioners, is not very convenient for the citizens or the authorities, and there is often scope for errors. The Telengana government has scrapped the old system and replaced it with an app-based authentication. All that is needed is a smartphone and internet, and by uploading a freshly-taken selfie on the app, the pensioners can bypass the otherwise tedious process of visiting the local treasury department to get the pension. The whole process takes just under one minute to find answers for the two crucial questions in authenticating a pensioner – Whether the pensioner in question is alive? Is she or he the legitimate pensioner?

Solution

Telangana state government has implemented the Real-time Digital Authentication of Identity (RTDAI) in authenticating pensioners. A smartphone is the only hardware requirement on the user end as fingerprints or iris images are not required. The beneficiaries have to take a photo and upload it to the exclusive app, which is offered as a part of the T App Folio – the umbrella app for Telangana's e-governance initiatives. The Pensioners Life Certificate Authentication through Selfie (PLCS) method deploys three levels of authentication: demographics (name, father's name and address), photo and liveness. PLCS uses AI based liveness check solution, big data and machine learning based demographic check solution, and deep learning based image comparison solution. The AI, ML and deep learning solutions quickly check the details submitted by the user with the information piled up in public data systems.

Impact

The AI tools can address challenges such as identifying old pictures in the data base from the latest photos of users as the system can detect the changes happened in faces over a period of time. Similarly with the names, the AI-enabled system can match names even with minor variation in spellings as it checks other parameters in the data, such as address or father's name. The success rate in authentication of pensioners is about 93 percent, and it can be as high as 96-98 percent as the system learns and improves over time.

ANDHRA PRADESH GOVERNMENT & PENSIONS: AI-BASED REAL-TIME BENEFICIARY IDENTIFICATION SYSTEM

Problem

The present PDO system in Andhra Pradesh that is in place for pensioner identification, is full of defects leading to misappropriation of funds. This is so because the social security pensions are not uniform for all groups. It ranges from Rs 2250 per month for groups such as senior citizens, widows, toddy tappers, weavers while for disabled persons, transgenders and dappu artists, it is Rs 3000 per month and those with chronic kidney diseases are entitled Rs 10,000 per month. The process of proper fund disbursement is often incomplete due to reasons such as smudged thumb impressions or no impressions at all.

Solution

The Andhra Pradesh government has announced the introduction of an Artificial Intelligence (AI) based Real-time Beneficiary Identification System (RBIS) in October 2020. The move comes as part of the nine promises, the Navarathnalu, made by the YSRCP during the election under which the government pays pensions to over 61 lakh people from poor and vulnerable groups such as senior citizens, widows, single women, persons with disability and several other such citizens.

Impact

The new system will make things transparent as it allows people to authenticate by facial recognition on a real-time basis. This will curb corruption that was rampant during the old system as the volunteers would take advantage of the uneducated villagers. The new AI-based authentication system was deployed in East and West Godavaris and Krishna districts as pilot projects and after being tested successful is being introduced across the state.

UTTAR PRADESH STATE GOVERNMENT & STAQU: AI VIDEO SURVEILLANCE PLATFORM FOR PRISONS

Problem

Over the years states like UP, Rajasthan and Punjab face huge challenge of increasing crime rates. Due to limited resources, the state law enforcements agencies have been increasingly turning towards tech-based solutions for criminal investigations and surveillance. Such agencies have often resorted to AI to reduce criminal activities. The Uttar Pradesh Government, in a first for India, have used AI-enabled video analytics platform to monitor prison inmates.

Solution

Use of AI to monitor prisons. UP is the only state in the country to harness AI for prison monitoring and supervision which houses 24 percent of India's total jail inmates. The video analytics platform JARVIS has been deployed in 70 prisons to monitor inmates since December 2019. The software has helped the jailers in disciplining and overseeing the prisoners in the past one and a half years.

Impact

UP Police and Gurgaon-based Staqu implemented JARVIS Video Wall to monitor real time footage from CCTV cameras across a vast network, and then flagged any segment that looked to contain unlawful activity. JARVIS runs Real-time video data analysis from over 700 cameras installed across 70 prisons in UP with 24/7 data feeds on parameters such as frisking of inmates, visitors' facial and image recognition, crowd analysis, unauthorized access, intrusion detection and fights. Key UP police officials access Mobile App for Real-time insights on potential threats covering 900 km area across parameters like violence, unauthorized intrusions, illegal mobile phone and weapons. For this remarkable initiative, the UP prison department received the prestigious FICCI Smart Policing award for 2021.

TELANGANA EMERGING TECHNOLOGY DIVSION: DRONE-BASED DELIVERY OF HEALTHCARE SUPPLY

Problem

Providing medicines and other healthcare items in remote rural areas in a quick and safe way has always remained a challenge for the government of Telangana. To counter this, the Telangana government launched 'Medicine from the Sky' initiative in partnership with World Economic Forum, NITI Aayog, and HealthNet Global. The objective of the project is to enable emergency medical deliveries that could include COVID-19 vaccines and other essentials and integrate drone deliveries with the existing systems and upgrade rural healthcare infrastructure to the urban level.

Solution

The 'Medicine from the Sky' project involves drone-based deliveries of blood, vaccines, medical samples and organs. As a pilot, 16 Primary Healthcare Centres (PHCs) around Vikarabad area hospital have been selected owing to the presence of cold chain facilities and the PHCs within the Visual Line of Sight (VLOS) and Beyond Visual Line of Sight (BVLOS) range. It needs to be mentioned here that BVLOS drone flights will be used for deliveries using the identified airspace of the Vikarabad district. Based on the success, large scale commercial deployment will be planned.

Impact

The project has been planned to be launched in three waves starting with pilot followed by mapping of the route network for operation of drones. For this, approval has been granted by the Civil Aviation Ministry and the State has been permitted to conduct the experimental flights for a period of one year. To implement the project, companies have been asked to submit SOPs along with the risk mitigation plans to the DG of Civil Aviation for approval. The pilot project is expected to last for 24 days where four batches would carry out sorties for six days each. In the first 2 days, the flights will be transporting only essentials followed by the others.

The project, the first of its kind in the country, is expected to enable better decision-making in healthcare supply chains and execute last-mile deliveries with minimum glitches and thereby augment the national healthcare programs.

DRDO: USING CHEST X-RAYS & AI TO DETECT COVID-19 INDUCED LUNG DAMAGE

Problem

As the COVID-19 pandemic is steadily making its way into the rural pockets, it is presumed that access to CT scans and radiologists will be even tougher. Realizing the need for early and timely CT scans at an affordable rate, DRDO has developed ATMAN AI, an AI-based COVID detection application software using chest X-rays (CXR) to detect COVID induced lung abnormalities. As CXRs are economical than CT scans, the solution does not increment the challenges PHCs and smaller healthcare facilities already face.

Solution

TCAIR, DRDO has developed an AI-based intelligent, secure, web based, COVID detection application software ATMAN using Chest X-rays which can classify the images into normal, COVID-19 and pneumonia classes using limited number of sample images. The secure web-based solution was developed on the premise of optimizing chest X-rays for rapid detection of COVID-19 triggered lung abnormalities. For this, the DRDO has also roped in HCG Academics and Bangalore-based deep tech startup 5C Network.

Using Indian datasets from COVID-19 positive patients, the dataset comprised of 1,324 COVID-19, 1,108 Normal, and 1,344 Pneumonia CXR images. Transfer learning was carried out on Indian dataset using popular deep neural networks, which included DenseNet, ResNet50, and ResNet18 network architectures to classify CXRs into three categories. The model was retrospectively used to test CXRs from RT-PCR proven COVID-19 patients to test positive predictive value and accuracy.

Impact

Based on the initial screening results, the solution is recommended for mass testing by the doctors. To help scale up this project, 5C Network enabled access to radiologists anywhere through its public cloud and AI-based infrastructure, effectively addressing the challenge of a skewed patient to radiologist ratio using technology. The turnaround time for the deployment of the solution is a matter of days and the reach can be increased many folds due to the remote, accessible nature of the 5C Network Platform. At present, an MoU has been signed with the government of Karnataka to deploy ATMAN across 194 PHCs across the state, with other such rollouts being targeted in the near future.

ANDHRA PRADESH TRANSMISSION CORPORATION: FORECASTING ENERGY NEEDS USING AI

Problem

The Andhra Pradesh government is aiming to build the most efficient and financially robust power sector to address future power demand and supply cost-effective power to consumers with zero interruption. The Andhra Pradesh Transmission Corporation (APTRANSCO), for the first time in India, released the day-ahead electricity forecasting model using AI and ML to forecast next day's electricity consumption, including a day-ahead electricity demand for every 15 minutes.

Solution

The forecasting model is being developed by Google and World Bank together, with SLDC working on the initiative in-house. As the system gets deployed, APTRANSCO aims to extend the day-ahead forecasting models for wind energy, solar energy, market prices, central generating stations' surplus and frequency. APTRANSCO is also working on a low-cost model for electricity dispatch. The model will generate data to inform about how much electricity should be generated and dispatched every 15 minutes, the next day from generating stations so that there are reduced costs arising from power purchasing.

Impact

The development will enable the AP State Load Dispatch Centre (SLDC) officials to take decisions on electricity demand and supply, grid management and minimise power purchase cost.

KERALA STATE GOVERNMENT & CORONASAFE NETWORK:
AN OPEN-SOURCE PUBLIC UTILITY DASHBOARD

Problem

COVID-19 pandemic has wreaked havoc in our lives for over a year and half now and still shows no sign of abating. As India reels under an unrelenting second wave, healthcare and frontline workers struggle to cope with the rising cases and critical resources like beds and oxygen cannisters are in short supply. In a community spirit that will be remembered for years to come, good samaritans have mobilized their time, skills and energies to crowd-source supplies for those in need on the back of technologies such as AI. The state of Kerala has been handling this surge in demand for beds and oxygen cannisters through a centralised control room built on an open-source software called CoronaSafe Network.

Solution

The CoronaSafe Network is an open-source public utility designed by a multi-disciplinary team of innovators and volunteers to protect the healthcare system of Kerala from a meltdown due to overload beyond capacity. The tech talent, led by Kerala Start-up village's Sanjay Vijaykumar, built the open-source public software. This software has various elements including telemedicine call management, directory of ambulances, blood banks, food delivery services, hospitals, number of beds and oxygen supply points. The dashboard provides real-time analytics of beds, ICUs and ventilators, real-time oxygen monitoring, capacity visualization for load balancing, facility management with inventory tracking, triage, telehealth facilities, integrated ambulance shifting, patient management and clinical data visualisation. Alerts and notifications are sent in real-time as well.

A crucial element that has been factored in is data privacy - patient data is securely stored on cloud service providers empanelled with MeitY and server access resides with state-appointed health departments. In addition, APIs have public and private end points with appropriate authorisation for system and cross-device integration. All the tools are free and open-source software, with the source code available on GitHub.

Impact

The coordinated effort was a success in Kochi and Ernakulam which prompted its implementation in every district under the State Disaster Management Authority (SDMA). The Network has been successful in creating awareness on COVID-19 and converting educational institutions into hospitals to offset for shortages.

TAMIL NADU EGOVERNANCE AGENCY: DL-FRS- A DEEP LEARNING APPROACH FOR FACIAL RECOGNITION-BASED ATTENDANCE SYSTEM

Problem

One of the challenges that public schools in the state of Tamil Nadu, India, are struggling to address is that of student attendance. Manual marking of attendance tends to waste the limited teaching resources of a school, in addition to being prone to errors and manipulation. The objective of the initiative is to help teachers in reducing the burden of manual attendance marking and providing an attendance management solution for maintaining and managing attendance records in safe and secure way.

Solution

This calls for an unobtrusive and accurate system that does not rely on any manual work by the teachers. TNeGA has developed a cost-effective DL-FRS, a deep learning approach for facial recognition-based attendance system, which runs on lightweight edge computing device, with an integrated camera.

Students can just walk into the school and the system automatically, recognizes each of them by face and marks their attendance. The user-friendly attendance management application helps school management in effective tracking of attendance records.

Impact

Earlier, teachers used to spend more than 45 minutes on attendance marking which has been reduced significantly. Students happily walk into the school and without any complicated process the attendance gets marked by the face recognition system. With the user-friendly FRS, teachers can easily track attendance of students, download, print and manage attendance records at ease with minimal time and effort.

Another unintended impact noticed after the implementation was schools started to see 85 percent drop in latecomers and in turn improving overall productivity of the class.

THE SUPREME COURT OF INDIA: AI FOR REFORMING JUSTICE DELIVERY IN INDIA

Problem

The pendency of cases in India's courts has been a long-standing challenge with no viable solution in sight. While the total number of pending cases stands at almost 44 million across all Indian courts, it is higher than 67,000 for just the Supreme Court (as of April 2021). Apart from pendency, there are problems in culling out facts from the records because of the bulky volumes being filed in the court. It was in this backdrop that an Artificial Intelligence Committee of the Supreme Court was constituted in 2019 for onboarding new-age technology of AI/ML in the judicial domain for enhancing the efficiency of justice delivery.

Approach

The apex court has launched a pioneering effort to use AI to aid legal research for judges. The AI portal SUPACE, short for Supreme Court Portal for Assistance in Courts Efficiency, has been introduced in April 2021. SUPACE is AI-enabled assistive tool that can augment the efficiency of the legal researchers and judges to work on cases, extract relevant information, read case files, manage teamwork, and draft case documents.

The AI-powered workflow of SUPACE has four parts: file preview, chatbot, logic gate and notebook. The case files, typically available as PDFs, can be converted into text. The text and voice enabled chatbot helps to give quick overview of the case. The fact extraction system gives information about the case such as overview, chronology, judgement and so on. Finally, an integrated word processor truly makes the tool an end-to-end system.

This entire system is subject to training by human users. The AI system learns patterns based on the information that's annotated and extracted – and that's how it's trained.

Impact

SUPACE is an online portal that is accessible through a login ID and password. It provides a digital infrastructure that can further the efforts and fulfil the purpose of the digitization movement happening across the country. SUPACE, with its robust workflow and machine learning abilities, will truly unlock the unutilised power of digitization. All high court judges have been recommended to start using SUPACE to enhance their efficiency.

TAMIL NADU EGOVERNANCE AGENCY: ARTIFICIAL INTELLIGENCE TO ADVISE FARMERS ON PESTS AND DISEASES IN CROPS

Problem

Worldwide, crops are affected by various pests and diseases. Most of farmlands are owned by small and marginal farmers in India who do not have access to right resources and are often misguided by a few fertilizer vendors and hence, they face a lot of crop damage and related challenges, ultimately leading to significant loss of income that affect their livelihood. This directly impacts farmers and their family and eventually economy which is directly dependent on agriculture.

Solution

TNeGA's has piloted a farmer friendly and easily accesibe, AI-powered solution which can work on smart mobile phone designed to help farmers with early identification of these pests and diseases, which would be very helpful to mitigate farmer distress compared to traditional approaches.

Deep supervised learning in recent years has been successfully used for pattern identification from digital images. TNeGA has implemented a solution for two crops Paddy and Maize for detecting 3 major issues using deep learning based model, which is trained based on a pre-built knowledge base to identify diseases and pests from digital images. The images were majorly collected from fields in the state of Tamil Nadu across 33 districts. Data was collected with the help of field experts, employed by the state government, who usually advise farmers and are familiar with local conditions. The solution employed is able to detect the issues with upto 80 percent accuracy. TNeGA aims to support variety of cases to cover various crop types. To achieve this goal TNeGA has also setup a system to collect data directly from ground and process to consume it for training models to support various crop types.

The data collected contains following details:

GIS coordinates	Crop stage	User Query	Images of diseased/ infected plants/ leaves
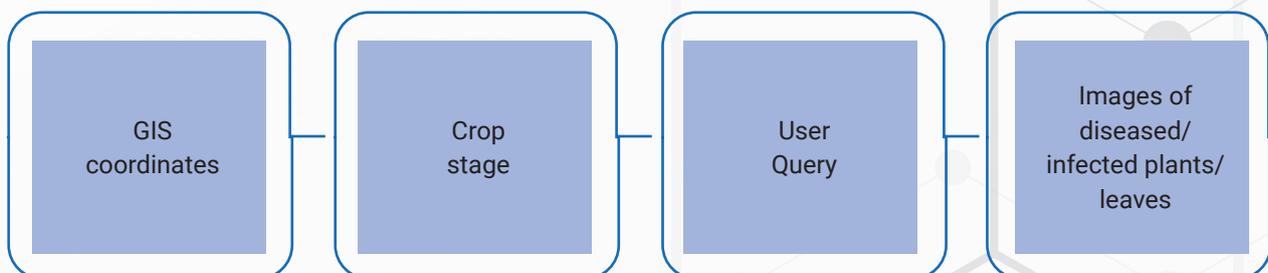
TNeGA aims to use this data to improve the solution and to provide even better support to farmers as well other involved stakeholders.

Impact

Given the ratio of farmers to ground experts in the state of Tamil Nadu, it's almost impossible to serve each and every farmer physically on daily basis. With this TNeGA with Agriculture Department was able to serve around 10,000 requests from farmers in a span of 3-4 months given almost no publicity of it's existence. The other benefits of the system is that it's able to serve farmers in their local language and hence has more reach. With all the requests from Agriculture Department, it was able to build rich dataset and based on data analysis is able validate stressed regions and also signals for onset of any diseases or pests by visualizing the patterns. Daily requests analysis will also lead to identification of various hidden resource related problems and help to tackle them carefully.

MAHARASHTRA STATE GOVT & HAPTIK: AI-ENABLED CHATBOT TO PROVIDE INFORMATION ON PUBLIC SERVICES

Problem

One of the key challenges the government of Maharashtra identified is the amount of time consumed for the delivery of government services and in the processing of paperwork. The government initiated an idea to give the desired services in a time-bound, transparent and predictable manner with minimum human interference.

Solution

In March 2019, the Government of Maharashtra partnered with Haptik Infotech Pvt Ltd (an enterprise conversational AI platform) and announced a new AI-powered chatbot. The chatbot is known as "Aaple Sarkar Bot" and allows access to information regarding public services managed by the state government. It can be accessed on the Aaple Sarkar Right to Services (RTS) websites.

As part of the Right to Services Act of 2015, the bot is deployed to complement existing mobile apps and websites that help with queries related to healthcare, education, public utilities, rural development, revenue, and other public related services. The chatbot comprises a range of algorithms that gives the ability to process many queries every day, such as analyzing, maintaining records and providing the user with the most useful information. Haptik used its own personalized tool for creating the bot which comprised of 3 parts called bot-builder, human chat agent and analytic dashboard. The Maharashtra Government provided various API's and information extract from multiple sectors to the company.

An individual can search for services such as permanent water connection, driving license and access related information including prerequisites for the application, tracking the status of the application, monitoring progress, etc.

Impact

The bot has substantially benefited users by providing instantaneous, accurate, transparent and complete information, as well as enabling them to track services offered by the government.

