THE ROLE OF ARTIFICIAL INTELLIGENCE IN INDIAN PERSPECTIVE: A CRITICAL STUDY

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Abstract:

Artificial intelligence is the branch of computer science which is concerned with developing machines capable of completing tasks requiring human intelligence. The advent of AI is a paradigm shift which needs to be fully harnessed for well-being of humanity. India has made significant progress in developing AI capability-building in the past few years through government initiative and private sector investments. In June 2018, Niti Aayog had released a paper which directs India's AI focus on five sectors: healthcare, agriculture, education, smart cities and infrastructure, and smart mobility and transportation. It has coined the term #AIforAll. This paper underlines a vision that India can become the leader in Artificial Intelligence.

In 2018, the National AI Strategy was published by the government. Since then, several initiatives have been taken to develop a strong AI ecosystem. The Centre of Excellence in Data Analysis (CEDA) has been established to provide expert data analytics services to government departments. Further, the Future Skills Prime online capacity-building platform has been launched to skill and reskill professionals in emerging technologies and in job roles. Also, the National AI Portal has been launched as a one-stop digital platform for collaboration and knowledge-sharing in AI. The concerned ministry (MEITY) is soon going to launch the National Programmed on AI.

However, a long leap has to be taken in this regard. The progress in AI development will lead to our economic well-being and contrary to expectations; it will help in new job creations. ButFor this, we urgently require a strong skilled manpower in AI applications as well as building up a gigantic database. We also need a robust data protection law for the protection of databases and individual privacy.

Keywords: Artificial Intelligence, Data analytics, Data Protection, Privacy, Capacity-building.

INTRODUCTION

Artificial intelligence is basically a computer programmer which is designed to do a specific task that can be accomplished by humans only. AI is thus the simulation of human intelligence and learning by machines. The thing that differentiates AI from other computer programmers is the code that permits the programmer to sometimes rework it. That implies that it can learn. AI is also capable of handling more data than any human and can do it several million times faster. In the words of Mr. Ravi Shankar Prasad, the Union Minister for Electronics & Information Technology, Government of India, "The advent of Artificial Intelligence is not just an incremental change, but a paradigm shift which must be harnessed for humanity's well-being".

In India, the growth and development of Artificial Intelligence is in nascent stage. It is being used in some sectors, mainly by start-ups or some institutions but in piecemeal manner. Niti Ayog has brought out a policy paper in 2018 which has focused on five key sectors for their growth based

on the intensive use of artificial intelligence, namely agriculture, healthcare, smart cities and infrastructure, and transport. It highlights the potential for India to become an AI "garage", or solution provider, for 40% of the world. However, there seems to be many obstacles in the achievement of this ambitious goal. This study aims to highlight the progress made in some core sectors in India and also to focus on the problems on the way.

APPLICATIONS OF AI IN INDIA
Agriculture
N agriculture, the use of artificial intelligence will help in providing information to farmers on the quality of soil, when to sow, where to spray herbicide, and when to expect infestation of pests. In India, there are about 30 million farmers with smartphones. But its use for augmentation of agriculture potential is almost minimal. It is mainly due to the poor extension service. Computers can help the agricultural universities in advising farmers on best practices. If it happens, India will witness a farming revolution. At present, AI-based solutions on water management, crop insurance and pest control are being developed in our country. With the help of technologies like image recognition, drones, and automated intelligent monitoring of irrigation systems, the farmers are supposed to destroy weeds more effectively, harvest better crops and ensure higher yields. Further, voice-based products with strong vernacular language support can enable the farmers to get accurate information. A pilot project has been taken up in the three districts, namely, Bhopal, Rajkot and Nanded which has developed an AI-based decision support platform combined with weather sensing technology to give farm level advisories related to weather forecasts and soil moisture information. It will help farmers in decision-making as to water and crop management. (ICRISAT) has developed an AI-power sowing app, which utilizes weather models and data on local crop yield and rainfall to predict and advise the farmers more correctly on the timing to plant their seeds. This has led to an increase in yield from 10 to 30 per cent for farmers. Moreover, AI-based systems can help in establishing partnerships with financial institutions with the strong rural segment to provide farmers proper access to credit facility. Further, AI-based pest management application has been instrumental in reducing the damage caused by the pink bollworm and quality improvement of the crop raised by the cotton farmers in Maharashtra, Gujarat and Telangana. According to a report by Wadhwani Institute for AI, this application built by the Institute works on a simple smartphone and provides 'real-time, localized, and accurate' pest advisory that can help the farmers in controlling the pest problem and saving the crops. Presently, this system is functional in four districts of three states in India that is helpful for the farmers to improve cotton quality and in saving costs. According to the report, there is 17% increase in yield of cotton crop in the three states, and they received 8% higher price due to the increase in quality of cotton.