The platform has already received an overwhelming response from people around the State. In March 2019, Aakrit Vaish, co-founder and CEO of Haptik announced that the bot would be compatible with Marathi and Gujarati languages soon which will further allow people from the remote areas to interact with the website in their language. The company is also looking to create such bots for other states as well.
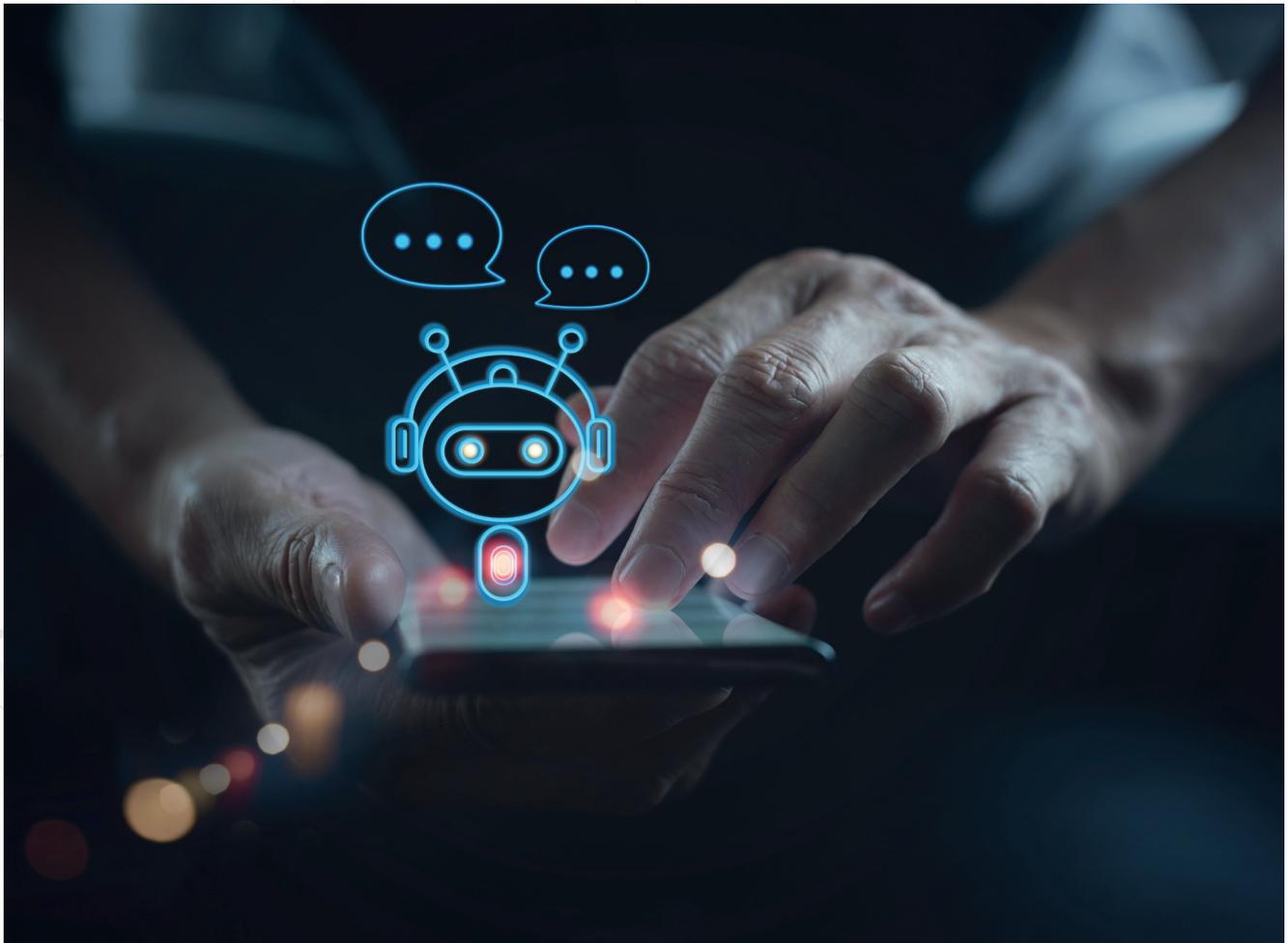
UTTAR PRADESH STATE GOVT: AI IS BEING USED BY THE POLICE TO CATCH CRIMINALS

Problem

As of 2016, Uttar Pradesh (UP) had the highest incidences of crime with a crime rate of 128.7 per 100,000 people. The UP Police became concerned with the inability to solve criminal cases rapidly and efficiently. Therefore, the police began to boost its efficiency by using various technologies such as crime mapping analytics and predictive systems (in partnership with ISRO).

Solution

In December 2018, the Director-General of Police Om Prakash Singh launched an AI-powered mobile application named 'Trinetra'. Trinetra has a record of 5 lakh criminals which contains a picture, address and criminal history of each criminal. This information has been collected through the inputs from district police, prison department and Government Railway Police (GRP).

It is powered by Staqu's facial recognition, visual search, machine learning, and deep learning solutions and works well with low-resolution images and videos. The application offers better accuracy with AI-powered Gang Identification Technology.

Trinetra not only identifies a criminal but also find their associates active in different parts of the state. The mobile application is connected to the data from all the prisons, DCRBs, SCRB, and CCTNS and creates non-ambiguous, non-repetitive data of criminals active in the state. It is also linked with the present Under Trial Management System (UTMS) that keeps track of the status of all undertrials across the state.

This information can be accessed by any officer using the application in real-time. The use of this application helps police personnel easily register or search for criminals via simple biometric features, such as images or videos.

Impact

Trinetra has assisted the police in catching one high-profile criminal accused of a daytime shoot-out in Lucknow. Trinetra is expected to reach 75 districts, 6 GRP, ATS (Anti-Terrorist Squads), and STF (Special Task Force). The application will be used by 1,464 station house officers in the state, 65 GRP inspectors and all other senior police officials.

The police, in partnership with Staqu, intends to introduce vehicle search technology on the mobile application, along with 'enable search by voice samples' through its advanced AI-powered speaker identification technology. Also, the application aims to support fingerprint-based identification and active geo-fencing of police personnel.

NATIONAL HIGHWAYS AUTHORITIES OF INDIA: AI-BASED ATTENDANCE FOR FIELD STAFF

Problem

The National Highways Authorities of India (NHAI) has deployed Artificial Intelligence (AI) based face recognition system to monitor attendance of the field staff at different project locations. This move has been undertaken by the NHAI as a step to increase transparency and accountability.

Solution

The AI system will also have the feature of real-time location tracking of personnel at project sites including key personnel, engineers and consultants. Further, the NHAI's system which is cloud-enabled as well as powered by the data analytics platform - Data Lake which will enable the system to tag each personnel with unique identification and monitoring which will help check unauthorized absenteeism as well as improve the quality of construction and project management.

Impact

This system will enable employees to log on using their mobile phones via an app and will capture employee details, date, time and location of the employees when they log in for the day and will prevent impersonation of employees/ consultants/ engineers.
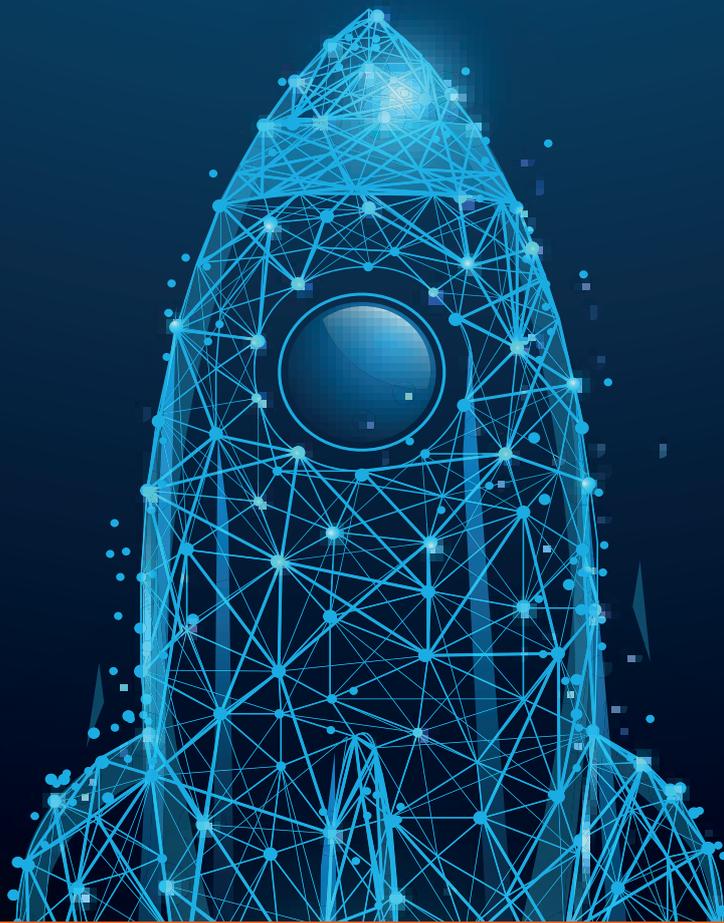
STARTUPS

AGNEXT: IMPLEMENTATION OF TRAGNEXT – AI-POWERED TEA CROP QUALITY SOLUTION

Problem

Certain stakeholders in the tea industry value chain often surreptitiously enhance the relative weight of the harvested/plucked tea leaves by moistening the leaves with water. This is done to increase the volume of the harvested tea leaf crop for a higher price realization. This is not only illegal but also detrimental to the quality of the tea harvest - the moisture reduces shelf life of the tea leaves. When any tea processing company/manufacturer procures tea leaves, the company determines the quality and price of the product using the Fine Leaf Count (FLC) benchmark. The quality of the product is tested and validated on the basis of the FLC. While FLC is used to estimate the price of the leaves, the presence of moisture distorts the quality of the tea leaf and the final product.

Goodricke, an Indian tea producing company, procures tea from several sellers. The company often procured the tea at an inflated price because of the presence of water/moisture in the tea leaves - this led to higher input costs for the same volume of tea harvest/produce. Moreover, the reduced shelf life of the tea leaves leads to further losses of revenue because of the spoilage of the tea produce. Currently, there are two traditional methods used by processing centers to determine the fine leaf count: weight based and Tocklai Ballometric (TB) Count based. The weight-based method, which has been traditionally used because of the agility of the process, is not very accurate and can be manipulated. Though the Tocklai Ballometric method is very accurate, it is very time consuming as the number of fine leaves need to be counted manually. Moreover, the manual quality process was prone to subjectivity. Hence, there was a requirement for a centralized digital solution to determine the quality of the tea crop/tea leaves by measuring the presence of water/moisture in the tea leaves.

Solution

AgNext developed an AI-based application called TragNext to identify the quality of agricultural produce, including tea leaves. The pilot solution was set up in association with the Tea Research Association to accurately measure the fine leaf count and the quality of the tea leaves. TragNext automatically determined the fine leaf count and the moisture component without human intervention, removing subjectivity from the quality checking process. This solution reduced the quality-checking process to seconds, and improved overall accuracy. The team at AgNext leveraged several functions of data science to build a portable futuristic platform for an accurate and instant food/tea leaf assessment solution. The system was developed by utilizing deep learning sciences in combination with spectral technologies. As part of the solution, AgNext developed a mechanism to store the details of the tea leaf's moisture on the cloud - these details could then be accessed by any of the stakeholders. The platform enabled the analysis of the quality of the tea leaves by utilizing several assessments using AI.

Goodricke also leveraged a machine-based physical installation, that provided real-time FLC estimation for samples up to 2kg. The system had three components — a dryer, a separator and an AI-enabled system. Calculations were done via a CV camera that was mounted over the last conveyor belt during processing - the camera recorded the sample's movement to give the FLC - Fine Leaf Count. Further, a web-based dashboard provided the complete information of the farmers registered in the system and the history of the batch quality associated with them. The payments made to the farmers were also managed from the dashboard.

Impact

To utilize the application/solution, tea leaves were spread evenly on a white surface - the image was taken and uploaded to the app. The results were calculated and displayed within 1 minute. The solution enabled Goodricke to carry out an accurate and immediate check on the quality of the tea produce and completely eliminate human errors - a 100 percent error reduction. The TragNext solution is fast becoming the determining factor for quality and price valuation. The initial deployments included estates of tea companies such as Goodricke, Rossell Tea, and Bokahola Tea. The Tea Board of India has also installed this solution in West Bengal and Assam. With the growing demand, TragNext is now deployed at CISTA or Confederation of Indian Small Tea Growers Association - at Jalpaiguri district of West Bengal.

NIRAMAI: BEATING BREAST CANCER THROUGH AI-ENABLED EARLY DETECTION SOFTWARE

Problem

Breast cancer is the leading cause of cancer deaths in women today. According to WHO, 1 in every 12 women have the risk of a breast abnormality. Indian women have only about 50 percent chance of survival. Early diagnosis is very critical to decrease mortality rates. The current gold standard for breast cancer screening, mammography, requires high capital cost for equipment and experienced radiographers. It is recommended once every 2 years and only to women above 45 years because it cannot identify tumours effectively for younger women, and uses of X-rays for scanning, which can make women more susceptible to cancer if screened multiple times. In addition, it is also very painful for the subject as about 20 pounds weight is applied on the breasts while screening. Other common method of clinical exam can detect tumours only after they are large enough to be palpable.

Solution

NIRAMAI Health Analytix is a Bangalore-based deep tech startup, which stands for "Non-Invasive Risk Assessment with Machine Intelligence". They have developed a new cancer screening software that uses machine intelligence over thermography images to detect breast cancer at a much earlier stage than traditional methods or self-examination. The core of the solution is Thermalytix, a computer-aided diagnostic engine that is powered by AI. SMILE (Software with Machine Intelligence for Life Enhancement) is a web interface for the NIRAMAI certified technician to upload demography information about the patient along with her thermal images. Big data analytics, AI & ML are leveraged to analyze the patient's breast health condition, automatically generating a report listing certain unique parameters and recommending a breast health score. This method of screening can detect tumours five times smaller than what clinical exam can detect. It is a low cost, accurate, automated, portable cancer screening tool that can be operated by a simple clinician. Unlike mammography, this imaging method is radiation free, non-touch, not painful and works for women of all ages.

Impact

NIRAMAI provide complete hardware-software solution for breast cancer screening in three modes.
(a) Sturdy, compact screening device with cloud processing for specialty hospitals
(b) Low-cost, handheld device with real-time cloud-based diagnostics for independent medical practitioners
(c) A portable solution for large-scale screenings. The innovative methods used in the solution have led to multiple US patents. The cancer screening tool, SMILE, has been tested on more than 4000 women in 12 hospitals/diagnostic centers as well as screening camps. 3 clinical trials, comparing Thermalytix with current standards of care, have been published in peer reviewed conference/journals. The results from these clinical trials indicate very high accuracy of Thermalytix that is comparable to, and sometimes better than, Mammography.

TRICOG: AI FOR DIAGNOSING CARDIOVASCULAR CONDITIONS

Problem

Approximately 31 percent of deaths globally are due to Cardiovascular diseases (CVD), out of which heart attacks and strokes account for 85 percent. In the last 26 years, there has been a 34 percent rise in deaths due to heart diseases in India. Three million people have died in India due to CVDs. While ECG machines are readily available in India, reading ECG, which is the first step in detecting any heart-related abnormalities, requires the skills of a cardiologist or an experienced physician since machine-embedded algorithms have only a 70 percent accuracy rate. There is a shortage of heart specialists in India. This results in frequent occurrences of misdiagnosis and delayed diagnosis.

Solution

Tricog was founded in 2015 with a vision of expediting cardiac diagnosis and accelerating treatment. It does this by providing accurate (physician-verified) ECG reports within a few minutes of taking ECG at remote centres. If any patient is found to be critical, Tricog works with tertiary hospitals in their neighbourhood to accelerate treatment. Tricog is also actively engaged in building a specialised product for coordinating cardiac care across primary healthcare centres, ambulances and tertiary hospitals.

Tricog's solution consists of cloud-connected ECG machines placed at various remote centres, which continuously push ECGs to the Tricog cloud. Proprietary algorithms first analyze the ECGs and provide preliminary interpretation for verification by the in-house team of cardiac specialists who are present 24/7 at Tricog's centralized ECG Analysis Hub. The physician-verified reports are then sent back via SMS/app to the remote centre.

Impact

By providing ECG diagnosis within minutes and architecting a low-cost solution, Tricog addresses the delay in response, which significantly decreases the risk of mortality.

HAPTIK: CONVERSATIONAL AI PLATFORM BY HAPTIK AI FOR HEALTHKART

Problem

Founded in 2011, HealthKart is a leading health supplement online store, offering a wide range of healthcare and wellness products. The company has a network of over 100 stores. HealthKart sought to enhance its customer service during the COVID-19 pandemic by making the online system more self-sufficient and asynchronous. HealthKart's overarching goal was to handle an increasing number of user queries during the pandemic. The eMarketplace also sought to become a go-to destination for diet, fitness and immunity-related advice. HealthKart sought to proactively recommend relevant products based on the lifestyle and fitness goals of customers.

Solution
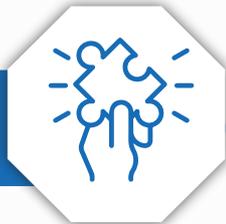
HealthKart sought a solution that could build new chat flows or modify the enterprise's existing flows. To facilitate this, HealthKart partnered with Haptik to build Intelligent Virtual Assistants (IVA) to address the surging number of customer queries during the pandemic. HealthKart leveraged Haptik's Conversation Studio to seamlessly create chat flows that provided personalized diet and fitness advice, product recommendations, and advice on immunity-related purchases. The proposed Conversational IVA or Interactive Voice Response (IVR) was supported by Artificial Intelligence technologies - the voice system provided near human-like voice interaction and enabled the quick resolution of customer queries.

The conversational IVR was easily integrated with HealthKart's existing contact center software and was automated to answer most customer queries in natural language. The system utilized Haptik's cutting-edge NLP and conversation flow capabilities. The AI capabilities of the system provided personalized diet and workout plans to customers based on their goals, eating habits, and physical attributes, among others. The solution also featured an activated on-demand support for routine queries such as order tracking, payments, bill queries, refund, and replacement, to name a few.

Impact

The system enabled the quick resolution of customer queries as the IVR would naturally converse with customers. Within five months of implementation, HealthKart achieved an 80 percent automation rate across its customer system, catered to over 106,000 customers and handled over 128,000 conversations. The number of queries that were resolved by the automated system reduced the cost per call by 87.5 percent of the traditional IVR-agent interaction.

JAGADISH K. MAHENDRAN: AI-POWERED BACKPACK HELPS THE VISUALLY IMPAIRED NAVIGATE WORLD

Problem

The difficulties people with visual impairments experience in navigating through the world-especially in public spaces are both obvious and, many times, profound. Their lives and opportunities are often seriously impacted by the need to depend on others for assistance in simply getting to work, going shopping, meeting friends, and on and on. What sighted people take for granted often becomes an enormous obstacle that the visually impaired must deal with on a daily basis. Meanwhile, visual assistance systems for navigation are fairly limited and range from global positioning system-based, voice-assisted smartphone apps to camera-enabled smart walking stick solutions. These systems lack the depth perception necessary to facilitate independent navigation.

Solution

Artificial intelligence (AI) developer Jagadish K. Mahendran and his team designed an AI-powered, voice-activated backpack that can help the visually impaired navigate and perceive the world around them. The system is housed inside a small backpack containing a host computing unit, such as a laptop. A vest jacket conceals a camera, and a fanny pack is used to hold a pocket-size battery pack capable of providing approximately eight hours of use. A Luxonis OAK-D spatial AI camera can be affixed to either the vest or fanny pack, then connected to the computing unit in the backpack. Three tiny holes in the vest provide viewports for the OAK-D, which is attached to the inside of the vest.

The OAK-D unit is a versatile and powerful AI device that runs on Intel Movidius VPU and the Intel Distribution of OpenVINO toolkit for on-chip edge AI inferencing. It is capable of running advanced neural networks while providing accelerated computer vision functions and a real-time depth map from its stereo pair, as well as colour information from a single 4k camera.

A bluetooth-enabled earphone lets the user interact with the system via voice queries and commands, and the system responds with verbal information. As the user moves through their environment, the system audibly conveys information about common obstacles including signs, tree branches and pedestrians. It also warns of upcoming crosswalks, curbs, staircases and entryways.

Impact

The backpack helps detect common challenges such as traffic signs, hanging obstacles, crosswalks, moving objects and changing elevations, all while running on a low-power, interactive device. Visually impaired users can take advantage of the system for both indoor and outdoor navigation, as well as for gaining an understanding of their local environment. Simple to put on, it's inconspicuous, and the user can take advantage of the system to walk freely on public streets without attracting undesired attention. Jagadish K. Mahendran won the grand prize in the OpenCV Spatial AI 2020 Competition, the world's largest spatial AI competition.

BOBBLE AI: AI-BASED CONVERSATIONAL MEDIA MARKETING PLATFORM FOR ITC SUNFEAST

Problem

ITC's Sunfeast YiPPee! was actively exploring content and marketing avenues, such as TV and print advertisements, to reach a wider audience and become an integral part of customer conversations. The brand was also looking to strengthen its consumer franchise for Mood Masala. To achieve these objectives, ITC Sunfeast wanted to design a campaign through which the brand could be a part of teenage communication and social media platforms.

Solution

To facilitate this, ITC's Sunfeast YiPPee! sought to capitalize on the cricketing calendar and reach out to younger audiences. ITC identified Bobble AI as the implementation partner to achieve the objective of enriching individual conversations through expressive and AI-based stickers and GIFs - Bobble AI utilized its conversation media marketing technology for this purpose. The AI-enabled platform enabled mood expression through visuals and helped the users converse with each other through Emojis, Stickers, and GIFs. It also allowed conversations via animated BigMojis. As part of the implementation, the Bobble AI Keyboard was utilized - this drove the adoption of Sunfeast YiPPee!'s 'Mood Masala': Mood Masala was an emoji driven media strategy and it became an integral part of daily conversations between consumers over WhatsApp, Facebook Messenger, Instagram, among others.

Bobble's AI engine identified the consumers' real-time intent and implemented Sunfeast YiPPee! Mood Masala's relevant stickers, GIFs, or BigMojis to replace the plain text messages. Bobble AI subtly integrated brand awareness as a part of the content with the data intelligence and AI-based stickers and GIFs.

Impact

1 month after the campaign went live for YiPPee! Mood masala, the brand was able to generate around 23 Million+ impressions with 8 Lakh+ unique viewers and 400K+ content shares, and 1.5 Lakh+ unique sharers for the brand on a pan India basis. For the people/consumers that the campaign was able to reach out - the demographic distribution was as follows:

81 percent of the people reached out to were from the age group of 15 to 24 years.

10 percent from 25 to 30 years age group.

9 percent from 31 to 45 years age group.

COGNIABLE: MANAGING AUTISM WITH THE HELP OF MACHINE LEARNING

Problem

Autism is a complex life-long developmental disability that appears in early childhood. Often known as Autism Spectrum Disorder (ASD), it can impact a person's social skills, communication, relationships, and self-regulation. However, early intervention can give children not only a better possible start but also the best chance of developing to their full potential. Statistics indicate that there are 5,000 children born every day in India which adds up to 18 million a year. Out of this 18 million, nearly 1 percent have autism. This is where health care startup CogniABle has an important role to play. CogniABle is a machine learning driven assistive technology for early detection and affordable treatment of Autism Spectrum Disorder. Driven by AI, the organization helps in early detection and treatment of autism.

Solution

CogniABle uses technologies like AI and ML to solve autism detection problem. The staff of the organization assess the child through their screening platform and prepare an individualised education plan. A child-specific education plan is prepared which gives a specific plan to advance a child's skills.

Impact

Team CogniABle developed a comprehensive screening platform. Parents can upload videos of their children using the CogniABle mobile application, and deep learning models work to identify gross motor skills, fine motor skills and other actions. Using computer vision, team CogniABle has developed transfer learning techniques, which allows the team to make ML models with about 25 percent of video data.

Once the screening is done, the team, with inputs from seven behavioural psychologists and four technical experts, provides personalized intervention plans for children spanning areas like language, social skills and behaviour as the founders believe that behavioural therapies are key to helping children overcome barriers in social settings and environments.

SPEKTACOM: AI-POWERED CRICKET COACH

Problem

The popularity of cricket has increased very rapidly in recent times, and as a result, innovative methods for improving batting techniques arose. This has also led to a need for data-driven assistance for players to assess the quality of their game.

Solution

Spektacom (a startup in Bangalore) came up with the idea of using non-intrusive sensor technology on the cricket bats to harness and power the convergence of data from the sticker of power bats, with insights-driven from cloud-powered data analytics, machine learning, and AI. The objective is to bring sports closer to fans through interesting ways of engagement using real-time sports analytics. This unique non-intrusive sensor platform (weighs less than 5 grams) is fixed behind a bat as a sticker to measure the quality, speed, twist, and swing of a bat and the power transferred from the ball to bat at impact. These parameters are used to compute the quality of a shot and help professional as well as amateur players and coaches to improve performance with data-driven feedback.

The data from the power bats are analyzed with powerful AI-models developed in Microsoft Azure and transferred to the edge for providing continuous feedback to the player. The sticker communicates using Bluetooth Low Energy (BLE) with an edge device called Stump Box that is hidden behind the wicket. The data from the Stump Box is transferred and analyzed in Azure and shot characteristics are provided to broadcasters in real-time. To ensure secure communication between the bat, edge device and Microsoft Azure, Stump Box has been powered by Microsoft Azure Sphere based hardware platform. The smart bat pairs with Spektacom mobile app to transfer and analyze sticker data in Azure. Currently, only three main data points are being collected, which are speed and twist of the bat's impact with the ball and the quality of the shot.

Impact

Spektacom has already debuted the technology at the Tamil Nadu Premier League (TNPL). The company believes that this technology will enhance fan experience and engagement with the sport and will also help coaches to provide more intensely focused guidance to players.

LEARNING MATTERS: AI VOICE ASSISTANT TO IMPROVE TEACHERS' ENGLISH PROFICIENCY

Problem

A teacher's language proficiency is a key element that decides the efficacy of teaching in any educational scenario. If the teacher doesn't have good command over the language, even meticulously-planned instructional design will deliver poor learning outcomes for the students. Teachers in semi-urban and rural schools have very limited exposure and experience in English. Meaningful conversational English is a herculean challenge for teachers in the classroom. This has a direct impact on the students. Failing to understand the language leads to poor performance.

Solution

Learning Matters' Tara focuses on increasing the teacher's vocabulary, thereby improving communicative skills with the proper use of grammar constructs. This is achieved by our carefully-designed training modules and pedagogical approach to language learning. Tara is a dynamic, two-way interactive, personalised teacher assistant that works on Amazon's Echo Dot, Google Home, and smartphones. Tara uses voice-assisted technology to incorporate the four critical components of language learning - Listening, Speaking, Reading and Writing (LSRW). Tara mimics a human teacher by "listening", responding to the learner's utterances, providing feedback and correcting grammatical mistakes, repeating lessons, and conversing with learners, over and over again, tirelessly. This helps learners learn at their pace by repeated practice to gain proficiency in the language. Tara also creates a non-judgemental learning environment in which learners can speak confidently without the fear of being judged. The lessons are based on real-life situations and everyday conversations. This gives learners the appropriate context to practice speaking in English.

Impact

Prior to beginning the programme with Tara, a baseline assessment of teachers is carried out to assess their listening, speaking, reading and writing skills on a scale of 5. The assessment is designed to reflect the Common European Framework of Reference (CEFR) guidelines for languages. The teachers are then mapped to CEFR levels of A1 and pre-A1 based on their scores. Teachers are assessed once again three months after the course commencement and one last time for the year, six months afterwards. They are assessed on the following parameters: grammar, vocabulary, comprehension, fluency, pronunciation and expression. Tara allows every teacher's individual progress to be tracked which helps to generate a monthly performance report. As well, teachers who are struggling with content and need customized interventions can be identified. Periodic generation of reports ensures that the sessions with Tara are being followed as per schedule and performance monitored.

CHALO APP: SIMPLIFYING BUS JOURNEY

Problem

Buses are the most common and preferred mode of transport across both rural and urban areas in India. While the ease of availability and the affordable prices are the primary reasons for preferring such journey, there are multiple challenges affecting the bus transportation system. From waiting for buses to buying a ticket, there are numerous hassles associated with a simple journey. While the easy answer is booking an Uber or Ola, the aam admi might not be so privileged to book a joyful ride. Having realized this, Vinayak Bhavnani, Mohit Dubey, Priya Singh Dubey and Dhruv Chopra wanted to change all of this, and make the intercity bus experience digitized, comfortable and easy for Indians.

Solution

Chalo (previously known as Zophop) was launched in 2014 in Mumbai with the focus on improving existing public transport with technologies. One of the ideas was building a multi-modal trip planner that can provide suggestions to users on the best mode of public transport.

One of the first tech stacks the Chalo team developed was on live tracking - a monumentally challenging aspect of bus transport in India. This helps passengers plan their trips efficiently. The ETA algorithms provide passengers information on the bus route and time of arrival. Soon after, the team went on to introduce digital payments through the Chalo app, and more recently introduced the NFC-based touch-to-pay Chalo Card that works as an integrated solution for passengers to buy tickets, make payments or use a QR code to travel. For conductors, they provided PoS machines that had a long battery life, high transaction volume ability and structurally sound to withstand tough environments. The team essentially works with transport operators to integrate all elements - GPS tracking on the bus to software solutions on the cloud and mobile applications for the users, end-to-end.

In addition to developing ETA algorithms, live tracking and extensive data-driven prediction engines, Chalo also introduced a Seat Availability Feature last year that would indicate how many seats the bus had during a trip. This was done after installing cameras onboard buses that helped provide data on seat availability and also enabled easier and accurate audits of bus journeys.

Impact

A 10–15 day pilot on a bus route was initiated which was a success. The team spends a considerable amount of time and effort to improvize on early version of its app. On average, there is a new version released with improvements every 2 weeks that saw additions such as emergency SOS, live trip sharing and multiple languages. At present, Chalo is present in 23 cities and works with many state transportation divisions such as WBTC Kolkata, DTC Delhi, KSRTC Kerela, TNSTC Tamil Nadu, ASTC Assam, AMTS Ahmedabad, KMRL Kochi and AICTSL Indore to name a few.

Officials believe that the app will increase the dependency of commuters on the public transport system which may help in reducing the number of cars on road.

TAGHIVE: KEEPING STUDENTS IN CLASSROOMS USING A CLICKER

Problem

India has one of the largest student populations in the world. We have 290 million students in our schools with more than half the number, enrolled in government schools across the country. Having so many students graduate from the schooling system in India is a matter of great pride for the country. However, we also have one of the most complex public education systems in the world with roughly 7 million students dropping out of school every year to take up low income jobs.

Solution

Class Saathi is a quiz-based EdTech solution for in-class and at-home learning. It offers clickers for classroom polling and an AI-powered smartphone app for use by students, teachers, parents, and administrators.

The classroom response system is a combination of a clicker for each student and the offline app for the teacher's smartphone. It is optimized to complement the existing infrastructure of a modest classroom without the need for computers, projectors, internet or even electricity. The teacher can conduct topic-wise formative assessments to gauge the learning levels of each student. As the students input their quiz response through the bluetooth clicker, a real-time report is displayed on the teacher's mobile app. This feedback is then shared with the parents and administrators on their apps, too.

Learning continues for students at home with the AI-powered personalized learning app. All questions have been designed by a team of IIT students, based on the NCERT curriculum. The quiz-based Class Saathi app offers a self-assessment solution for Maths and Science for class 6–10 students. The question recommendations and difficulty levels on the app are fine-tuned to the child's aptitude and performance.

Impact

It is a multi-stakeholder solution for it connects all parties on a single platform, also increasing accountability. The in-class device and app are a versatile, teacher-centric solution in that it automates tasks such as attendance taking, question framing and report making, hence enhancing teachers' productivity. The home learning app adds new dimensions to the meaning of self-study with its AI-enabled dynamism. Through partnerships with the Madhya Pradesh and Uttar Pradesh governments, they have recorded improvements in student performance and attendance.

SHOPTIMIZE: AI-DRIVEN PLATFORM BY SHOPTIMIZE TO BOOST THE REVENUES OF ONLINE STORES

Problem

An Indian consumer brand – that operates mainly through offline stores - started an online store in 2012-2013. The brand has now felt the need to scale online operations and revenues along with its in-store revenues. To enable this journey, the consumer brand was looking for answers to such critical factors as: key KPIs to be monitored, growth levers to focus on, triggers and contributing factors for revenues, allocation of costs between various marketing channels for maximum RoI and ensuring customer satisfaction and growing online presence. The brand required a product that focused on the development of the e-commerce domain through data-driven insights.

Solution

Shoptimize introduced its Growth product to tackle the challenges for the client. The growth product attempted to solve the challenges related to growing the operations and revenues of an online store. The Growth product enabled the consumer brand with key insight generation - the insights covered factors that contributed to revenue growth, actionable recommendations based on the insights that the team could implement, various canned dashboards for the digital marketing teams to monitor metrics and run targeted campaigns.

The solution personalized aspects of the brand's website to improve conversion rates. Shoptimize's Growth product was designed to help the consumer brand achieve consistent revenue growth – this was achieved by keeping costs in check. The solution was built on a data-centric platform with accuracy, efficiency, and flexibility as the core offerings. The insights and recommendations that were generated helped the consumer brand fine-tune the business based on data of the client's customers. Moreover, the website was personalized to provide better recommendations for the various customers.

Impact

The consumer brand is consistently growing its revenue from the online store and generating very good Return-On-Ad Spends (ROAS). In comparison to the previous year's festive season, there was a 100 percent increase in online revenue for the client without increasing the ads expenditure. The aim to entirely remove dependency from the marketplace and get the online store to perform at par with the offline stores was achieved through the growth product.

STREAMOID: IMAGE-BASED STYLING SOLUTION

Problem

Abof ("All About Fashion") is the online venture of the Aditya Birla Group, the third largest business conglomerate in India. The Aditya Birla group is established in the fashion retail segment with over 2000 brick & mortar stores. In July 2016 they acquired Forever 21 in India further consolidating their position in the Indian fashion retail market. Abof understood that to succeed in improving customer's experiences, it required to focus on smart technology and digital innovation across all aspects of the online business. One of the key areas was the use of content curation technology. The company's stylists collected user generated content (UGC) and trends from social media and hand curated looks. This gave the online retailer good results but the solution was not scalable. Each week only a handful of products were available in the curated form.

Solution

Abof tested various kinds of recommendations based on product attributes and color. These solutions ranged from meta tags to collaborative filtering. After doing A/B tests, Abof zeroed in on Streamoid's image-based recommendations, as the solution enabled an increase in click through rates from 3.4 - 9 percent. Abof introduced Streamoid's Outfitter, an AI-powered recommendation engine that created complete looks for every product in the inventory, in real-time. The recommendation engine was trained on Abof's styles, and was based on outfits modeled in the catalog and the internal style guide.

The self-learning system learned about trends as well as the customer, hence, the recommendations were personalized. Outfitter is the result of several patented technologies:

01	It combines a proprietary fashion rules set with data science technologies, including Computer Vision and Machine Learning.
02	The key to Outfitter's performance is in the ability to extract features from images and run these features through a rules engine to provide appropriate recommendations.
03	These recommendations are provided in under 0.5 seconds.
04	This self-learning system is highly scalable and can be easily integrated with other systems.

Impact

The performance of Streamoid's product recommendation system impacted several key metrics of Abof.com. The results of the solution post the implementation indicated that customers who utilized the Outfitter were 20 percent more likely to stay on the website after visiting, spending 21 percent more time, and were 60 percent more likely to purchase. The implementation led to a 6-times increase in conversions, 31 percent increase in basket size, and 38 percent greater revenue.
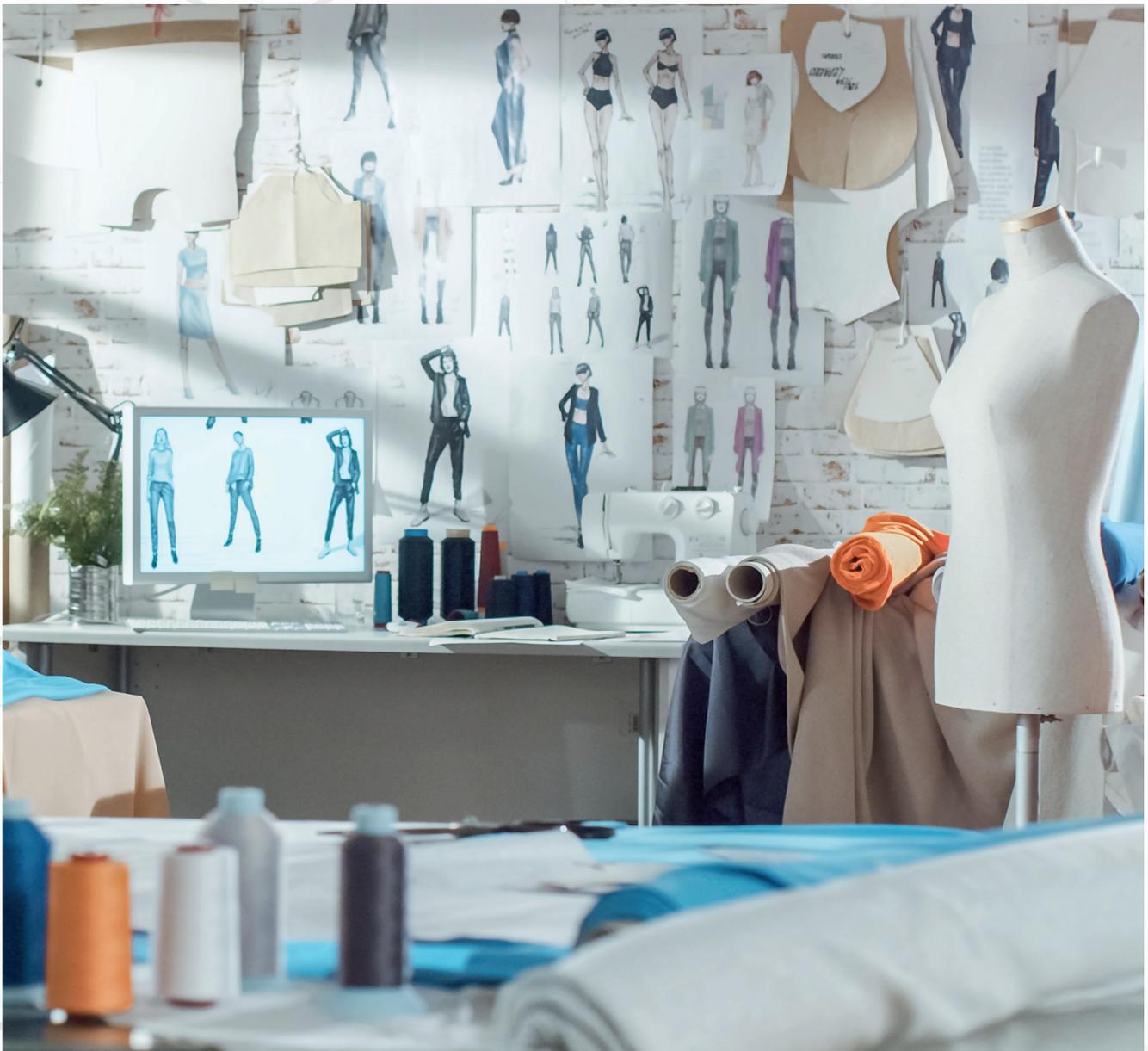
AQUACONNECT: AI-POWERED FARM ADVISORY FOR AQUA FARMING COMMUNITY

Problem

Aquaculture is the practice of breeding, raising, and harvesting fish, shrimps, shellfish, and aquatic plants. This practice could evolve into a viable commercial farming practice in India, with an export value of $5 - $7 billion. in 2018-2019, and an annual growth rate of 10-15 percent. However, the industry lacks the technology adoption and efficiency. Around 2 million rural farmers in coastal communities are involved in aquaculture - the farmers typically follow traditional farming practices, which prevents them from achieving production efficiency or predicting/preventing the spread of diseases. The shrimp farming industry comes with two main challenges — high production costs and disease outbreaks. Breeding of shrimps is usually carried out by these smallholder farmers who are not equipped with the latest technology or knowhow to farm shrimp. Furthermore, aqua farmers struggle to manage water quality and diseases, and most of the time are unable to make informed decisions during their daily operations. Lack of data is a critical challenge that the industry needs to address. Some other challenges include procuring good quality feed, ensuring regular healthcare inputs, and prompting prospective buyers to purchase the harvested catch.

Solution

To eliminate these problems and omit the multiple layers of distribution, Aquaconnect, a full-stack aquaculture technology company, developed an AI-powered data-driven marketplace for the shrimp farmers to connect with the dominant companies of the sector. To address the overall challenges Aquaconnect built AI models that analyzed the pond level data continuously such as the "Morby-mass" model, pond health monitoring model, healthcare management model, growth prediction model and feed optimization model. The team at Aquaconnect developed an AI-based app — FarmMOJO — that advised small scale shrimp farmers by tracking the farming practices and identifying any drawbacks that required attention. Aquaconnect's mobile application FarmMOJO utilized Big Data and Artificial Intelligence (AI) to advise farmers on their pond operations based on constant monitoring of water quality, feed intake, disease outbreak indicators, and biomass conversion (which indicates the efficiency of farm feeding strategy).