AI in flood forecasts
An AI-based flood forecasting model has been implemented in Bihar, which is now being expanded to whole of India, to ensure that around 200 million people across 2,50, 000 square kilometers area get alerts and warnings 48 hours earlier about impending floods. These alerts are flashed in nine languages and are kept confined to specific areas and villages which are prone to floods. This is done with the adequate use of info graphics and maps to ensure its each to all concerned.

Healthcare
AI is fruitfully being used in the field of medicine and healthcare. It has been successfully used to

detect heart and lung ailments and treat cancers. Two years back, a recent study found that a Google neural network correctly identified cancerous skin lesions more often than expert dermatologists did. Scientists have also developed an Artificial Intelligence tool that can successfully predict whether a patient is at risk of developing a serious and potentially life-threatening infection after surgery. Lily Peng, Google Health product manager and a non-practicing physician, in an interview with Times of India has stated that "Mostly, the problems where AI can be useful are routine and common. Medical imaging is generally a good example since you have large datasets to work with and the information that is gathered is not always uniform". She further emphasizes that some of the biggest healthcare problems like cancer, heart disease and diabetes can be addressed with the help of AI. In a paper published in Nature Medicine, a group of researchers in the United States and China have reported that they had built a system that automatically diagnoses common childhood conditions-from influenza to meningitis- after processing the patient's symptoms, history, lab results and other clinical data with the help of Artificial Intelligence. The system was found to be highly accurate.

In India, a Bengaluru based start-up has developed a non-invasive, AI-enabled technology to screen for early signs of breast cancer. Similarly, hospitals in Tamil Nadu are using Machine Learning algorithms to detect diabetic retinopathy and help address the challenge of shortage of eye doctors. Further, an AI-enabled Chatbot was used by MyGov official portal for ensuring communications for the COVID-19 response. Similarly, the Indian Council of Medical Research (ICMR) put in practice, the Watson Assistant on its portal to respond to specificQueries of the frontline staff and data entry operators from various testing and diagnostic facilities across the country during COVID-19. Moreover, AI-based applications have proved to be useful to biopharmaceutical companies in shortening significantly the preclinical drug identification and design process from several years to few days or months. This intervention has helped the pharmaceutical companies to identify possible pharmaceutical therapies to combat the spread of COVID-19 by repurposing drugs.

In Ahmedabad, a cardiologist performed the world's first in-human telerobotic coronary ntervention on a patient nearly 32 km away in December 2018. This clearly heralded the dawn of AI in the Indian medical scenario. An artificial intelligence (AI) tool, qXR, to interpret chest X-rays was developed by the Mumbai-based Qure.ai, a healthcare technology company. It was trained on over 1.5 million X-rays to detect 15 chest abnormalities, ranging from tuberculosis to potentially cancerous lung nodules. Later, testing of the product was done in collaboration with the Bengaluru hospitals of the Colombia Asia healthcare group. The company received a set of 2,000 chest X-rays from Colombia Asia's digital database which was then interpreted by qXR. Next, the AI's findings were compared with the interpretations by three expert radiologists. It was found that the AI was calling the X-rays correctly around 90% of the time. AI-based technology is also helpful in taking services to populations that have been underserved till now. For example, there are not enough pathologists available in the country. Any system which can effectively study a large number of samples at a time would certainly fill this gap. In India, SigTuple, a start-up, is doing it. A device designed by SigTuple creates a digital image of every blood slide submitted and analyses it. The analysis by the algorithm in clinical trials has been found to be as accurate as a pathologist studying it. Keeping in view the total availability of pathologists in the country is limited to just 19,000; this is proving to be a crucial time-saver.