The app leveraged machine learning technology to provide relevant insights to farmers and suggested appropriate advice for better productivity. The data intelligence capability connected farmers with industry players including food and produce processors, certification agencies, and feed and healthcare producers - this capability enabled the farmers to optimize their supply-chains and created a sustainable procurement process with traceable information. It also connected the farmers with financial institutions to enable crop insurance facilities.

Impact

FarmMOJO is helping shrimp farmers in the optimization of feeding, disease prediction and control and water management. It ensures effective feed usage and biomass conversion in shrimp farming. The AI-powered farm advisor — FarmMOJO — helps the shrimp and fish farmers enhance their farm productivity and increase their farm income by 5 percent. Alongside, it also simplifies the farm operations and improves efficiency, predictability and transparency.The overall approach helped shrimp farmers improve disease prediction rates and accuracy, boost production efficiency, produce higher quality shrimps, increase profits and reduce dependency on external sources for daily operations. During the pilot, FarmMOJO predicted diseases across more than 120 ponds; and helped farmers take corrective actions and minimize the losses.

Currently, FarmMOJO works with 3000 shrimp farmers from states like Andhra Pradesh, Gujarat and Tamil Nadu, however planning to expand its operations by adding 5800 ponds across India. Aquaconnect has partnered with IDH - Farmers In Transition (FIT) to advance its prediction and disease control in Indian shrimp farms. This partnership will support 350 hectares of aquaculture production in Tamil Nadu and Andhra Pradesh. It has also associated itself with Solidaridad's Sustainable Aquaculture Initiative in Odisha to provide data-driven shrimp farming advisory services to 2000 hectares.

CROPIN: AI-POWERED CLIMATE CHANGE AGRI-ADAPTABILITY PLATFORM FOR THE INDIAN FARMING COMMUNITY

Problem

Adverse climate change is a threat to sustainable farming as it leads to soil degradation, drop in crop yield, and lower quality of produce; it also increases the attacks by pests and insects. As per an Indian Council of Agricultural Research (ICAR) report, a reduction to the extent of 9 percent in agriculture yields are expected in the medium term (2010-2039) because of climate change. This calls for swift adoption of climate resilient agriculture practices. Among the developing nations, India is one of the biggest agro-based economies in the world, where nearly 70 percent of rural households rely on it for their sustenance. Given that Indian farming is still dependent on weather and climate cycles for planting, irrigating, and harvesting crops, the problem of adverse climate change is all the more severe for the Indian farming community. There is an overwhelming need to utilize technology and smart farming solutions to build climate resilience for the Indian farmers.

Solution

CropIn Technologies was selected as the Agtech partner in a public-private project with the Government of India and the World Bank for developing agriculture technology to build climate resilience. The project spanned an area of 1650+ hectares. CropIn developed a holistic solution for the project in an effort to combat the effects of climate change. The overall solution covered 5 modules, of which 4 were relevant to the farmers:

- **SmartFarm** was the farm management solution that enabled digitization of farms. This enabled quicker decision with the help of prescriptive, predictive, and descriptive data analytics. The module mapped and calculated farm data through geo-tagging and area auditing of the farm plot. The module also captured data on the seed varieties and crop stage information. The data was analyzed by the system and accurate measurements were carried out for the farmers - right from seed selection to harvest. This saved the farmers' time and provided accurate data on the entire seed to harvest life cycle.

- **SmartRisk** was an intelligence solution for agri-business leveraging agri-alternative data and provided risk mitigation and forecasting. A machine learning algorithm provided insights on weather data at the farm/village and regional level.

- **mWarehouse** enabled farm to fork traceability and compliance, quality control and flexible inventory management. While the solution was developed for food/agri processing and export companies, it benefited the farmers as well, as the farmers/producers had a bird's-eye view of the end-use of their produce.

- **AcreSquare** was a mobile application that enabled companies/cooperatives to directly interact with farmers - these organizations were able to reach out to farmers to educate, share content, and provide consultation. This enabled companies to build trust with the farmers, without the intervention of intermediaries.

Impact

CropIn's climate smart advisory module developed season-wise crop configurations for all the major crops. CropIn helped schedule and monitor farm activities to implement complete traceability of the produce/harvest. Seven-day weather forecasts were derived from the best available weather observation systems and forecast models, and provided to the farmers. CropIn helped educate farmers on adoption of the right package of practices and inputs. CropIn helped devise systems for monitoring crop health and harvest estimation. The project empowered farmers to adopt climate resilient practices and adapt to the climatic changes and unpredictability. As a result of the project, 12,000 plots were digitized. Approximately 8300 farmers impacted, with an adoption rate of 90 per cnet.

CREDITVIDYA: AI-POWERED INCOME ASSESSMENT SOLUTION FOR NON-BANKING FINANCE CORPORATION (NBFC)

Problem

Accurate assessment of income is critical a step to approve and disburse a loan. This process plays an important role in determining the ability to repay, which is critical for underwriting unsecured loans. Lenders typically have two methods for determining the income of a loan applicant:

- **Physical Verification -** Physical verification through bank statements and other supporting documents. This is a cost-intensive process, and requires numerous follow-ups with the customer. In most cases, the customer withdraws the application because of the amount of time taken and the number of documents required for verifications. This leads to high drop-offs.

- **Bank Statement Extraction -** Tools for this purpose, such as Statement Scrapers, are available for barely 10 percent of the population. The accuracy is low and the results are not real-time. In most cases, customers are required to provide their bank ID and password so that the lender can access their statement records - this leads to customers withdrawing from the process altogether.

A leading NBFC was using a bank statement extraction to determine the income of potential borrowers. This process was cumbersome and time consuming for the NBFC causing a long delay in loan disbursal.

Solution

CreditVidya was onboarded to provide a solution to determine the income of the borrower. Its tool IncomeX has revolutionized the process of income determination for lenders. Unlike scraping tools, IncomeX is based on the extraction of alternative data to which a deep neural net model is applied. Embedded in the app of the lender, the algorithm identifies an individual's income with >90 percent accuracy.

The product has two components:

- **TrueSalary:** This system accurately identifies the income of the individual
- **Income group behavior:** This system places the individual within a likely income band, with 90 percent accuracy, when the data is insufficient to predict the exact income

IncomeX enabled the lender to assess the incomes of 8 times more users compared with the existing bank statement scraping tool.

Impact

Once the solution was implemented, there was no need for uploading documents or physical verification. The Turn-Around-Time (TAT) for determining the income of the loan applicant was reduced from over 24 hours to under 1 minute. The implementation of IncomeX enabled the lender to assess the income for about 8-times more users as compared with the time and resources taken for the existing bank statement scraping tool.

ARYA.AI: AUTOMATED INSURANCE UNDERWRITING SOLUTION FOR INSURANCE PROVIDERS

Problem

Insurers have multiple data and information sources for any product, service or customer. These sources needs to be carefully analyzed before applying the data for any policy or claim. Moreover, this analysis needs to be carried out across all stages of the insurance service - Distribution, Risk Selection, Underwriting, Policy Servicing, Claim Intimation, Claim Admissibility, Claim Adjudication and Settlement, Fraud Prevention and Monitoring. Insurance service providers have, so far, been utilizing rule-based systems and manual interventions to carry out this analysis. But, with the increase in the number of customers, types of customers and insurance products, claims, and even fraud cases, the data and data types have exponentially increased - the analysis of this data has become a cumbersome task for all insurance service providers. Even with digitization, the problem has not been mitigated, and the amount of manual intervention has doubled over the years.

Solution

To address this problem, Arya.ai utilized a predictive system - Libra - that was powered by Artificial Intelligence and Machine Learning. Arya.ai has pioneered the use of AI/ML in financial services - Arya's Insurance Stack — Libra has been developed specifically to automate the key functions in the Insurance sector. Libra provided an autonomous AI product stack for insurance companies to automate the key business functions. The system was trained with specific data from insurers and customized as per the needs of the business.

Impact

Post the implementation of the solution, there was increase in efficiencies in the underwriting and claims management processes - efficiencies increased by 50 percent to 70 percent respectively. There was improvement in customer turnaround times. Decisions, by the system, were taken in less than a second - this improved the level of satisfaction of the customer and the sales channels. The process of decision making was standardized. In a manual system, the judgment and analysis would differ across experienced underwriters and claim managers, and novice underwriters and claim managers. The modules provided complete uniformity in decision-making, thereby improving sales confidence and customer delight. Over a period of time, the insurance service provider's portfolio improved. The service provider plans to partner with Arya.ai to extend the product modules to cover upstream and downstream processes - this would bring all the aspects of the insurance company's business and operations under the AI/ML Libra solution.

CULTYVATE: DEVELOPMENT OF A SMART IRRIGATION SYSTEM BY CULTYVATE FOR INDIAN FARMERS

Problem

Improper crop watering and nutrition management are two primary causes of poor harvest quality. In India, the cultivation of 70 – 80 percent of the crops is reliant on rain or flood irrigation. To get the optimum yield, a farmer typically considers 10-12 parameters before reaching a decision on the precise watering and nutrient management schedule. The excessive reliance on seasonal/climatic water supply results in a low yield during periods of lower rainfall. This increases the probability of a bad harvest coupled with pest infestation and disease. Any shortfall in the harvest yield causes a loss of revenue to the farming community. For example, sugarcane - a crop heavily reliant on regular irrigation and water supply. Traditionally, an estimated quantity of 22 million liters of water per acre per year needs to be supplied through flood irrigation to yield a successful sugarcane harvest of an average yield of 40-45 tons per acre.

Solution

CultYvate's Smart Irrigation System leveraged IoT, Predictive Analytics, and AI to calculate the precise amount of water required for crops. The system utilized 2 types of parameters to provide automated irrigation solutions:

Static parameters, such as crop type and soil type

Dynamic data points, such as crop age, amount of water irrigated in previous seasons, wind speed, and the amount of sunlight, among others

Once the data was collected, a complex algorithm analyzed the data to identify the optimum water to be supplied to the farm/crop. The water supply was managed by regulating the power supply voltage - the power supply adjusted the water flow to the farm/crop. This ensured the ideal amount of water to be supplied for the crop. CultYvate's system leveraged a combination of electrical systems, which included soil sensors, flow meters and valves. The data from these systems was combined with satellite data to identify the precise watering schedule. Wireless and battery-operated controllers were utilized to run the electrical system even without regular electricity/power - this ensured that there was seamless transmission of data to the cloud. The AI engine was developed after analyzing data from millions of similar use cases. Data from the use cases was used to develop specific and customized automation controls. The machine learning algorithms constantly analyzed the data from the farms. After the implementation of CultYvate's smart irrigation system, farmers received soil moisture alerts on their smartphones.

Impact

The system calculated the soil moisture to decide the optimum water requirement - this saved time and precious water and human resources, and maximized the crop yield. The system's advanced sensors and technologies kept track of water usage and saved large quantities of water. Farmers were able to check the ground level data on their smartphones to monitor and assess the watering of the crops. The smart farming technology kept the farmers updated through the various stages of growth of the crops. With the implementation of CultYvate's Smart Irrigation System, the water consumption for sugarcane farms was reduced by approximately 50 percent, while the yield increased by 100 percent. The farmers were able to grow close to 105 tons of sugarcane per acre by utilizing only 12 million litres of water per acre per year. The system was also suitable for such crops as grapes and pomegranate - crops that require precise watering - that varies depending on the season and soil type.

INTELLO LABS: DEVELOPMENT OF AN AI SOLUTION TO ASSAY AGRICULTURAL PRODUCTS

Problem

Quality assaying is a crucial aspect of the agricultural supply chain. This step has traditionally been performed manually. As a consequence, the results have been subjective, time-consuming, and open to malpractices. The fruits and vegetable wholesalers and retailers across Mandis required an easy-to-use, scalable, and reliable assaying system that could be implemented at all National Mandis. While labs and even semi-portable machines were alternatives to the manual process of quality assessment, these solutions are expensive and have limited capacity. This was the reason that the Mandi Associations were looking for a viable quality assessment solution that provided results in a digital format.

Solution

To address this issue, Intello Labs, an agri-tech start-up, developed an AI-based platform to grade and monitor the quality of agricultural commodities. The platform utilized computer vision and deep learning technologies. Intello Labs provided an image-based solution that delivered results on a smartphone app. This brought transparency and standardization to the process of quality assessment and reduced the risk associated with the long agriculture supply chain. Through an image taken from the smartphone of the agri-product, the application tested, analyzed, and graded the visual quality parameters of the product. The farmers could upload the picture of their yield directly onto Intello's system through the mobile app. The advanced algorithms would examine the photo of the commodity and provide a rating based on a set of USDA approved criteria, including color, size, and visual defects. With the algorithmic rating in place, each party in the value chain was aware of the quality of the commodity on sale, and could accordingly set the prices. The platform and corresponding results were hosted on the National Agriculture Market or eNAM - the online trading platform for agricultural commodities in India.

Impact

The app caters to all members in the agri supply chain, including growers, packers, aggregators, exporters, foodservice, and retailers. In 2019-2020, the app offered services for testing and grading wheat, tomatoes, potatoes, onions, and cardamom. Six or seven more commodities are scheduled to be added to the assaying portfolio, including coffee, tea, and grapes. The solution has reduced the testing time of the quality of the agri-product from 15 minutes to 2 minutes, with an accuracy rate of more than 95 percent.

DECIMAL TECHNOLOGIES: AI-DRIVEN LEAD MANAGEMENT SOLUTION FOR INDUSIND BANK

Problem

IndusInd Bank was seeking to implement an automated, end-to-end lead management solution to create, process and track sales leads from generation to conversion. The bank further sought to digitize the customer follow-ups, track workforce productivity, improve lead tracking, and receive real-time insights on various parameters aimed at enhancing the performance of the bank's sales agents.

Solution

Decimal Technologies, a fintech startup, offering various mobile-based applications for business requirements, developed an AI-driven lead management and activity management platform. Decimal implemented a fully digital, end-to-end lead management system for IndusInd Bank's sales team - the solution was delivered as an on-the-go mobile application. The solution enabled real-time dashboards for performance tracking, generation of One-time Passwords (OTP) to authenticate the sales and client meeting process, geo-tagging/geo-fencing of leads, and an AI-driven system enabling the auto-allocation of leads to various sales channels and agents. The appropriate allocation of tasks and leads was implemented by a combination of linear programming and business rules. The leads were determined by combining ML algorithms and utilizing data on 8 sourcing channels, 44 financial products, and 150 product variants. Moreover, Decimal Technologies utilized the AI-engines as microservices and APIs. This enabled the majority of the algorithms to be applied across different use cases.

Impact

After implementation, IndusInd Bank was able to manage leads in excess of 9 million, covering the various channels and products. IndusInd bank's sales force witnessed an improvement in efficiency and productivity leading to a cost competence. This efficiency enabled the bank to double its sales team. IndusInd bank was able to develop a central repository for customer interaction data to enable cross-sell and up-sell opportunities. The lead management system could also be integrated with Decimal Technologies' other AI-driven platforms including a recommendation-driven loan approval platform, and an e-KYC solution.

VPHRASE: AUTOMATED REPORTING PLATFORM FOR HDFC BANK

Problem

HDFC Bank has a wide branch distribution network comprising Branch Banking Heads (BBH), Regional Heads (RH), Circle Heads (CH), Cluster Heads (CH), and Branch Managers (BM). To increase customer satisfaction and RoI across digital channels, the Branch Banking Heads (BBH) monitored the performance of branches within their allocated region. This process started with the Branch Managers receiving a branch performance report.

The reports contained large volumes of data, tables, and charts to indicate the performance of products, channels, and branches. The Branch Managers were required to manually analyze the numbers, compare it with monthly allotted targets, and interpret the data to share with their respective Cluster Heads. The Cluster Heads followed the same process of manually collating the branch performance reports into one comprehensive report. This was presented to the Circle Heads. This process was mirrored and followed right up to the Branch Banking Heads.

This system of report creation and analyzing data was time-consuming and inefficient. The managers at various levels spent hours collating data, interpreting insights, and creating personalized reports for the next in-line manager. The manual effort substantially slowed down efforts in core banking operations and overall deliveries. Overall, HDFC Bank identified 4 issues with this process:

- Cumbersome manual data extraction for report creation

- Lack of personalized reports across branches

- Branch employees spending too much time analyzing and interpreting the data

- Branch Banking Heads unable to perform a quick analysis of sales performance
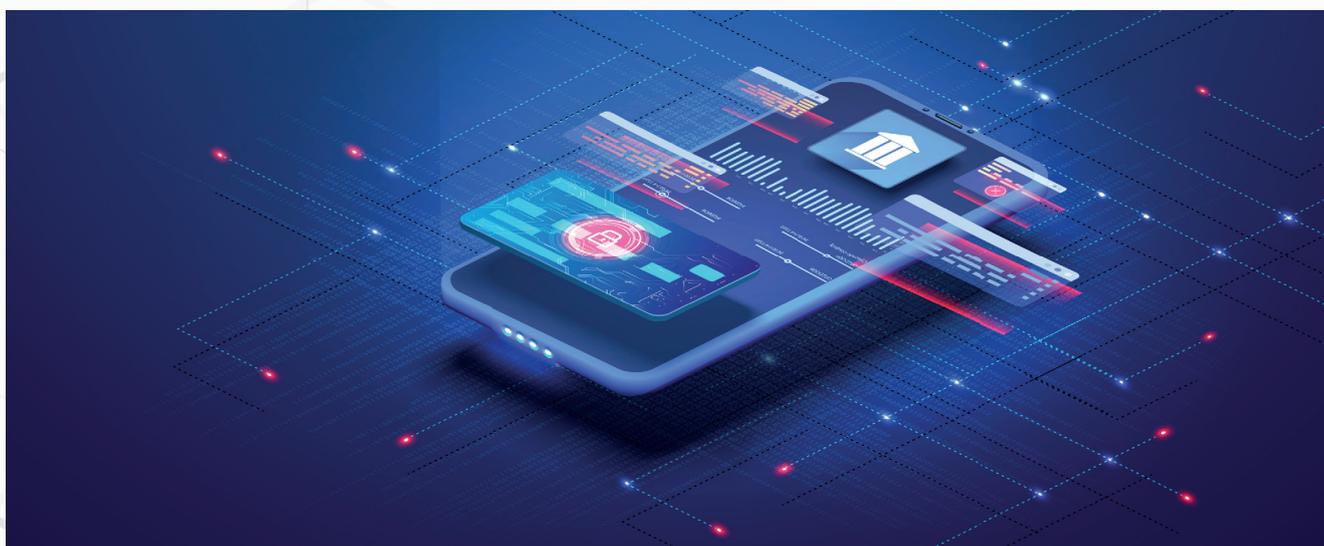
Solution

To address the reporting deficiencies, vPhrase, a pioneer in Reporting Automation and Business Intelligence, implemented Phrazor, a Natural Language Generation (NLG) platform for HDFC Bank. The platform enabled the automation of the internal reporting process and report writing. The solution sourced data from MIS, multiple datasheets, and files, and facilitated the generation of on-demand reports with summarized insights. The automated platform provided a comprehensive overview of the sales and performance of the branches and digital channels. Phrazor utilized natural language techniques to automate the writing of reports, thus saving time from analysis to report writing.

Impact

The Senior managers could easily identify the performing and non-performing branches and employees based on the KPIs. The management could compare the performance of each branch against allocated monthly targets and other regions at a granular level, and identify shortcomings and other sales opportunities. Phrazor enabled HDFC Bank achieve the following benefits and efficiencies:

Minimize manual efforts in report creation	Effectively monitor and evaluate employee productivity across every branch	Analyze and set realistic targets for different divisions	Improve the levels of speed and data accuracy within each branch	Make data-driven decisions to increase customer satisfaction

The solution enabled the generation of 6,250 reports each month for all Branch Managers. The time taken to generate a monthly report was reduced to 5 days. Also, 450 man-hours were saved through the entire process.

LOCUS AI: AUTOMATED AND INTELLIGENT ROUTE OPTIMIZATION SOLUTION FOR URBAN LADDER

Problem

Urban Ladder, founded in 2012, is a curated online furniture seller. It procures or manufactures the furniture, and delivers the furniture to locations within India. Initially, Urban Ladder used a manual process for planning the logistics and delivery. The delivery agents were given a list of orders on paper and they were expected to decide which optimum route would enable the fastest deliveries. The company and the logistics providers faced problems related to load balancing and assessing which vehicle should be utilized for which orders - this manual process was carried out to meet delivery promises made to customers within the promised delivery and installation time. The manual process was cumbersome and time consuming. Moreover, there was no possible way for the company to keep track of the delivery agents except through mobile phones. The manual shipment process significantly increased error rates, processing times, human resource costs, and additional overhead costs. The manual delivery process was unable to efficiently solve the issues related to variability in the product volumes and multiple customer delivery points.
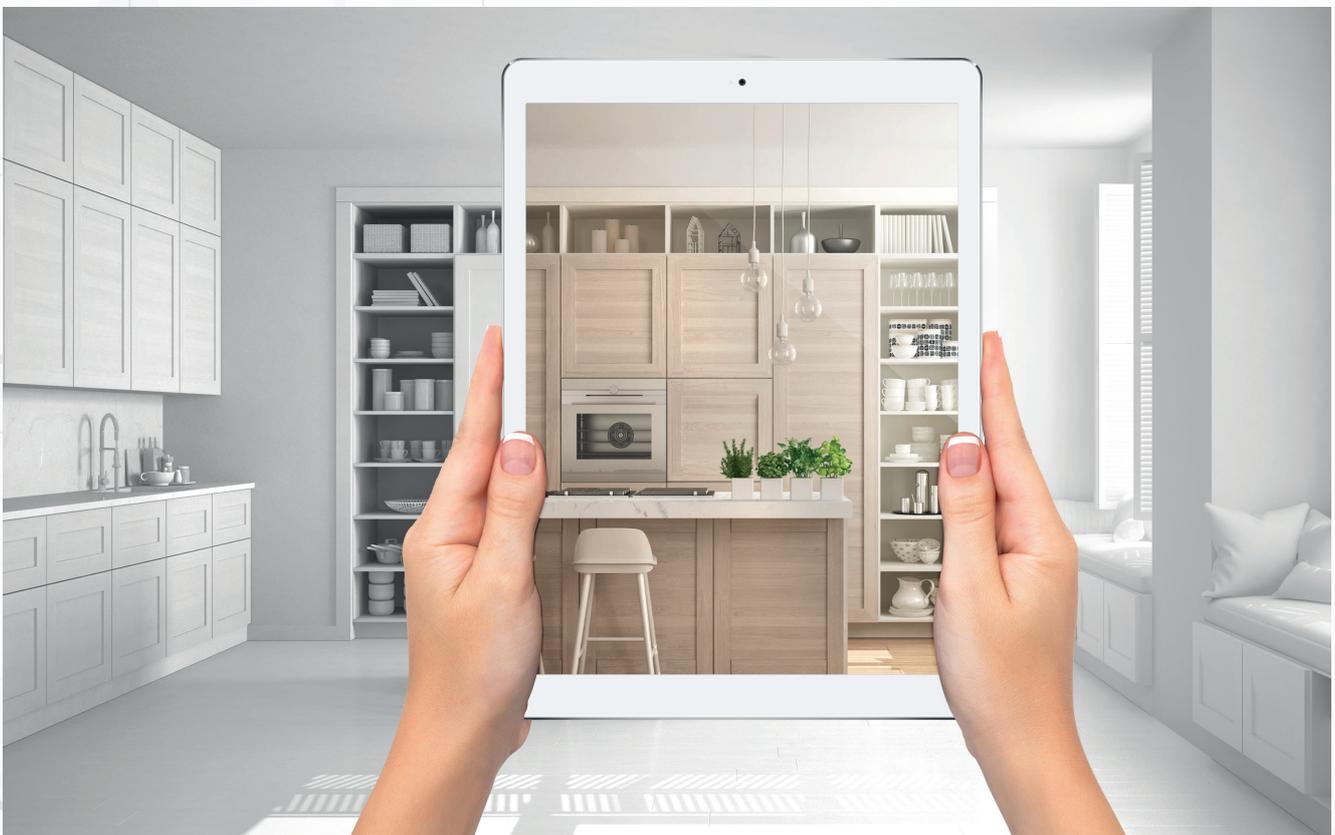
Solution

Locus AI implemented the Intelligent Retail Automation Solution for Urban Ladder - to simplify logistics and optimize operations. The solution included a complete algorithmic automation platform from the point of dispatch till the order reached Urban Ladder's customers.

01 The solution was an advanced route optimization solution for material dispatching.

02 The solution enabled automatic shipment sorting and rider allocation and intuitive and dynamic automated packing plans.

03 The platform enabled automated beat planning, real-time tracking, insights & analytics.

This solution solved the problem for last mile delivery optimization. Locus AI's powerful dashboard enabled Urban Ladder to track the shipments with live tracking and intelligent alerts - the alerts highlighted events that required the most attention. As and when Urban Ladder had to deliver a furniture item(s), Locus AI solution plugged into Urban Ladder's Order Management System (OMS), analyzed the deliveries, and automatically identified the optimum vehicles and routes. The solution also identified the preferences of the customers' delivery time by analyzing the OMS. The comprehensive system factored in hundreds of business variables based on the requirement of each customer. The system classified the Urban Ladder's requirements as Single Pick, Multi-Drop (SPMD) logistics requirement. Urban Ladder's warehouse managers were provided a complete view of the field workforce through the dashboard. Urban Ladder's customers were also able to track their orders live through a tracking link.

Dispatch Automation: along with these solutions, it enabled the management of deliveries with several automated features including: automated smart dispatches and fleet visualization as well as proprietary route deviation engine that analyzed the routes for quicker deliveries. Locus AI offered the entire logistics technology stack in the form of a PAAS (Platform As A Service.)

Impact

Locus AI enabled Urban Ladder to automate the logistics operations and optimize last-mile delivery costs, improve delivery performance and most importantly, enhance customer satisfaction levels. Urban Ladder was able to carry out on-demand deliveries that were scheduled prior to the actual day of the delivery. The systems provided logical route planning and load balancing solutions for the entire logistics process. After 3 months of implementing the solution, Urban Ladder was able to improve productivity and efficiency by 25 percent.

CONSTEMS AI: AUTOMATED AND STANDARDIZED GRADING INSPECTION SYSTEM FOR ITC

Problem

ITC's Agri-Business Division (ABD) is one of India's largest integrated agri business enterprises with significant presence across every node of the agri value chain. The sale of tobacco leaves to domestic and international customers (cigarette manufacturers) is a major revenue stream for ITC's ABD. Each customer has specific requirements for leaf tobacco - these requirements are achieved by blending different kinds of leaves together. As tobacco is an agri-produce, there are massive variations found in the leaves year-on-year.

Customers placed sales orders against specific tobacco grades. The grades required by the customers were based on specific parameters, such as color, ripeness, size, and texture, to name a few. Thereafter, every order of tobacco placed by a particular customer had to comply with the customer's initial grade requirements. Customers expected consistent product grades with every sale, which made the blending process critical. Hence, before a given sale, it was important that the grades (packaged in tobacco cases) were inspected for compliance with the customers' requirements. The manual process of grading was time-consuming and highly subjective. Personnel deployed for the manual process were expert graders, and managed to inspect only 10 percent of the total number of tobacco cases at the processing plant.
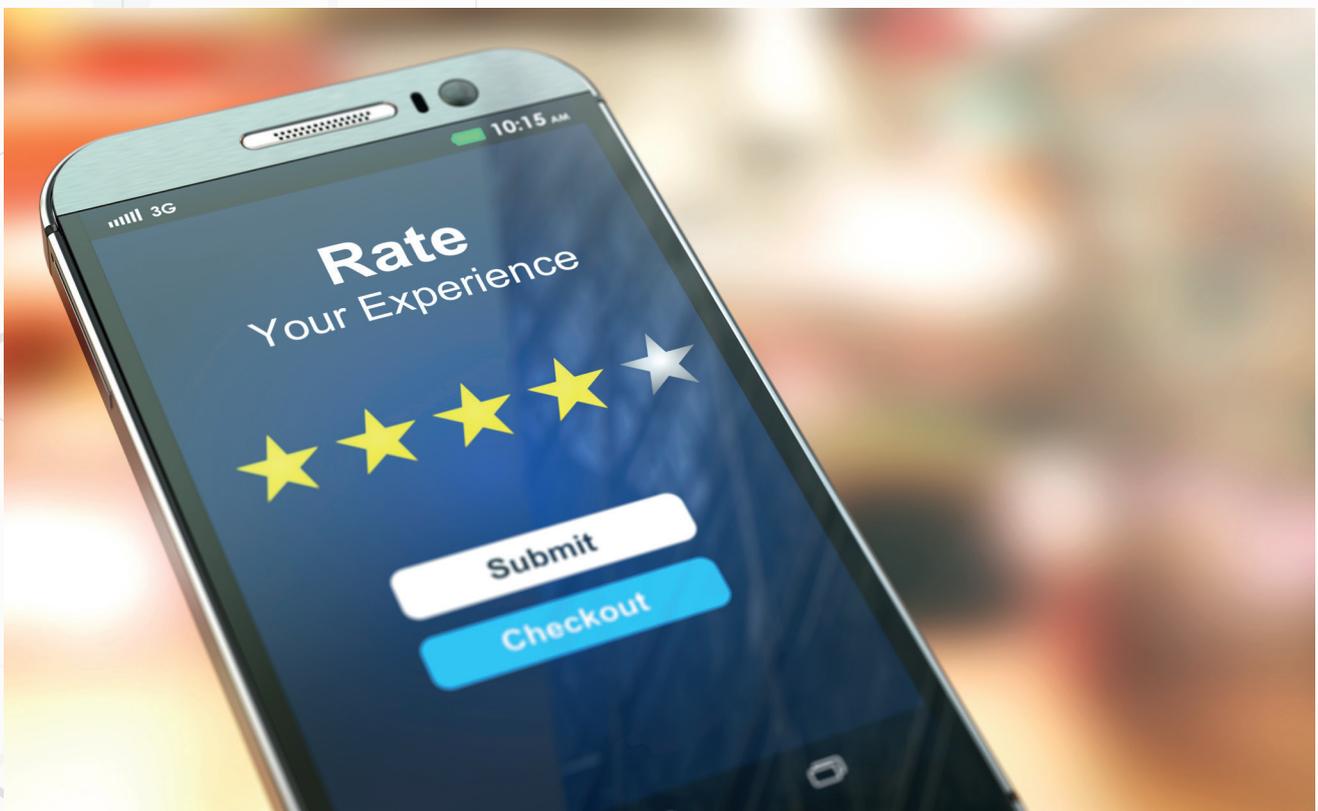
Solution

A robust quality check and AI/Computer Vision (CV) system was required to ensure that the tobacco cases processed were physically compliant (in terms of identified parameters to grade tobacco) with the customer's approved tobacco grades. For this purpose, Constems AI (CAI) developed a base level machine learning model. This was carried out by utilizing a data set of more than 1500 images of tobacco (leaves) grades.

Constems' AI-based packaged tobacco inspection system, consisted of three modules:

- CAI's core module - the AI grading application
- CAI-UI's software module - user interface
- CAI-reporting system - a reporting module for the ITC project management team - this system generated the analytics for the inspection. The reporting module also provided other predictive results for strategic planning

The system had a high-definition camera, which was custom-designed and mounted with a pneumatic arm on each of the production lines. This was operated in-sync with the tobacco-case production and inspection cycles.

Impact

The solution enabled the maintenance of product quality by minimizing manual involvement in the inspection process. The solution significantly reduced costs by reducing the personnel time taken during the daily inspection process with 1 to 2 manual graders per-line. The solution enhanced efficiency by grading 100 percent of the tobacco leaves instead of the 10 percent carried out in the manual process. The solution made the real time inspection of all 100 percent tobacco (leaves) cases.

TARTAN SENSE: WEED REMOVING ROBOT FOR INDIAN FARMERS

Problem

Weeds are harmful to crops and farming in general. Weeds compete with the desired crops for the resources that the crop typically needs, including direct sunlight, soil nutrients, water, and space for growth. Hence, the growth of these undesirable plants in a field diminishes the yield as well as the quality of crops. According to a study published by the International Journal of Weed Biology, the crop losses caused by weeds are the highest at about 32 percent - higher than pests, 18 percent, and pathogens, 15 percent. Farmers, therefore, need to spend a lot of time and money on regularly removing weeds (weeding) or spraying weedicides.

Solution

Bengaluru-based agritech startup, TartanSense, developed a small, land-based robot rover to carry out weeding and pest control. The solution was deployed as pilots across many states, including Karnataka. It has also been provided to agri co-operatives and large farming/agri companies. The robot, named Brijbot, moved in the farm, identified weeds, and sprayed the targeted weed with weedicides and pesticides.

The functionality of the system utilized several AI and Autonomous technologies:

- The rover autonomously traveled across the fields with a downward facing camera mounted on it.
- The AI/ML system identified the weeds using Computer Vision.
- The system was trained with images of both crops and weeds, so it could automatically differentiate between the two groups.
- Once the weed was identified, the robot automatically sprays weedicide and pesticide on the plant, through a precision sprays system.
- Brijbot sprays the chemical only on the detected weeds.

The product has been designed to move around narrow Indian farms for long hours. The rover is also equipped to gather land-based data (including crop health and soil quality) and generates reports with actionable insights for the farmer. TartanSense offers the robot as a subscription service to farmers as opposed to a direct sale.

Impact

During the pilots, Brijbot carried out weeding for eight hours a day with zero manual intervention or monitoring. The weedicide/pesticide was sprayed with a precision of about 3 cm, this reduced the usage of chemicals by 50 to 70 percent - reducing costs and protecting the crops. The robot removed weeds for an entire acre in an hour; alternatives take at least half-a-day per acre - the robot thus increases weeding efficiency by 700 percent.

ARTIVATIC: AI UNDERWRITING PLATFORM FOR LIFE INSURANCE SERVICE PROVIDERS

Problem

Life insurance companies are regulated by IRDA (Insurance Regulatory and Development Authority) in India. Moreover, life insurance companies utilize legacy processes, systems, and risk assessment models, along with rule-based outcomes. These outdated processes and systems increased the challenges for the particular life insurance company - as the redundant processes caused a loss in customer confidence and revenues. Additional detrimental impacts of the legacy systems included increase in risk & fraud and longer processing times for claims and refunds. Lack of data insights was a significant barrier for the data-driven risk, profiling, and decisions of the insurance service provider - and was impacting the underwriting process of the insurance provider. Moreover, the rule-based system was not adequate or smart enough to tackle changing customer data, regulatory compliance, customer behaviour, competitive environment, and overall customer needs. Overall, outdated systems and processes resulted in poor product planning and creation, and detrimental customer benefits. More than 70 percent of the operations of the insurance provider were manually run - this led to errors, poor experience, and increase in labor costs. Overall, the Life Insurer was facing the following challenges in the manual process: a turnaround time of more than 2 days, less than 20 percent data-driven insights - moreover the manual insights process was error-prone, a manual system with no dynamic scoring and no risk profiling. The insurance provider wanted to replace its manual and legacy process with an ML-based dynamic decision system.
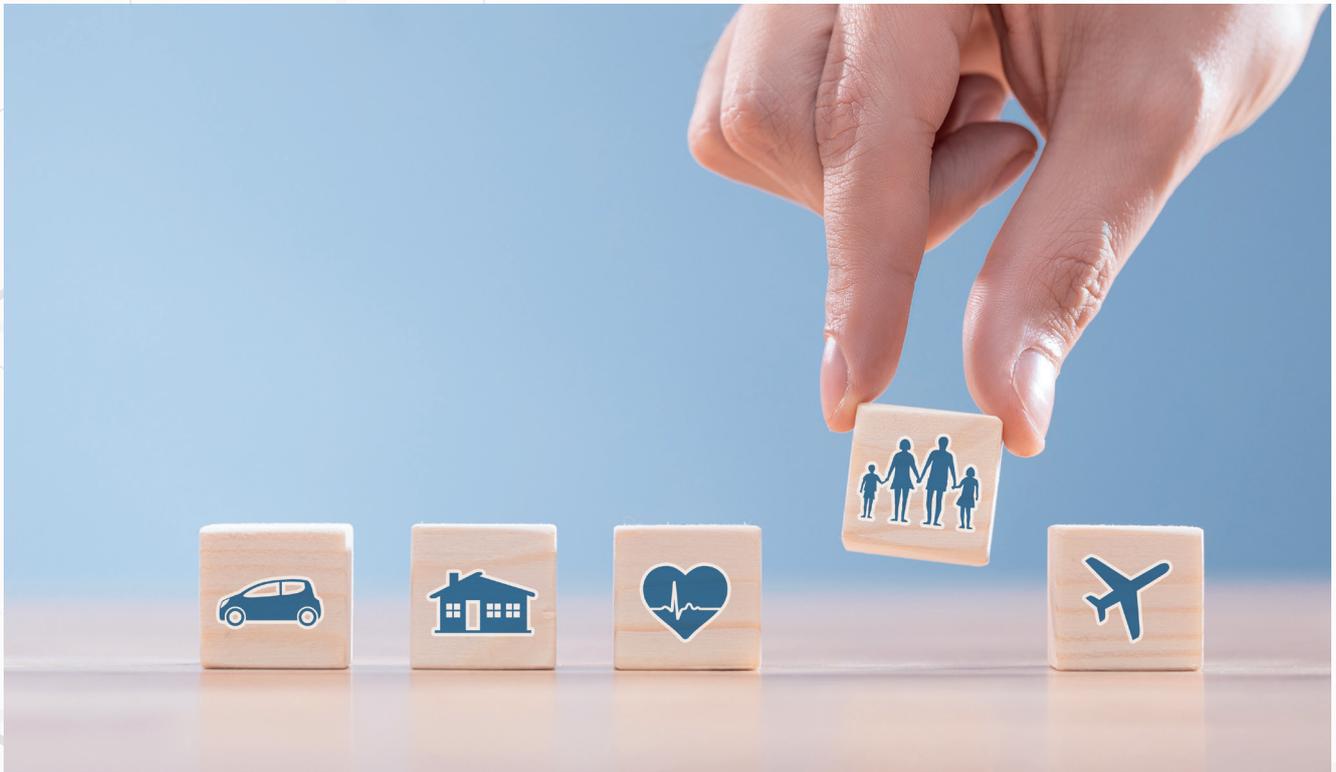
Solution

The Life Insurance Provider wanted to improve the complex underwriting process both for medical and financial underwriting. The insurance company sought the services of Artivatic for this purpose - Artivatic implemented AUSIS (AI Underwriting Platform) for the Life Insurance provider to transform the complex underwriting journey to a simple, automated, and real-time process.

Artivatic provided an end-to-end automation solution to understand the customers from a 360-degree perspective. The automation solution utilized third party, government, device, and other data points to build a 360-degree risk scoring, fraud and decision system. The solution provided a customer credibility score to instantly assess the customer's viability. The solution utilized dynamic ML-based learning and self-reliant rule-based engines to perform the complex processes.

The solution predicted financial and health risk and provided insights on fraud to better assess the premium, benefits, and cover for the insurance customers. The automation was enabled by STP (Straight-through Processing) that carried out most of the manual transactions in one pass. Straight-Through Processing ("STP") is a mechanism that automates the end-to-end processing of transactions of various financial instruments. It involves the use of a single system to process or control all elements of the work-flow of a financial transaction, including Front, Middle, and Back office, and General Ledger operations. STP can be defined as electronically capturing and processing transactions in one pass, from the point of first 'deal' to final settlement.

Impact

The automated underwriting through STP for underwriters assisted the insurance company to cut-down the policy issuance time. The seamless and real-time underwriting decision system processed policies in less than 180 seconds. The solution provided real-time scoring and decision making from multiple data points. The process of policy issuance, in-depth risk scoring, and fraud insights was 100 percent automated. The policy issuance process was automated with in-depth reasoning.

VERLOOP.IO: CUSTOMER SUPPORT AUTOMATION PLATFORM

Problem

Nykaa, a fashion and beauty retail startup, is a go-to destination for online beauty and wellness. Nykaa offers a comprehensive selection of cosmetics, skincare, haircare, fragrances, bath and body, luxury and wellness products for women and men. Nykaa ensures a positive customer and buying experience. Nykaa, however, wanted to be constantly aware of the customer pulse. Moreover, customers were now preferring self-service to speaking to agents. Understanding customer's concerns/context is the key to an efficient self-serve. Previously Nykaa used emails and query forms to follow up with customers during a conflict resolution.