Further, at Max Healthcare, Delhi, AI is being used to help monitor critical patients resulting in freeing up beds in the ICU's and cutting down critical care costs to patients by 30%.[xiii] Lastly,

Google is partnering with Madurai-based Aravind Eye Hospital on an AI-based algorithm to screen diabetic retinopathy and detect the early onset of blindness. Diabetic Retinopathy (DR) is the second leading cause of blindness. It is a condition where lesions develop in the retina ofThe eye of those living with long-standing diabetes which puts them at risk of losing vision, if untreated. In April 2018, USA's Food and Drug Administration validated AI as a significant DR screening tool. In this regard, it needs to be mentioned here that in Mumbai, India's first research institute, the Wadhwani Institute, focused on artificial intelligence (AI), with potential applications in the fields of education, agriculture, healthcare and infrastructure, was inaugurated by the Prime Minister in February 2018. The big advantage of AI in healthcare is that it can help where there is a scarcity of human resources. India, with its acute shortage of specialist doctors in rural areas, could immensely benefit from the use of AI. At Wadhwani AI the aim is to collaborate with governmental, non-governmental and public sector institutions to gain access to data fields from different communities and regions. To begin with, the Institute is in touch with the Maharashtra government's public health department to identify which communities to focus on, and the specific problems that different villages have when it comes to healthcare. It helps in data collection. Using such data an app can be developed which can serve as an assistant to health workers by collating the medical history of patients ranging from age to prior health issues, nutrition levels, living conditions, family habits, and such data can be used for predictive analysis too.

AI can make a real difference to the Indian healthcare system. At present, there is no connection between hospital systems around the country and the underlying data of patient health records, diagnosis, and treatment outcome. Moreover, our healthcare system is basically relying on providing reactive treatment rather than preventive care. In this regard, a nation-wide uniform and centralized data- deposition system will be immensely useful as a first step. This can be incorporated into the National Health Policy of 2017 which has the potential to significantly change patient diagnosis and treatment, and aid in preventive health management. For example, patients living in villages can send their eye images to ophthalmologist for confirming the diagnosis and further recommending the treatment for immediate clinical intervention, if required. This can be easily done with the help of a mobile phone fitted with camera which is not a thing of the past for the villagers now. Such a system has been in vogue outside India. Scientists from the University of California have shown that it is possible to diagnose retinal disorders and childhood pneumonia quickly and accurately using images of the human eye and chest X-rays. Similarly, scientists from Singapore and the University of Southern California,U.S., have made AI-based tools to detect outbreaks in advance. In India, a similar predictive tool accompanied by an underlying system that can integrate data from hospitals, will be quite helpful to predict, stop and take pre-emptive measures for future surveillance, safety and follow-up in case of outbreaks like dengue, Nipah virus or the latest novel corona virus.

Education

In the field of education also, the use of AI has made a beginning. Next Education, an end-tech company in Hyderabad has developed an AI-driven assessment platform that can set papers within one minute and customize questions to each student's learning needs. It also gives instantaneous results. This platform is being used by more than 50 schools in India. At present, a teacher takes, on an average, an hour or more to set a question paper with 35 objective questions. This is a time-consuming exercise that can be repeated only at set intervals. In this new process, adaptive assessments provide very accurate results. The teacher can give

individual feedback to each child on what should be the way for improvement. It is far more advantageous than handing out a general advance to students to perform better. That way AI allows teachers to be more focused. In the early 2019, the Mount Zion School in Gangtok, Sikkim introduced adaptive assessment software, Next Assessment that uses artificial intelligence for setting and assessing objective question papers. Similarly, Algorithms are replacing mentors for the students. AI now enables students to discover a unique path of learning, customized to their aspiration and capabilities. Krackin, a student engagement and employability platform that matches students with skills they need for the job they want, and connects them with recruiters. Such skills are not part of their curriculum. For example, if a third-year engineering student wants to be a data scientist, Krackin will sift through his academic and curricular profile and give him an employability score. It will also suggest skills appropriate for his becoming an attractive candidate for a data scientist's job. This platform is now being used in 89 colleges and by more than 300 companies till the end of 2019. Further, Remote Proctoring is an AI platform that allows teachers to remotely invigilate an online exam. The technology used in this case captures physical movements of the candidate. In case the candidate tries to open a new window or an URL, it immediately sends an alert to the remote invigilator. This reduces the logistical burden of conducting and writing exams. In some of the schools in Tamil Nadu, the attendance register has been replaced by a mobile app.

While traditional attendance takes about 10 minutes, this AI-driven app can do the task in one minute. This is a Bengaluru-based system, known as ICET attendance system. AI is proving quite helpful in checking the impersonation during the exams. Recently, the National Testing Agency has identified 56 candidates from the February cycle of JEE (Main) 2021, whose images match with some of the 20,000 top-ranked candidates of the exams in 2019 and 2020 despite differences in other credentials. According to the Ministry of Education officials, after registration, NTA matches the images of candidates with those of previous years' toppers. "There may be repeat candidates, but their details will remain the same. However, based on AI algorithm, we found that there are 56 such candidates whose image matches with someone from the top 20,000 of either 2019 or 2020 exams, but their credentials are different".

In this changing world of ours, knowing must shift to learning. Though machine learning is transforming online education, yet a lot more is needed to be done in this regard. Manish Sabharwal and Shantanu Rooj in their article aptly summaries this by stating that " We believe that the basification of machine learning could be the missing ingredient- enabling personalization, flip classrooms, rethinking assessments, enabling non-conventional credentialing, etc." ...... However, Indian online education is held back by regulatory cholesterol that distinguishes between distance and online education". It is noteworthy here that in the recent Niti Aayog paper, education is one of the five key sectors on which much emphasis is to be given by the government. It is hoped that in near future, the much-needed cholesterol will be infused into education sector to make it more pliant to the needs of modern society. In this context, it is pertinent to note that The Central Board of Secondary Education has integrated AI in the school curriculum to ensure that students passing out have the basic knowledge and skills of data science, machine learning and artificial intelligence. The Ministry of Electronics and Information Technology (MeitY) had launched a "Responsible AI for Youth" programmer this year in (April 2020), wherein more than 11,000 students from government schools completed the basic course in AI.

Industry

In India, AI adoption is governed by the evolution of the IT infrastructure. As per the IDC Cognitive User Adoption Survey (2017), an overwhelming majority of Indian organizations, Nearly 70% have either adopted or have plans to leverage cognitive capabilities in the next 18 months. This includes a combination of pilot and enterprise-wide deployments. At present, one in five organizations has already deployed cognitive systems which indicates a higher level of maturity as compared to Asia-Pacific counterparts where this ratio is one is to ten in regard to implementation of deployment of cognitive systems in the organizations. In Indian scenario, the specific industries in this regard are telecom, technology and banking which may rightly be mentioned as frontrunners. To begin with, State Bank of India recently announced plans to leverage AI for its integrated platform, YONO (You Only Need One). This is a digital banking platform which provides access to users to banking as well as a host of lifestyle services through a single sign-on. The other sector is healthcare industry that places reliance on AI to fine-tune the accuracy of medical predictions, and accordingly selecting an appropriate line of treatment. Retail is another area where AI has made a strong presence. Mainly, E- commerce firms depend largely on AI tools to detect malpractices, improve conversion ratios and foresee consumer buying patterns. Factually, e-tailers in India are increasingly using AI for personalized recommendations and better optimization of their supply chain networks. In this context, Tata Cliq, and The Label Life are working with Mad Street Den that is offering visual search technology, product recommendations and personalised homepages based on the tastes of individual shoppers. This helps in improving customer experience considerably leading to wider conversations.