As this was not a viable option in the ever-changing customer service scenario, Nykaa decided to automate its customer support to focus more time on other important aspects of customer experience. Nykaa customer service executives spent over 32,000 staff hours a month answering and replying to support queries.

Solution

Nykaa collaborated with Verloop.io to increase customer engagement by solving customer problems over chat. Verloop.io implemented a solution in which Nykaa was able to use bot-qualified questions to handle repetitive requests - these included cancellations, returns, shipping inquiries, replacements, refunds, and payment issues. Verloop.io's broad range of integration options enabled Nykaa to experience a smooth transition while switching software systems (including Ticketing Software, CRM, among others). The automation and Verloop.io's Natural Language Understanding (NLU) modules were built equally on classical machine learning as well as modern deep learning ideas. The tools that were utilized for the implementation included spaCy, MITIE, and Duckling - these tools cover the main NLP-focussed toolkits. PyTorch and Tensorflow were utilized to develop the deep learning flows. The goal of utilizing AI and ML tools was to understand the user intent and respond to the queries in a personalized manner.

Impact

After implementing Verloop.io, Nykaa has been able to clear customer queries with deeper context - this has resulted in higher post-purchase customer satisfaction and improved customer loyalty. In the first 30 days of using Verloop.io, Nykaa handled approximately 1.6 million unique conversations. Customers were also given a button called 'Beauty Advice'. Once clicked, the conversation was handed over to one of Nykaa's in-house experts who would handpick products based on the customers' requirements, eliminating the need to manually assign conversations. This was feasible via the chat threads that Nykaa was able to create on Verloop.io to offer a personalized experience for its customers. Over 90 percent of the customers who participated in these conversations rated the Verloop.io bot as highly favorable or excellent.

UNBXD AI: ML-DRIVEN SEARCH PLATFORM TO BRIDGE THE GAP BETWEEN ONLINE AND OFFLINE RETAIL

Problem

Lenskart is India's biggest optical retail chain with over 500+ brick and mortar retail stores across 70+ cities. The organization, which combines in-store and online retail, had an annual turnover of over Rs. 4800 million in 2019-2020. The company recently adopted an omni-channel sales strategy, wherein it unified the retail store and online shopping experience, focusing on a unified sales catalog. This strategy has provided Lenskart's customers a large catalog of spectacles and optical options. The strategy, called 'Endless Aisle,' has enabled Lenskart to integrate its in-store and online retail services. It became imperative for the organization to implement a solution that allowed its customers to find the relevant product in the fastest time possible across both the channels. Lenskart sought an advanced AI and ML-driven search solution which recognized the user's intent and personalized the results for the customers.

Solution

Lenskart sought to provide its customers with the feature of searching for products from the convenience of their homes - this feature enabled the search of the both the online and in-store product range. The enterprise turned to Unbxd to implement the desired AI and ML solutions: Unbxd developed an AI-powered eCommerce recommendation engine.

The recommendation engine enabled the company to enhance its website experience across the online and in-store experiences. The online customers were able to get personalized recommendations for optical styles. The sales people were able to select the right products for the in-store customers. For online users, the AI-powered recommendation engine provided personalized search results to each query. These results were based on the user's browsing behavior and interest that the platform studies over a period of time. The AI and ML algorithms analyzed the customers' affinities and other data points to provide unique results for search queries. The AI model provided a personalization feature that offered smarter results in case of mistyped queries Unbxd's smart merchandising solution enabled Lenskart to customize the search results:

- The results did not show "Out-of-stock" products
- Models that went out of fashion – were pushed lower in the search results
- Lenskart's in-house brands were pushed higher in the search results ranking
- Lenskart was able to push the most relevant and high converting products to the top of the results list

Impact

Lenskart managed to maintain a seamless customer experience across online and offline retail. This strategy saved inventory and supply chain management costs. With Unbxd AI and Ml capabilities, Lenskart boosted their conversions and increased their customer lifetime value (CLTV) by inspiring customer loyalty. Lenskart also scaled its business by using brilliant merchandising tools and strategies. Lenskart saw an average increase in orders/conversions by 20 percent.

AGRI10X: A BLOCKCHAIN-BASED DECENTRALIZED PLATFORM FOR THE INDIAN FARMING COMMUNITY

Problem

In the agriculture sector, middlemen or traders often do not provide farmers with the optimum price for the harvest. Traders typically charge a 30-60 percent fee on the produce (agriculture commodity or harvest). After the produce is supplied to the trader, the farmers face a relatively long and protracted payment cycle - typical pay-out transactions take 45-60 days to fulfil. To shorten the transaction time and reduce the reliance on traders, a platform was required to bring farmers directly in touch with the buyers.

Solution

Agri10x developed a decentralized platform that created a transparent ecosystem and gave farmers greater autonomy over their harvest. The startup developed the world's largest digital agriculture e-Marketplace. The decentralized blockchain network, Agri10x, provided a secure data platform and prevented the possibility of any price manipulation. Initially, farmers from the state of Maharashtra were on-boarded to the platform.

The platform had in-built AI programs, and had such features as instant payment, quality assaying, competitive pricing, and storage and logistics support for farmers. The platform's in-built AI engine analyzed the data on the differential price of produce/commodity - the prices were procured from over 250 APIs. The platform then arrived at a set of maximum and minimum prices for that commodity. This was carried out through several algorithms, which took inputs from multiple factors. These factors included quality, transport costs, demand-supply trends, and commodity prices, among others. The entire suite of technologies was developed on a consensus-driven blockchain network. By utilizing NLP tools, the startup removed the communication gaps between the farmers and the traders.

Impact

Farmers who were on-boarded to the platform, traded directly with the buyers eliminating the need for the middlemen. Immediately after the sale was carried out, the respective farmer received a digital payment. Conventionally, there is 45-60 days wait period for farmers to receive the payment from the trader. However, the blockchain system ensured immediate disbursement of funds. Agri10x takes a 6 percent share from every transaction compared to the 30-60 percent commission that middlemen usually charge. The platform or marketplace connected farmers with buyers both in domestic and international markets. Agri10x thus assisted farmers to export commodities to various Southeast Asian and Middle East countries.

Since its launch, the platform has expanded beyond Maharashtra to pan-India, specifically to states such as Bihar, UP, Jharkhand, Karnataka and Tripura, to name a few. To spread awareness of this initiative, Agri10x has built an influencer campaign and called these farmers as influencers or 'Village Entrepreneurs'.

ACADEMIA

IIIT HYDERABAD: USING ML TO CREATE MORTALITY PREDICTION MODEL FOR COVID-19 PATIENTS

Problem

The COVID-19 pandemic has put immense pressure on the healthcare systems around the globe. In these times, it is crucial to assess risk so that critical resources can be mobilised to treat patients progressing to severe stages. Focused medical treatments can be administered only when there is a clear understanding of the risk factors that influence mortality the most. Therefore, it has become imperative to know early on in the diagnosis about the progression of the disease. Machine learning methods are capable of discerning useful patterns in large dimensional data that is expected to aid in the decision-making process of identifying, with high accuracy, patients who are at high risk.

Solution

Researchers from Centre for Computational Natural Sciences and Bioinformatics (CCNSB) at IIIT Hyderabad have developed an ML model for risk and mortality prediction of COVID-19 patients. A powerful combination of five features: age, neutrophils, lymphocytes, LDH, and hs-CRP, has helped to predict mortality with 96 percent accuracy. In their study titled 'Machine learning based clinical decision support system for early COVID-19 mortality prediction', the researchers have attempted to provide a mortality prediction as early as 16 days before the outcome. The outcome in this case is described as discharge from hospital or death. Various ML models (neural networks, logistic regression, XGBoost, random forests, SVM, and decision trees) have been trained and performance compared to determine the model that achieves consistently high accuracy across the days that span the disease. The best performing method using XGBoost feature importance and neural network classification, predicts with an accuracy of 90 percent as early as 16 days before the outcome. Robust testing with three cases based on days to outcome confirms the strong predictive performance and practicality of the proposed model. A detailed analysis and identification of trends was performed using these key biomarkers to provide useful insights for intuitive application.

Impact

This study provide solutions that would help accelerate the decision-making process in healthcare systems for focussed medical treatments in an accurate, early, and reliable manner.

WADHWANI AI: AI-BASED EARLY WARNING PEST SYSTEM FOR THE INDIAN COTTON FARMING COMMUNITY

Problem

In terms of output yield, cotton is India's third-largest crop after rice and wheat. Typically, 75 percent of the crop is grown by small holder farmers. One of the critical challenges the farmers face is managing pests despite the heavy use of pesticides and pheromone traps to catch pests. In the past, thousands of farmers from the state of Maharashtra, especially from the Amravati district, have had to flatten/destroy their entire cotton crop because of crop damage caused by the pink bollworm pest. Even after farmers switched to the genetically modified BT Cotton, which is resistant to pests, the problem persisted. Farmers were struggling with the lack of timely intervention and the shortage of expertise to handle such a situation. Typically, farmers depend on the Government workers who manually examine the pests and relay the data to various departments for research and action. However, considering these field workers are typically not equipped with the appropriate technology to identify pests affecting the crop, the manually collected data has, so far, not been accurate. Moreover, the time taken to analyze the data and send recommendations back to the farmers is too long and any incidence of pests destroys the crop during the delay of information and action.

Solution

Farmers from Maharashtra needed to implement Artificial Intelligence (AI) to fill this critical gap. Wadhwani AI or Wadhwani Institute for Artificial Intelligence, a Mumbai-based independent and non-profit research institute, developed an AI-based pest management platform that could be easily deployed on the smartphones of farmers/field workers. After the field workers uploaded necessary images of the crops, the images passed through a multi-task network that accredited the image. The advanced AI algorithm and image classification models then classified and counted the pests based on the photos and suggested ways to tackle the problem. Using features generated from a Convolutional Neural Network (CNN), the AI system detected and counted the number of pests. Using this count, along with the help of guidelines set by entomologists, the AI system recommended appropriate actions to the farmers - which included whether or not to use pesticides on the crops.

Impact

The AI-based system was piloted in partnership with the Better Cotton Initiative and the Maharashtra Government. The system is currently deployed in the districts of Gujarat, Maharashtra, and Telangana, with over 18000 farmers utilizing the application. Post the implementation of the AI-based system, the farmers observed a 25 percent gain in the yield of the cotton crop.

IIT KHARAGPUR: AI-BASED PREDICTION MODEL FOR DETECTING ARSENIC IN INDIA'S DRINKING WATER

Problem

Arsenic has been a menace in Eastern India especially along the banks of the Ganga for almost two decades now, putting millions of people at severe health risk. Researchers have been studying the distribution patterns of the contaminated groundwater for years to develop a large-scale ecological and environmental framework addressing this challenge in the region. The studies conducted until now were unable to offer an effective model for policy decisions due to the delineation of the local extent and geochemical mechanisms for arsenic pollution. The researchers from IIT Kharagpur, thus opted for AI which is now being used across the world to successfully model the distribution of groundwater contaminants.

Solution

In a breakthrough, a first of its kind, researchers from IIT Kharagpur have successfully predicted the distribution of groundwater arsenic and human health risk in the affected areas, using AI algorithms on environmental and geological and human usage parameters. The researchers have delineated the high and low arsenic zones across the entire delta using AI and quantify the number of people exposed. They have developed probabilistic models of arsenic occurrence, exposure and human health risk assessment within the delta region. The model shows a strong association of 'surficial aquitard thickness' and 'groundwater-fed irrigation' to regional-scale As-hazard.

Impact

While the predictive model framework would prove to be vital typically for the identification of drinking water sources in arsenic affected areas of West Bengal, it can be used in other parts of the country which are also suffering from severe groundwater pollutants. The outcome of this study provides the information for the location of safe groundwater, which is the primary source of drinking water for most of India. Eventually, all this information forms the baseline knowledge for the recently initiated Jal Jeevan Mission of the Government of India which aims to provide safe drinking water to every household of the country by 2024. Such successful use of AI in geoscience enables us to find answers and build prima-facie understanding before undertaking further field-based investigation or validation.

IISC: RAPID IDENTIFICATION OF COVID-19 BIOMARKERS IN BLOOD PLASMA USING RAMAN SPECTROSCOPY AND AI

Problem

Given the rapid pace at which the COVID-19 pandemic has been creating havoc, it is important to develop new technologies that can rapidly detect COVID-19 and perform mass testing at an affordable price. In this regard, Raman spectroscopy holds considerable promise as it has found numerous applications in disease diagnosis. Every disease is associated with a change in biochemistry which can either be a cause for disease manifestation or may be a consequence of the disease itself. With gaps existing in the prevalent testing methods, researchers at IISc and AIIMS Bhopal are hopeful that their novel method of detecting COVID-19 biomarkers through Raman spectroscopy and AI will become more widely adopted and standardized.

Solution

This particular experiment is aimed at identifying COVID-19 biomarkers in the blood plasma of infected patients. Along with the power of machine learning, it will be possible to identify patterns from large datasets more effectively. Raman spectroscopy is an analytical technique where scattered light is used to measure the vibrational energy modes of a sample. It can provide chemical and structural information, as well as the identification of substances through their characteristic Raman 'fingerprint'. Raman spectroscopy extracts this information through the detection of Raman scattering from the sample. This method was devised by physicist CV Raman and his research partner KS Krishnan in 1928. IISc has teamed up with AIIMS, Bhopal, who will be providing patient samples and healthy controls. With machine learning aided by multi-level Convolutional Neural Networks (CNN), large datasets can be analyzed in a matter of seconds.

Impact

Newer forms of AI are finding greater use in science, especially biomedical data analysis. So far, scientists have been able to analyze bacteria and sepsis, so analyzing a virus seemed like a natural extension of this branch of investigation. It is well known that several challenges exist with the efficacy of RT-PCR and RAT. Therefore, the researchers aim to bring about more accuracy in mass testing for COVID-19 through this method.

IIIT DELHI: REPURPOSING EXISTING DRUGS TO TREAT COVID-19 USING AI

Problem

As the COVID-19 pandemic is intensifying, it has become imperative to develop innovative ways to help the overburdened medical fraternity in treating COVID-19 patients efficiently and effectively. Along with global researchers, India's AI researchers are also building novel solutions to fight the pandemic. To treat covid patients, IIIT Delhi has been working on computational AI model for drug repositioning. The beauty of drug repositioning is that instead of manually going through drugs to check its effectiveness against the disease, AI algorithms can speed things up with high accuracy. Some well-known examples of drug repositioning are Hydroxychloroquine (HCQ), Dexamethasone and Remdesivir.

Solution

The first step is of Drug Target Interaction (DTI) prediction, which is a standard approach where AI models can compute the similarity between chemical structures of the selected drug and the similarity between the genomic structures of viruses including the coronavirus. As a next step, the model then scrutinizes the historical information on the efficacy of the drug on different viruses and selects the drug that has been successful in treating viruses whose genomic structure is similar to coronavirus.

Impact

IIIT Delhi plans to scrutinize more than 100 listed antiviral drugs and prune it to 5-10 drugs that have the best chance of succeeding. So far, the model has selected drugs like Remdesivir, Umifenovir, Ribavirin and Sofosbuvir.

IIT MADRAS: AI4BHARAT- INDIAN LANGUAGE NLP INITIAITVE AND AI

Problem

Language technology holds special relevance in a culturally diverse country like India that has a variety of languages and dialects spoken in its various corners. Through allied abilities such as Natural Language Processing (NLP) and speech recognition, it gives machines the ability to comprehend and respond to human texts and speech. Even though the proliferation of mobile devices is intense in the country, the availability of digital information in regional languages in extremely limited, if not entirely negligible. Therefore, innovations in the field have the potential of impacting the lives of billions who still interact primarily in their vernacular language.

Solution

AI4Bharat is a non-profit, open-source community of engineers, domain experts, policy makers and academicians, all collaborating to build AI-solutions for solving India's critical socio-economic and environmental challenges. It is helmed by IIT Madras faculty members Mitesh Khapra and Pratyush Kumar, who aim to improve the digital experience for India's millions of users who access the web in vernacular languages but are challenged by the extremely low availability of information.

As a result of their efforts, they were able to release the largest corpus of Indian language texts and increase the size of corpus available by an order of magnitude in many languages. They are creatively collecting data from different places, and then, building and releasing translation models in Indian languages. Further on, they're focusing on the transliteration problem, which involves typing in a regional language using an English keyboard, by swapping text in predictive ways. The goal of this initiative is to bring parity in AI-technology for Indian languages with English.

Impact

AI4Bharat was part of Google India's first 'AI For Social Good' cohort, where the team worked with the NGO Pratham Books. Recently, they've worked with the Nandan Nilekani-backed 'EkStep Foundation'. Further, they've launched a year-long AI residency program to mentor students who have completed their B-Tech. They're also in talks with the Government with regard to the National Language Translation Mission which was announced in this year's budget. The team at AI4Bharat wants to keep all their models open source with permissible licenses so as to support startups, governments, or companies using these models.

DETECTD: NAGPUR-BASED STUDENTS ARE FIGHTING DEEPFAKES WITH AI

Problem

In the digital age, information spreads fast but misinformation spreads like wildfire. The ease of communication has enabled the rapid transmission of fake news, and the phenomenon has become so prevalent that it's taken on proportions of a pandemic – an information pandemic – or infodemic. The problem escalates manifold when the medium of misinformation is video – something so compelling and seemingly true that even the smartest and most skeptical of minds could be taken for a ride. Known as deepfakes, these are AI-generated videos showing real people doing and saying fictional things. General Adversarial Networks (GANs) are commonly used to generate deepfakes.

Solution

Detecting deepfakes used to be a very challenging task for individuals because it requires expertise in the AI domain. But they have created this platform where the user can simply visit the website, upload a media file from his local system, whether a photograph or a video, and the video is passed through our state of the art model. The media is then analysed for AI forgery to find out whether the video is fake or not, and the results are returned to the user within minutes.

Impact

A major issue with most of the deepfake detecting solutions that are presently available in the market is their unreliability and the slow pace at which results are given. Detectd currently has an accuracy of 96 percent and is the first of its kind in India and amongst very few available globally and at present it can provide results from as low as 3-minutes. Last year Detectd emerged as the World Finalists and India Champions in Microsoft Imagine Cup 2021.

IIIT-DELHI: AI RESEARCHER'S WORK TO SAVE TIGER POPULATION

Problem

The National Tiger Conservation Authority in collaboration with the State Forest Departments, the Wildlife Institute of India (WII) and conservation partners conducts a national assessment for the "Status of Tigers, Co-predators, Prey and their Habitat" once in every four years. The aim of this exercise is to gauge the success of conservation efforts and to keep track of tiger populations and their ecosystems. What had until recently been a manual process of counting the individual tigers in the forests has now sought to be automated with the use of artificial intelligence techniques.

Solution

It was in 2016, when Ankita Shukla was in her second year of PhD at the Indraprastha Institute of Information Technology, Delhi, under the supervision of Dr. Saket Anand, she was offered to work on the tiger project with WII. The idea was to leverage computer vision for solving a real world problem. They started by getting a lot of tiger images on camera traps. The first step to identifying tigers was the detection of different species. This species classification is a pre-processing step to even the tiger identification problem because they need to separate out the tiger images from rest of the species first. The task of the AI system that they devised was to identify the species present in a given a set of images.

Impact

The image processing software known as CaTRAT (Camera Trap Data Repository and Analysis Tool) is currently being used by WII for geotagging, coding and segregating the images to individual species folders. The geo-tagged images are scrutinized for potential software misclassification.

IISC: USING MATH & ML TO PREDICT THE TRAJECTORY OF COVID-19

Problem

As the world continues to battle the pandemic, with some nations disproportionately affected, timely decisions based on mathematical deductions and AI-based models are the need of the hour. In order to help the policymakers understand virus behaviours and make data-driven decisions and interventions, Prof. Sashikumaar Ganesan and Prof. Deepak Subramani from the Indian Institute of Science are providing Karnataka's Technical Advisory Committee (TAC) with results derived from mathematical modelling of COVID-19 that projects how the disease will move through the population and how effective lockdowns can be.