In order to help a CEO of a company to supervise thousands of markets and stores, a Bengaluru-based, Manthan Analytics is constructing a $100- million voice-based AI platform called Maya. This will enable a CEO to get access to statistics on any specific market and can deduce the response of daily sales. This system records both social feeds and also tallies it with market performance. Further, companies such as Starbucks and Pizza Hut are working to execute chatbots to help accelerate customer purchases. With the advancement of Chatbot technology, virtual agents will be able to forge a more personal relationship with each customer. In doing so, they can also track customer purchases, behavior and preferences. This data can later be integrated into a conversation to recommend products or services. Successful companies process high volumes of data regularly to gain meaningful insights. Retail, in particular, is such an area where businesses are deploying AI analytics to ensure availability of right product in

The right place at the right time. The use of AI is helping organizations present actionable insights, drive revenues, boost efficiencies, help think through complex problem areas and transform customer experiences. In near future, industries are expected to experience more AI use cases ranging from digital shopping assistants in retail to carefully curated teams in sports, and factory automation systems in manufacturing.

AI and the law

In India, there are nearly 3 core cases pending in the courts at present which is a matter of grave concern for all. In a recent observation, Chief Justice of India, S.A. Bobde has highlighted the importance of artificial intelligence for courtrooms. The use of technology can really help in facilitating reduction of backlog in courts. Mr. Amitabh Kant, the CEO of Niti Ayog, has stated in an article in The Economic Times, that "the judiciary could explore the assimilation of technology that is disruptive and seamless to build upon its proactive effort to integrate IT and

communication-led technologies, including through the e-court project. Tools derived from AI will help expedite case-flow management, unclog the processes that are slowing justice down, and in many cases, ease administrative aspects". In this regard, significant progress has been made. Presently, standardization of data collection is in existence. AI would help in real- time governance of courts based on simple metrics such as frequency of case disposal per judge, or categorization of subject matter with respect to judges. Resultantly, the CJI and chief justices of high courts can have a live dashboard regularly updating them on the lower courts' performance based on color-coded markers for various key performance indicators (KPIs). This would create a better deal of accountability and trust in the system. (). This will also help in identifying which laws or the specific sections within a particular law are generating larger amounts of litigation. Accordingly, the remedial steps can be ensured in order to lighten the judiciary burdened with huge number of cases. The National Judicial Data Grid (NJDG) has already begun to provide data containing fresh insights.

AI through machine learning is helpful to judges, their personnel and attorneys in another way also. According to Bloomberg, it enables them to "improve case law searches for relevant legal authority to cite in briefs and decisions". Some scholars and legal practitioners have started using AI to 'predict the outcome of cases based on algorithms based on tens of thousands of Prior cases' with an approximate accuracy of 70%. Besides the other innovations in dispute resolution mechanisms, the use of AI and other technological interventions can be epoch-making.

he use of AI is gradually increasing in routine policing work. In February 2019, the Kerala police inducted a robot for police work. Recently, jail authorities and Banda district police (in U.P.) are set to deploy AI based drone cameras for aerial surveillance of Banda jail compound and adjoining areas to screen any suspicious movement in view of the security of jailed gangster, Mukhtar Ansari. AI tools like face recognition can be effectively used to track criminals by the optimum use of data obtained from the CCTV cameras which are growing enormously. During the lockdown this year, the Telangana police used AI-enabled automated number plate recognition software to catch violations.

AI's use in hiring real talents
AI -assisted technology equipped with amazing features such as Big Data and Predictive Analysis has revolutionized the recruitment process followed by the Indian business organizations. In this process, activities like making phone calls to potential customers, shortlisting of the resumes and replying the applicants through emails are switched to AI software in digitally transformed organizations. Apart from assisting the recruiter agency in the preliminary works, this technology is fairly impressive in judging the candidates over analytical skills and psycho-emotional traits. These collateral benefits are also helpful in reducing the cost of hiring and granting more time to managers in meeting their targets. There are HR software's like ATS, Entelo, HireVue, Beanery, JobBot, and Mya which are enabling the techno-savvy enterprises in quality hiring of personnel. While Entelo and Beanery search and check the profiles of the potential candidates on social media to find out applicants planning to switch jobs, the HireVue is quite useful for assessing the personality of applicants on various facial and verbal parameters in video interviews. Mya and JobBot are interactive software that communicates with applicants on chatbots and based on these virtual communications, they do the ranking of the candidates and help to schedule interviews with the staff of the concerned department. This new system is

neutral to religion, caste, color, gender, and race. AI led system is free from any biases and discriminations. This helps in generating a healthy work Culture and improves employees' satisfaction level. It not only saves time and money of the organization but also provides an opportunity to them to select people best suited to the job. By using AI tools, companies can easily optimize their resources that include human capital also.