Solution

Upon being roped in by a member of the Karnataka COVID-19 taskforce, Prof. Sashikumaar Ganesan and Prof. Deepak Subramani of the Department of Computational Data Science, Indian Institute of Science (IISc) built a partial differential equation model that aims to predict the trajectory of COVID-19 across Indian states. The model provides mathematical insights on projected infection numbers should states go into lockdowns that are either 15 days, 21 days or 30 days in duration. The primary use of epidemiological models is mainly for hindsight analysis. This is what spurred the development of their model, and they wanted to use this data to eventually help predict how the ongoing COVID-19 crisis would evolve.

Impact

This model helps policymakers stay ahead of a crisis. With data analysis and machine learning, it is possible to closely track a disease's trajectory in the population. Mathematical models must be used to understand the scenario that lays ahead. It points policymakers in the right direction and tells them where to look more closely.

IIT BOMBAY: AI MODEL FOR DIAGNOSIS OF TWO SPECIES OF MALARIA PARASITES

Problem

Putting and end to malaria remains a top government priority in India. In 2016, India introduced its first National Framework for Malaria Elimination (2016-2030). In 2019, the Government of India increased funding by more than 25 percent for the National Vector Borne Disease Control Programme. Currently, malaria diagnosis is undertaken by manually studying the blood samples for the parasites which still has difficulty in determining the progress of the disease. Researchers from the Indian Institute of Technology, Bombay (IIT-B) have recently developed proteomics technologies and made artificial intelligence-based model in collaboration with three different hospitals across India. The model differentiates between two malaria parasites — P falciparum and P vivax— for better malaria diagnosis.

Solution

The researchers collected blood samples for strains of P falciparum, P vivax and dengue from across the country - Medical College Hospital, Kolkata, Sardar Patel Medical College, Bikaner and Dr. LH Hiranandani Hospital, Mumbai, respectively, along with blood samples of healthy people, for creating a dataset for the training of the AI model. The dataset was analyzed and the researchers studied the protein levels from blood plasma against the severity of malaria to create quantifiable data.

Impact

In malaria season, the number of cases is high, resulting in an increased burden on clinicians for manual diagnosis. Hence, if the diagnosis along with timely progression prediction from non-severe malaria to severe condition before the development of clinical manifestations is made for clinicians, then the treatment can be specific and efficient. Currently, the team is focused on creating a prototype of a diagnostic kit so that the technology is available to mass-detection of the disease. The project has been funded by the Department of Biotechnology, Government of India.

IIT KHARAGPUR: AUTOMATED READING OF LEGAL CASE JUDGEMENTS

Problem

In India, the bigger case documents are really long, running into hundreds of pages of paragraph after paragraph. Most of the work in the field of legal AI is done in Europe, China or US, but very few people in India work on it. IIT Kharagpur has one distinct advantage that it is possibly the only top engineering Institute with its own law school. Dr. Saptarshi Ghosh from the Indian Institute of Technology Kharagpur took up the project.

Solution

One project that Dr. Ghosh's team is working on is the automated reading of case documents to save time of the legal practitioners. Another project is the automatic summarization of legal documents. Once they take a summary written by an expert and the summary generated by an algorithm, and then match the two. That gives a score in the range of 0-1. One means exact match and zero means no match at all. The methods that they have tried give the score of the range 0.5-0.6.

Impact

There are some indisputable benefits that AI can bring to the legal field. One advantage is speed. The things that take a week for a human to do may be done by AI five to ten minutes. So, if the more mundane jobs can be pushed to AI, then the law experts can actually focus on legal questions.

IIT HYDERABAD: COVID-19 TEST KIT

Problem

The COVID-19 virus is wreaking havoc across the country. An objective of the research team from IIT Hyderaad behind developing the self-testing kit was to break the transmission chain through affordable testing.

Solution

The scientists from the IIT, Hyderabad, Telangana have developed COVIHOME, an AI-powered COVID-19 test that allows self-testing at home. Since this is a self-testing kit, there is no need for expert supervision for an RT-PCR (Reverse Transcription Polymerase Chain Reaction), or a BSL 2 lab facility for the extraction of RNA. The kit is able to give a result in half an hour for symptomatic and asymptomatic patients.

Impact

While the kit is yet to be commercialized, once it will receive ICMR approvals, the product will be available at a reasonable rate of Rs. 300 in the market. The Council of Scientific and Industrial Research's Centre for Cellular & Molecular Biology (CSIR-CCMB) has undertaken tests for the product's validation independently with the in-house samples and hospital samples as advised by ICMR. The results have been impressive so far - the kit's efficiency is at 94.2 percent, Sensitivity is at 91.3 percent and Specificity is at 98.2 percent.

IIT ROPAR: DEEPFAKE DETECTION IN LIVE VIDEOS

Problem

Deepfake a form of AI which seamlessly stitches anyone in the world into a video or photo they never actually participated in. Sophisticated AI techniques have spurred a dramatic increase in the manipulation of media contents. Such techniques keep evolving and become more realistic. That makes detection difficult.

Solution
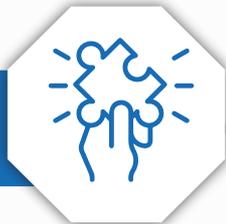
The Indian Institute of Technology in Ropar, Punjab has developed 'FakeBuster', a deepfake detector to identify and prevent imposters from attending video conferencing and manipulated faces on social media. It is a deep learning-based solution that helps detect if a video is manipulated or spoofed during a video-conference meeting. It has been tested for its effectiveness on popular web conferencing applications - Skype and Zoom and also detecting deepfakes where faces are manipulated on social media to spread misinformation or defame persons. 'FakeBuster' can function online and offline. It uses a 3D convolutional neural network for predicting video segment-wise fakeness scores. Deepfake has been extensively trained on datasets such as Deeperforensics, DFDC, VoxCeleb, and deepfake videos created using locally captured (for video conferencing scenarios) images.

Impact

The tool was presented at the 26th International Conference on Intelligent User Interfaces, in the USA. The unique detector can also detect deepfakes on social media.

ISI KOLKATA : DEEP LEARNING FOR SCREENING COVID-19 USING CHEST X-RAY IMAGES

Problem

The ongoing pandemic has made inroads into the country and is now spiralling out of control. The first step to providing appropriate treatment is to detect the infection. But the CT scans which are typically used for COVID-19 patients are an expensive treatment. Therefore, the cost associated with the CT scans and their availability in rural areas is a constraint for a country as populous as India.

Solution

During the process, they could understand that pneumonia and COVID-19 had similar representation, which could further be made clear in a CT scan. There were two datasets used, one was from NIH Chest X-ray, and the other was acquired from four open-source databases- Italian Society of Medical Radiology and Intervention (25 cases), radiopaedia.org (20 Cases), J. Paul Cohen et al. COVID-19 image data collection (180 Cases), a hospital in Spain (80 Cases). The data was segregated into data set A-training and validation data with the numbers of normal and diseased cases. The data set B contained the number of normal cases, pneumonia, other diseases, and COVID-19. The DETL (Domain Extension Transfer Learning) algorithm was used in the study. The involved CNN models were trained from scratch on data set A to learn to classify between diseased and normal X-ray images. The next phase was to replace the last fully-connected layer of the pre-trained CNN with a new fully-connected layer, having as many neutrons as the number of classes, which in this case was 4, i.e., normal, other diseases, pneumonia, and COVID-19. The rest of the weights in the remaining layers of the pre-trained network are to be retained. Then the last convolution block and the fully connected layers are retrained using SGD (Stochastic Gradient Descent).

Impact

The idea of using X-rays for screening is based on making the screening more affordable instead of CT scans that are expensive.

ENTERPRISES

IBM: AI-BASED FARMER ADVISORY SERVICES TO IMPROVE FARM YIELD AND INCOME

Problem

Soil moisture, soil temperature, and soil health are a few of the critical inputs required for precision agricultural applications - these applications include irrigation scheduling, crop health management, pests and diseases prediction, and estimation of yield and acreage. As India is not a water-rich country, farmers need to have an accurate understanding of spatial and temporal variation in soil moisture and temperature to achieve optimum water utilization in all agriculture applications. The soil moisture and temperature can be measured by using instruments in the field, including remote sensing techniques or a physics-based Land Surface Model (LSM). However, these methods are not always reliable and accurate because of noisy high-resolution data and dependencies on data quality. This creates several large discrepancies across the models. Furthermore, for Indian farms, the data from the past - including soil moisture, LSM data, and remotely sensed data needs to be regularly cross-validated to ensure consistency and quantifying uncertainties. This is because India is categorized by different climate zones.

Solution

Keeping this in mind, IBM developed a robust technology platform to address some of the fundamental challenges in improving farm yield and farming income in India. The technology is based on the data fusion approach. Data from The Weather Company, satellites, and the IoT-based field data were combined using AI technology to provide timely, localized and actionable agriculture advisory to farmers.

The AI system combined the weather data and the analytics on a field-by-field basis - this enabled the Indian farmers to make informed decisions, leading to better crop output throughout the year. The aim of developing the AI system was to provide highly affordable and scalable Farmer Advisory Services by combining Remote sensing, Weather data, and Local sensing via IoT. The farmer advisory services include:

Pest/Disease Advisory: The AI system integrated weather forecast models and crop health data - this provided the farmers with crop-specific pest and disease risk prediction. For example, the farmers were aware of when and how much pesticide/ insecticide had to be applied.

Irrigation Advisory: The AI system leveraged real-time weather data from weather sensors. This data provided suggestions on irrigation management by estimating the soil moisture levels - this ensured that the crops received the right mix of sun and water.

Nutrient Advisory: The AI system provided farmers with inputs on fertilizer usage - thus maximizing output.

Impact

The AI model improved the quality of work of the farmers. The farmers were able to get the required information via a smartphone, saving time travelling to Agri Labs in search of solutions. The high-resolution soil moisture and soil temperature service were used as a real-time decision support system for precision agriculture in India.

INTEL & SANKARA EYE FOUNDATION: HARNESSING AI TO TRANSFORM DIABETIC RETINOPATHY DIAGNOSIS & TREATMENT

Problem

India has one of the largest diabetic populations of any country in the world, approaching the alarming mark of 98 million cases by 2030. Diabetic Retinopathy (DR) is the major cause for blindness and vision loss in persons of working age. Hence, early detection and treatment are critical to stopping the damage. However, with majority of the population based in rural India, the lack of well-trained ophthalmologists to identify DR – especially in remote rural regions – is a major concern. Also, there remains a huge gap in the number of patients and the needed medical care and infrastructure available in the country.

Solution

To address this challenge, Sankara Eye Foundation collaborated with Leben Care to implement a cloud-based AI solution based on the Intel Xeon Scalable processor platform, powered by Intel Deep Learning Boost (Intel DL Boost). Netra.AI, a comprehensive retina risk assessment software-as-a-service platform available on cloud, has been trained to be device-agnostic to specialized low-powered microscopes with attached cameras. It provides the option to be used as both online and offline modules, such as a standalone box. The solution uses cutting-edge algorithms, developed in collaboration with leading retina experts, with a four-step Deep Convolutional Neural Network (DCNN). This neural network helps in detecting retinal photographs from non-retinal images, sensing generic quality distortion for automated image quality assessment, detecting the DR stage. It also helps in annotating the lesions based upon pixel density in the fundus images.

Impact

Netra.AI has the ability to identify healthy retina from an unhealthy one, which makes it a great tool to screen retinal disorders in a large population with limited infrastructure and resources for tertiary healthcare. The model is trained to identify different stages of diabetic retinopathy, and suggest whether the patient may need an early referral or regular monitoring. Furthermore, it can identify glaucoma, which can be a great tool for early screening of this progressive disorder that leads to blindness, and thus help in early treatment and control. The comprehensive report generated by Netra.AI within 2 minutes of uploading the images enables optometrists or imaging technicians to provide instant counsel for patients needing a referral to the hospital. The solution also delivers excellent sensitivity and accuracy while detecting any DR, i.e., 99.7 percent and 98.5 percent respectively.

GOOGLE & CENTRAL WATER COMMISSION: USING AI TO PREDICT FLOODS AND SAVE LIVES

Problem

Flooding is the most common natural disaster on the planet, affecting hundreds of millions of people and causing between 6,000 and 18,000 fatalities every year – of which 20 percent are in India. Reliable early warning systems have been shown to prevent a significant fraction of fatalities and economic damage, but many people don't have access to those types of warning systems.

The Google Flood Forecasting Initiative aims to use Google's infrastructure and machine learning expertise for providing accurate real-time flood forecasting information and alerts to those in affected regions. This is made possible through AI and physics-based modelling which create accurate and scalable inundation models in real-world settings. With reliable on-ground data obtained from governmental agencies, Google's river flood forecasting models can more accurately predict not only when and where a flood might occur, but the severity of the event as well.

Through an innovative approach for inundation modelling, the initiative aims to provides unprecedented lead time, accuracy and clarity in flood forecasting.

Solution

To simulate the water behaviour across a floodplain, inundation modelling uses as inputs measurement or forecast of river water levels and high resolution elevation maps. Real-time river measurements and forecasts are obtained for this initiative through Google's collaboration with the Central Water Commission (CWC), the technical organization of India in the field of water resources.

Google has devised a new approach for inundation modelling, called a morphological inundation model, which combines physics-based modelling with ML to create more accurate and scalable inundation models in real-world settings. In comparison to classical physics-based models, this morphological model improves accuracy by 3 percent, which can significantly improve forecasts for large areas, while also allowing for much more rapid model development by reducing the need for manual modeling and correction.

Additionally, their alert-targeting model allows identifying areas at risk of flooding at unprecedented scale using end-to-end machine learning models and data that is publicly available globally. They have also developed HydroNets – a specialised deep neural network architecture built specifically for water levels forecasting – which allows the utilization of some exciting recent advances in ML-based hydrology in a real-world operational setting.

Impact

First piloted in the Patna region of Bihar in 2018, Google's flood forecasting initiative has been extended to the whole of India by 2020, covering 200 million people across more than 250,000 sq km. Google technology is being used to improve the targeting of every alert the government sends; around 30 million notifications have been sent to people in flood affected areas, to date.

The alerts sent out include three tiers of risk: some flood risk, greater flood risk, and greatest flood risk. For better accessibility, the information is provided in different formats so that people can both read their alerts and see them presented visually; they have added support for Hindi, Bengali and seven other local languages, too.

Google.org has started a collaboration with the International Federation of Red Cross and Red Crescent Societies (IFRC) to build local networks that can get disaster alert information to people who wouldn't otherwise receive smartphone alerts directly. A partner notification infrastructure has been established to provide these forecasts for the CWC and other organisational partners that can use it to prepare for disaster management and relief efforts.

Google's initiative is providing people with information about flood depth: when and how much flood waters are likely to rise. And in areas where it is possible to produce depth maps throughout the floodplain, they are sharing information about depth in the user's village or area. The recent improvement to the forecasting model has allowed them to double the lead time of many of their alerts – providing more notice to governments and giving tens of millions of people an extra day or so to prepare.

BKC WEATHERSYSTEMS: AI FOR WEATHER ADVISORY IN ADVANCE FOR CROPS

Problem

There is a need for authentic information on the status of crop production before they mature in order to plan for imports, exports, or buffer well ahead of shortages or surpluses.

Solution

BKC WeatherSys Pvt. Ltd. (formerly known as BK Consimpex Pvt. Ltd.) is one of India's first few private sector meteorology and environmental technology companies. Founded in 1989, BKC WeatherSys provides turn-key technology and service solutions for weather, power, aviation, agriculture and solar energy industries.

Through the Fasal Salah app, farmers can get weather advisory in advance, which is related to the crops that they grow. This app can also act as a tool for crop insurance system, which is currently faced with challenges like delayed submission of yield data to assess damages as the system relies on thousands of crop-cutting experiments, lack of trust in the quality of such data, and delay in the payment of premium subsidy by the state governments to the insurance companies.

Impact

The solution has resonated well with over 1 lakh farmers who are using the app to estimate yield, get information about traders, input providers, mandi prices, and receive highly personalized and hyper local weather forecasting.

IBM: AI-BASED CHATBOT TO HELP STUDENTS IN RURAL BENGAL LEARN ENGLISH

Problem

When a group of IBM India employees, including data scientists and communication experts, volunteered to work on a tech solution that could help students learn the English language, the challenge was to figure out what that solution would be. The team had thought about multiple ways to design a solution that teaches students the English language, especially those from semi-urban and rural areas. During the early phase of the project, there had been discussions on creating videos to be distributed through WhatsApp and Facebook Messenger, considering the reach of both platforms in India. The team also thought about developing an app, but decided against it as the common consensus was that the app would divert attention and focus instead of engaging students within the age group of 10 to 16. Discussions to develop an AI-based chatbot started in 2019, when the Abheda Foundation, an NGO run by a group of retired IT professionals providing digital education to students from rural parts of Bengal, approached IBM to incorporate AI and ML capabilities in their learning solutions.

Solution

Professor Idiom is an AI-powered chatbot developed for Abheda Foundation, an NGO based in Kolkata. Professor Idiom is a persona, a witty professor who likes to joke and tells a good story. Developing a conversational AI-powered chatbot is a logical language-learning solution as it provides the liberty to express one's feelings which are missing when learning from English teaching apps or tutorial videos. Idioms have been fixed as a specific topic because an open-ended chatbot could be very difficult to build. With Professor Idiom, a student can send a chat asking for the meaning of an idiom in their local language and the bot will reply with the answer in English. A conversation can be continued for 10-15 minutes to find out how well a student can converse in English. For the team of developers at IBM, it took five weeks to have the first draft ready, and between three to four months to develop the content which was the more difficult part.

Impact

About 90 percent of Abheda Foundation's 200 students are using Professor Idiom and this small number makes it easier to analyse the data and keep improving the AI-powered chatbot. The team is in the process of collecting data and this will help not only monitor the student's progress but also improve the chatbot. Although a beta release, for now, students can access Professor Idiom by activating Google Assistant on their Android devices. There are further plans to make the chatbot available to larger users after the production release.

MICROSOFT: AI-BASED SOWING APP BY MICROSOFT FOR FARMING COMMUNITY IN ANDHRA PRADESH

Problem

ICRISAT realized the criticality to empower small-holder farmers in India to increase their income through higher crop yield and greater price control. Traditionally, Indian farmers from Andhra Pradesh sow seeds in the beginning of June every year. Changing climate patterns are varying the optimal conditions of sowing - making it difficult for farmers to predict the sowing date. Accuracy with the sowing date is critical for farmers to ensure harvesting of a good crop. Any failure in sowing can lead to a massive loss incurred through loss of seeds, fertilizer, and efforts by the farmers. To predict the sowing date, the standard process is to measure the Moisture Adequate Index (MAI) that assesses rainfall and soil moisture adequacy. MAI calculates the amount of water required for the crops and provides an optimal sowing period. The farmers needed a solution to assist in the accurate prediction of the sowing of seeds.

Solution

Microsoft partnered with the International Crop Research Institute for the Semi-Arid Tropics (ICRISAT) to develop an AI-powered sowing app for farmers to identify the optimal time for sowing the seeds. The application has been built on the Microsoft Cortana Intelligence Suite, which includes Machine Learning and Power BI - the platform systematically promotes digital farming practices in Andhra Pradesh. The sowing app was combined with the personalized village advisory dashboard for Andhra Pradesh. The village advisory dashboard was supported by a powerful business intelligence tool that was designed to provide cloud-based predictive analytics. The advanced analytics offered crucial information and insights for farmers to reduce crop failures and increase yield. The sowing app advised farmers on the best time to sow crops depending on weather conditions, soil, and other indicators. The advanced AI algorithms of the app were connected and interfaced with weather forecasting models - this included extensive data on rainfall from the last 45 years. The data included 10 of data on the groundnut sowing progress in the district. The massive data was then downscaled to build predictability - the resulting data assisted farmers with picking the ideal sowing week.

To determine the optimal sowing period, the MAI was calculated for assessing the degree of adequacy of rainfall and soil moisture to understand the potential water requirement of crops. The MAI was calculated in real-time with the advanced AI algorithms. 10 sowing advisories were also initiated and disseminated until the harvesting was completed, including essential information covering optimal sowing date, soil test-based fertilizer application, farmyard manure application, seed treatment, and optimum sowing depth, among other parameters. The app utilized data collected manually from farms across 13 districts of Andhra Pradesh, the data was collected by ICRISAT field officers and uploaded to Azure Cloud.