AI and the jobs

Whether in India, the introduction of AI is going to result in job loss phenomenon? According to an estimate by Teamlease Services study, more than half of generic work profiles are facing the risk of disruption over the next two years. However, this does not imply that the automation will necessarily result in job losses. On the contrary, automation would throw up new job profiles for those getting substituted. The study, based on data from secondary sources estimates 52-69% of repetitive and predictive roles in sectors such as IT, financial services, manufacturing, transportation, packaging and shipping to get exposed to the risk of automation in the near future. However, we have witnessed the impact of technology and automation earlier also in case of ATMs. Then it was thought that the ATMs would do away with the cashier's in the bank. But both exist in today's scenario. Moreover, automation would allow humans to get more involved in tasks requiring higher specialization and critical thinking. As against this, we have enough number of talented workforces fully well-versed in the field of computer learning. They only need specialized training and orientation programmers to tone themselves up in automation-related field.

In a survey conducted by the All India Management Association (AIMA) & the PwC in 2018, it was found that as much as 49% companies, that responded how artificial intelligence is reshaping jobs, had implemented AI solutions in their businesses and were enjoying the productivity benefits. In another survey by EY and Nasscom on the Future of Jobs in India, there will be a change in workforce mix by 2022 due to enhanced adoption of technologies. By then, 9% of the workforce will be deployed in new jobs that do not exist today. 37% will be in jobs with radically changed skillsets and rest 54% will remain unchanged. On the basis of above-mentioned surveys it can be deduced that automation will only bring the change in the job profiles to some extent. It will not reduce the quantum of employment in any case. At the same time, it will bring a new set of jobs which will require higher level of specialized Knowledge and learning attracting the enterprising brains available in the field. For this, the focus of the India's engineering education will have to be shifted from quantity to quality to provide necessary manpower for IT needs in the coming years.

AI and the traffic management system in Smart City project

In the Kalyan Dombivli Municipal Corporation, the process of installing 1,200 closed-circuit television (CCTV) cameras is on which is being carried out by Vehant Technologies. Its very purpose is to improve surveillance traffic management under the Smart City mission programmer. So far, 75 such cameras have been installed for the intelligent traffic management system which envisages the system's connectivity to a central control center, mainly responsible for managing traffic signals depending on vehicle density. These AI-based cameras can take snapshots of vehicles and feed them back into a system integrated with the central database. This leads to issuance of challahs for traffic violations. In case a car has jumped a red light, the trained cameras can detect the violation and can also issue an e-challan to violators through an SMS. The artificial intelligence firm, Vehant Technologies is working with NEC and CMS as system integrators for this project.

CONSTRAINTS ON THE WAY

For the successful implementation of AI in India, one has to keep in mind the importance of data in this regard. "Data is the basic building block for any AI system. India, with over 700 million internet subscribers, 1.21 billion phone-users generate massive amounts of data daily. It has the largest user-base for some of the major global internet companies; it also offers the most affordable internet services in the world. These.....put India at the cusp of the AI revolution". What is needed in this regard is the presence of a proper mechanism for the upkeep of these gigantic databases for the optimum use in AI applications. The other major constraint is lack of effective and robust data protection laws in the country. Though a Bill is pending in the Parliament, yet only time will tell about its efficacy. Unless data is properly secured and a legal regime is there, the efficient use of data for AI purposes will be a far cry in India.

CONCLUSION

Given the availability of huge amount of data and an efficient pool of technical manpower, India can shortly emerge as an AI superpower. But we have to evolve strategies for the better and well-oiled mechanism for upkeep and protection of stored data. Also, we need to work on producing well-trained and skilled manpower in this regard. It seems that we are on the way to achieve this ambitious goal of becoming a role model in the field of AI applications for the betterment of humanity. A concerted effort is mandatory from all concerned to push back the troublesome barriers in the widespread use of AI in India.

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