Impact

The intelligent BI tool provided essential insights around soil health, fertilizer recommendations, and can predict seven days' weather forecast. In the pilot project, the information sent to farmers about the sowing date via SMS was sent in the Telugu language. The sowing app advised farmers about the optimal sowing period - this resulted in an increase of 10-30 percent yield per hectare. Overall, the solution reduced farming stress and generated better income.

YELLOW MESSENGER: AUTOMATED ONLINE RETAIL SOLUTION AND CUSTOMER SERVICE PLATFORM

Problem

Leo Coffee has 40+ cafe outlets in South India and 300+ distributors across India. It is a family-run coffee enterprise; the brand exports various coffee blends, vending machines, and coffee merchandise globally. Leo Coffee has an online presence, selling its products through online stores and also through its own 'Leo e-Store'. With the onset of the pandemic, Leo Coffee shut down most of its services during the lockdown. Moreover, with social-distancing norms in place till the end of 2020, Leo Coffee experienced a sharp decline in its business across the cafe outlets and the sales of the packaged coffee through retail outlets. To circumvent this situation Leo Coffee aimed to expand its market to a younger crowd and continue serving packaged coffee - the organization planned to expand its sales via e-commerce channels. However, the business via these e-commerce channels was just over 1 percent prior to and during the initial period of the lockdown. To boost their online presence, the organization had to increase its customer support infrastructure to handle queries coming in from online customers and boost its online technology pack. With call-centers completely closed till June-July 2020, Leo Coffee required an automated customer service solution to resolve queries.

Solution

Yellow Messenger deployed a channel-agnostic AI-powered interactive bot for Leo Coffee. Yellow Messenger also implemented Canary - its eCommerce solution for Leo Coffee. The bot solution included an AI-powered Virtual Assistant and NLP Engine support. Leo Coffee's chatbot, named Leo, was deployed on Facebook Messenger, WhatsApp Business, and their web store "Leo e-store". The intelligent virtual retail assistant enabled customers of Leo Coffee to browse in-store, place orders, track and confirm orders, and even place subscription orders while the customer was ordering another product. The virtual assistant provided exceptional customer engagement while responding to numerous queries from the customer. The bot was integrated with sentiment analysis to understand emojis and also reply with emojis. The other features that were provided cover: FAQs for faster query resolution, About Us section describing the history and details about Leo Coffee, nearby Store Locator to help customers find nearby stores, channel partner facilitation for business development related to store dealership, kiosk for supermarkets, packed coffee distribution, and vending machines installations.

The Leo Store bot could be accessed from anywhere in India. The Bot child of Leo Bot was deployed across 4 regions to provide streamlined support, and deliver region-wise analytics. For the next phase, Yellow Messenger is integrating the platform with Shopify's API to enable abandoned cart notifications.

Impact

Within a few days of deployment, the subscription order value provided by Leo Bot crossed Rs. 100,000 and the total order value crossed Rs. 150,000. Leo Coffee chatbot resolved customer queries with 100 percent accuracy 24/7/365. With region-wide analysis, the bot provided accurate data on coffee consumption across India and assisted Local Store managers in SKU management.

THRIDWATCH (RAZORPAY): ECOMMERCE FRAUD DETECTION PLATFORM

Problem

RTO or Return-To-Origin is a situation wherein Online retail or E-commerce orders cannot be delivered and have to be shipped back to the warehouse/seller. The reasons for failure of delivery cover one or more of the following: incorrect or incomplete address provided by the, impulse purchases by the customer wherein he/she decides to cancel the order because of a delay in delivery or sourcing the same product for a better price from a different store/marketplace or fraudulent orders placed without any genuine intent. Another popular terminology for RTO orders is NDR which stands for Non-Delivery Report. RTO or NDR puts a significant cost burden on online sellers/ eMarketplaces as they lose a lot of money in shipping the order back and forth.

Karatcart.com is an online jewelry store that offers one of the biggest curated collections of designer and handmade jewelry for women. RTO was at an all-time high for Karatcart and this began to affect its operational and marketing costs. For every return, a cost of Rs. 60 ($0.80) approximately had to be incurred one way - or a total of Rs. 120 ($1.60) when both forward and return logistics were included. RTOs caused huge overhead costs for KaratCart. The problem was broken down into 3 parts:

KaratCart's customers typically came from Tier II and Tier III areas. One of the main issues that E-commerce companies face in such cities is the inconsistency in addresses. This directly impacts deliveries, leading to a higher percentage of returns. Cash-on-Delivery (CoD) is a popular payment option in India. Typically, higher RTO rates are observed when the mode of payment is CoD as the customer can cancel the order at any time. KaratCart, was an online store fairly new to the E-commerce trade - a significant proportion of customers (85-90 percent) were first-time shoppers. The RTO percentage of KaratCart was high as the online platform had no significant percentage of loyal or repeat customers. Hence, a comprehensive solution for KaratCart's business and scale was required.

Solution

KaratCart's digital payments were powered by one of India's leading payment solutions enterprise - Razorpay. Razorpay implemented Thirdwatch, an e-commerce RTO and fraud detection and prevention platform, built specifically for the Indian E-commerce landscape. Powered by an Artificial Intelligence engine, Thirdwatch processed every order placed in the online store and analyzed a combination of order parameters and behavioral patterns of customers/users. To solve the issue related to RTO, a mix of merchant-specific learnings injected into the AI-engine was identified as the best solution.

For KaratCart, Thirdwatch analyzed 200+ parameters in a matter of milliseconds. Thirdwatch tackled the complex problem of RTO by utilizing a carefully crafted combination of seller-specific and rule-based algorithms on top of Thirdwatch's machine learning algorithms. It handled all major cases of RTO such as delivery address issues, impulse purchases of users, and fraud orders placed by delinquent users - it took a holistic approach to tackling RTO.

KaratCart initiated the fraud prevention process by installing the Thirdwatch App on the Shopify App Store. Once integrated, KaratCart's orders were captured on the Thirdwatch platform. Within minutes, the Thirdwatch engine started flagging Karatcart's orders. It also utilized the Thirdwatch dashboard for deeper insights and for a detailed view of fraud profiling of their orders. The implementation was designed for easy use - the easy integration with Shopify enabled the availability of the risk flags (provided by Thirdwatch) on the Shopify dashboard.

Impact

The implementation enabled KaratCart to make significant savings on operational costs related to RTO orders. Moreover, the logistics and marketing teams could spend the time saved on identifying and flagging RTO orders on other high-impact areas. Thirdwatch's solution was implemented in November 2020. One month after implementation, RTO rates for KaratCart started to fall, while sales numbers increased at a 20 percent growth rate month-on-month. After three months, Thirdwatch helped KaratCart reduce RTO by 36 percent. With the implementation, KaratCart directly saved Rs. 35,000 (approximately) for every 1000 orders every month.

MICROSOFT: E-MARKETPLACE PLATFORM FOR FARMERS

Problem

To estimate the income from farm yield, farmers in India have had to wait till their crops were harvested and the yield measured - the income was then estimated from the harvested yield. Alternatively, farmers carried out advance trades on agri-futures platforms, a process that has relied on guesswork on the prices on the futures market.

Solution

The process of estimation and guesswork has been replaced by a scientific trading platform that enables farmers to sell their produce at an optimum price - this eMarketplace platform has been implemented by Microsoft for CropData. On this platform, CropData connects farmers with bulk buyers, where the harvest is hedged early in the crop cycle - this process depends on the predicted quality and yield of the potential harvest.

For this implementation, Microsoft developed numerous tools and technologies on the eMarketplace platform for farmers - these tools included Dr. Krishi and Agriota. Dr. Krishi, a workflow-based platform, performed essential diagnostics on the farm based on information and data - the data was constantly monitored and analyzed. The platform also served as the primary interface for customized advisory services. Agriota connected all the stakeholders in the agri value-chain through the use of blockchain.

Microsoft incorporated the AI-related workflows in their existing cloud-based agri platform, FarmBeats, into the workflows of CropData's farm diagnostics process. The team from Microsoft's Farmbeats integrated the Normalized Difference Vegetation Index (NDVI) and weather data pipelines for cloud correction - this enabled better accuracy of the weather forecasts. Once the farmers were on-boarded to the platform and their data entered into the platform, CropData performed farm land diagnostics. This process included crop health assessment with weather correlations, aerial imagery, seed variety and quality evaluation, sowing techniques, and soil stress levels, among others. The entire process was carried out on the Dr. Krishi module.

Once the on-ground diagnostics were completed, the machine learning algorithm evaluated the health of the farm and the expected yield and quality of the produce from the land. The algorithm integrated and clubbed together farms with similar characteristics and features (in terms of risks, produce, harvest quality, and other health parameters). The farms were integrated and clubbed together based on the similar qualities and parameters of the farms. By grouping smaller farmland with larger farmland, the smaller farmland owners were provided economies of scale and fair prices that the larger farmland owners would automatically receive in the market. This grouping also provided farmers with access to institutional lines of credit at favorable rates.

Impact

As of the end of the calendar year 2020, the CropData platform has a footprint in 30 districts across eight states. The program is in the phase of expansion despite the risks due to COVID-19. 50,000 farmers have been onboarded to the marketplace. The Agriota platform has been launched with 18 farm commodities/produce, each having anywhere between five to ten varieties.

The data platform, Geospatial Tile Management, consistently aggregates information to provide insights at granular levels. The program has a short-term yet ambitious goal of on-boarding 150,000 farmers to the marketplace in the first year of implementation. The medium-term goal is to on-board over five million farmers in five years. If these goals are met, the impact and benefit in terms of gross merchandise value (of transactions) is expected to be USD 250 million in the first year and USD 8.5 billion over five years.

TIGER ANALYTICS: PLATFORM TO MEASURE THE EFFICACY OF AGRI-INPUTS

Problem

The study was aimed to measure the efficacy of agri-inputs on corn plants by estimating the size of the leaves of the corn plant. Corn develops in a progressive manner. The area of the leaf of the plant is used to determine the health of the plant. Unhealthy plants appear to have narrow and twisted leaves compared to healthy plants.

The underlying goal of the study was, therefore, to measure the leaf area of corn plants. The specific metric to be studied was the Leaf Area Index, wherein the area is normalized by analyzing the ground area the leaf would typically occupy. The farm was divided into regions across which the specific interventions of agri-inputs had to be carried out. Prior to the implementation of the platform, leaves from corn plants were examined manually to measure the health of the plant. An expert would untangle and straighten each leaf to measure the dimensions of the plants along its length. This measurement was used to calculate the leaf area and then converted to the leaf area index for the plant. The manual process was extremely time consuming and made the process of measuring leaves across large swathes of plants untenable. This led to measurements that were carried out sporadically in controlled settings on a smaller set of plants, thereby affecting the overall study of the health of the plants.

Solution

The agrochemical company was seeking a partner to understand the feasibility of the project within the achievable accuracy of measurements and goals of the projects. The agrochemical company collaborated with Tiger Analytics to utilize drone images of the farm with deep-learning based image processing techniques to estimate the leaf area index. Moreover, the goal of the project was to study different parameters of the produce/harvested land over a period of time. The near-term goal was to utilize drone imagery of the farm and determine growth parameters of individual plants and compare the produce of the farm regions that had different levels of fertilizer utilization.

Tiger Analytics drove the solution design and execution of the project:

- The drones were equipped with ZENMUSE cameras to capture high-quality images of the farm.
- Additionally, the solution provider added markers on the ground to identify crop sections pertaining to those rows of corn plants that had to be examined.
- Ground-reality data had to be developed from sample data/area of the leaves as creating such data from the manual inspection of the leaves was proving to be time-consuming.

Impact

The agrochemical company was able to test the efficacy of different products across a large sample on the farms. The farm was divided into regions with different treatments - the growth parameters were accurately measured across several weeks and were fed back to the product research and development teams for analysis. The solution was developed for corn plants. However, in the future, other crops would be added to the process. The solution consisted of a unique and detailed method to create synthetic images, a robust and generalizable deep learning inference, strategic image capture and scoring pipeline with a clear path to derive farming intelligence from sensors. Outcome in terms of mean absolute error in identifying the images of diseased or affected crops was drastically lower for synthetic test images.

COGNIZANT: AI PLATFORM FOR BIOMETRIC DATA PROTECTION

Problem

Aadhar Card is one of the documents accepted by the Reserve Bank of India (RBI)/Indian financial institutions for verifying Know Your Customer (KYC) details. Given the privacy and data implications related to Aadhar card details, Indian financial service providers now need to comply with the 2019 Aadhaar Act privacy amendment provisions, wherein Indian companies must mask the individual's Aadhaar number for security reasons.

Based on this new mandate, one large Indian insurance company sought to conceal the biometric numbers of its customers using an AI-based automated process. Moreover, the law also prohibited intermediate storage of data - therefore, the company had to identify proper techniques masking the data without disrupting its existing processes.

Solution

To facilitate this, Cognizant, an IT and ITES provider, created an AI-enabled solution that masked the Insurance provider's historical heterogeneous data and enabled future real-time Aadhaar image processing. This automated system processed the input image (of the Aadhar card) and provided a masked image as the output. The platform operated on a cognitive service-based machine learning model - this model was deployed on the Microsoft Azure platform. Moreover, the model masked all the background images, enabling masking of the customer's image on the Aadhar card.

The solution facilitated the processing of both long and short-format Aadhaar cards and masked the bar codes, QR codes, and Aadhar numbers. To identify the Aadhaar numbers in the image, the automated system utilized MS Azure's Computer Vision technology - this technology enabled the identification and extraction of the numbers by leveraging Text Extraction/Optical Character Recognition (OCR) technology. The AI model was trained by utilizing sample data from the insurance provider - this enabled the identification of QR codes and barcodes.

Impact

The automated system provided a fully compliant solution that was easily scalable. The solution operated much faster than the traditional image masking techniques that used human intervention - moreover, the solution was fully compliant with RBI's process requirements. The solution's API did not store images during processing; thus, there was no risk of data leakage. The system provided 99 percent reduction in operational costs over manual masking with 100 percent image masking accuracy.

ERNST & YOUNG: AI-DRIVEN CYBERSECURITY SOLUTION INSURANCE PROVIDERS

Problem

Cybersecurity threats for insurance and other financial companies are a major cause of concern for the financial services industry. Apart from any financial loss, valuable personal data is at risk in the eventuality of a breach. Moreover, the company's reputation and brand are adversely affected. Considering the potential fallout, and given the increase in the number of cyber-crimes, an Indian insurance company was looking to strengthen the organizational cybersecurity to protect the data, systems and infrastructure from potential cyber threats. The company also sought to deploy a 24/7 security log monitoring system that could conduct analytics, threat profiling, correlation and alerting.

The company knew that to build a reliable cybersecurity function, it had to implement an AI/ML-based managed detection and response system and a Security Orchestration, Automation, and Response (SOAR) system. Thus, this required the insurance service provider to team up with a reliable partner to build an information security and data breach management framework. The partner/solution provider had to deploy and operate the necessary capabilities for AI and ML enablement.

Solution

The insurance provider engaged EY to establish a Managed Security Service (MSS) model to provide round-the-clock security monitoring and incident reporting. EY implemented an AI/ML-based security incident and event management process - the system could proactively monitor threats and determine response plans for complex cybersecurity breaches. The solution's AI and ML capabilities provided a comprehensive threat response that managed several non-core security processes. The solution collected useful data from the network, endpoint, cloud, container, and virtualized attack vectors - these enabled analysts to examine the entire picture throughout the kill chain. The AI capabilities could dismiss false positives allowing analysts to focus on real threats. The platform leveraged machine learning technology to improve its detection and response capabilities over time. The MSS model enabled the insurance company to secure its devices and information, and continuously monitor security threats. The solution was designed on the principle that cybersecurity is a product of constant vigilance rather than sporadic responses to cyber-attack.

Impact

After the deployment of EY's AI-based solution, the insurance company pre-empted active threats and analyzed potential vulnerabilities. The implementation of the solution decreased the Mean Time to Detect (MTTD) incidents related to perimeter traffic and antivirus by more than 70 percent. The implementation resulted in a 48 percent reduction in the number of anomalies and offences within 3 months. Finally, the implementation resulted in a 67 percent reduction in the number of phishing emails within 3 months.

MAHINDRA & MAHINDRA: KRISH-E NIDAAN - A CROP DISEASE AND PEST RECOGNITION SOLUTION

Problem

Some sections of the Indian farming community still struggle to optimize farm yields affected by pests and crop disease. Although farmers receive information about managing and controlling pests and diseases from several sources, such information is not always accurate - this leads to crop damage and a reduction in overall farm output. Incidence of pests and crop diseases increase the expenses of farmers as regular spraying of farms are required to protect the crops.

Solution

Mahindra & Mahindra's Farm Equipment Sector (FES) developed Krish-e Nidaan, an advanced crop disease and pest recognition solution, to enable Indian farmers improve farm yields. Krish-e Nidaan enabled early-stage diagnosis and provided control measures for crop diseases and pests.

Impact

Since the launch of the platform in October 2020, the utilization and adoption of the Krish-e Nidaan solution has significantly enabled farmers to improve the accuracy of disease detection and decision-making with regards to application of pesticides and chemicals. This has increased yield and farm income per acre. The Krish-e-Nidaan solution has increased the yield of farmers by 15 percent and brought down the cost of farming by 8-12 percent. In those areas where Krish-e-Nidaan has been implemented, the solution has helped increase profits by Rs 6000 per acre. Till the last quarter of the 2020 calendar year, M&M's FES team worked on close to 10,000 crop diagnosis reports.

The solution has responded to thousands of diagnosis queries per second, with little or no expert intervention. This has helped farmers in early and mid-stage identification of crop diseases and expert advisory. The platform is expected to add 3-times more disease support functions by October 2021. The system is expected to achieve a performance score of more than 95 percent by the end of 2021.

TCS: INTELLIGENT DAIRY FARM ASSISTANT

Problem

The average annual milk yield of Indian cattle is 1172 kg which is 50 percent of the global average. The obvious implication is that cattle need to be cared for in a much better manner, and human efforts need to be complemented through tech intervention. It's the very same idea that we see in the industry – technology augmenting productivity for the human in the loop. The quality of milk is dependent on breeding. Imperfections in this process can lead to poor/weak progeny. But it can be addressed scientifically and that's precisely what TCS's AI-enabled solutions offer under their mKrishi platform.

Solution

The Intelligent Dairy Farm Assistant is a combination of two advanced technologies – AI & motor sensors. The latter is tied to the cow's neck to transmit data and the AI can decipher patterns after an adequate amount of data is collected. Accordingly, alerts can be sent to the farmer when there's a change in pattern that warrants human intervention. TCS uses AI systems to match existing cattle breed with suitable mates for cross-breading. When the calf is born, it is issued a digital certificate and marked as a probable high-yielding milk producer. TCS has leveraged its co-innovation network comprising tech startups and expert bodies such as BAIF & Indian Agriculture Research Institute.

Impact

Monitoring systems aided by IoT sensors, bots, and AI is at the heart of a "smart" cowhouse. Detailed observation by AI-powered image analysis can detect illnesses early, including injuries. It can be imagined on the lines of a system which monitors cows 24/7/365 to ensure they stay healthy to maximize their value. These vital signs play a critical role when artificial insemination is carried out leading to higher quality breeding.

CONCLUSION

When looking back at India's growth story, the pivotal role played by technology, especially over the past two decades, cannot be overlooked. Of all of these technologies, that drive socio-economic impact, artificial intelligence is well on its way to becoming the strongest contender to drive future growth. While still in its nascent stage, AI is projected to add $ 500 billion to India's GDP by 2025 and, as one would expect, this number is poised to grow exponentially in the coming decades.

This booklet celebrates India's thriving AI sector, as we celebrate *Azadi Ka Amrit Mahotsav*, by showcasing some of the most impactful and creative uses of AI to solve important challenges in business and society today. The sheer volume and diversity of solutions accurately capture India's versatility and prowess in the field of AI, and the immense scope for innovation that exists in the market. Armed with the right strategy and backed by suitable talent, India is unstoppable in its pursuit of an AI-driven future for its citizens and for the world.

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