



Mapping the growth and challenges of artificial intelligence in India: An introduction

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Abstract

Artificial Intelligence is marking its footprints all across the world in different sectors. India is no exception in this list. Artificial Intelligence has immense potential to contribute significantly to the whole project of Good Governance. In India, from health to education, Agriculture to Defense, AI is being used to accelerate the positive outcomes. AI, however, is throwing some very serious ethical question which requires our attention. From unemployment to the question of privacy, Transparency to the issue of biases, we need to discuss such issues before AI is implemented. This requires a comprehensive study of the subject matter. The study of AI should not be prerogative of any one particular discipline. The discipline of law is as much important as the discipline of social science. Study of AI from the social science perspective becomes more important when a machine that is working on the principles of AI will interact with an extremely diverse country like India. Different values, faith, caste, and languages throw a different kind of challenge that needs to be taken care off.

Keywords: ethics, artificial intelligence, machine learning, India

Introduction

The reliance of Human being on Technology is not a new phenomenon. When the great civilizations across the world were not developed in their real sense, human being invented different tools and primordial technologies for its comfort and survival. The invention of the wheel and precise stone weapons are some of the examples of human endeavor in this field. Over a period of time, as we developed, our quest for new technological innovations also unfolded itself very rapidly. The transition from a primitive age to this present modern age has seen numbers of new technologies, created by human beings. Though we come a long way from the old age ordinary tools and technique to state of the art and most precise technological innovations, the common thread of this transition was human control over his brain's bi-product.

With the coming of Artificial intelligence human control over its creation does not appear so effortless. Scholars and scientists, who are working in the field of Artificial Intelligence (Hereafter AI), have argued to the extent where the whole of humanity may itself fall under the control of AI. Such scholars vehemently champion the idea that days are not far away when AI equipped machines would be in a position to manipulate the humans. And therefore, the apprehension that AI could be more fatal than anything else should never be disdain. However, none of them have denied the immense potential of AI. Driverless car to precise prediction in Health and Agriculture services, from industry to Defense, machines functioning on the principles of AI are now being used to every possible extent. An ordinary man also interacts with AI daily, knowingly or unknowingly.

This paper attempts to map out the contemporary debates of AI and would critically analyze the interaction of AI with human beings. An attempt would be made to probe areas where AI has already made its footprints. The paper would also explore the ethical dimensions that are arising with coming up of AI. Not all the question raised in this paper

can be addressed as of now and therefore requires a holistic, inter-disciplinary approach to deal with. This paper encourages people across various disciplines to come together and engage with the subject matter because the kind of complex challenges that AI is throwing before us cannot be solved in isolation or with any specific disciplinary approach.

Evolution of AI

Professor John McCarthy was the one who coined the term Artificial Intelligence, and therefore he is often referred to as the Father of AI. He coined this term in 1956. He defined AI as, "it is the Science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable.

When a computer or machine can perform such tasks which typically require a human mind and intelligence, this ability of machine is called AI. This is a very straightforward definition of AI, and there is a consensus over it among the scholars who are working in this field. In a way, it is machine doing all such things usually performed by humans. Recognition of faces in different photos, driving a car or predicting what we may like based on our previous choices... these are some of the instances to show how AI is stimulating human intelligence. Before we proceed further, we must make a distinction between an ordinary machine and a machine working on the principles of AI. The everyday computer has limited functions that it can perform. Our daily use of Dedicated desktop does not learn from and predict something, the kind of data it deals with, however, in the case of AI equipped computer, the machine not only analyses the data instead it also learns and predict based on the data it is interacting with. As AI is still in its evolutionary phase, there is a vigorous debate taking place on the very nature of AI. Is AI being mere stimulation of Human Intelligence? We don't know because the world still

has to see AI in its complete avatar. However, McCarthy had said that to some extent we can say that AI is stimulation of Human Intelligence but it is not confined to mere stimulation of Human Intelligence, and it goes beyond that. He noted that AI researchers are free to engage with methods that are not observed in people while making any decision, meaning by scientists are free to design a machine working on the principle of AI which can surpass the human intelligence and make decision not based on how we usually arrive at a decision instead, the machine may evolve its mechanisms.

John Searle's through his famous Chinese Room argument where he held that no digital machine can understand language and there is no possibility of artificial mind. He argues that digital machine can merely stimulate the ability to understand Chinese language but can we say that machine has understood the Chinese language? He makes a distinction between strong AI and weak AI and argues that stimulation part of a computer is a manifestation of weak AI where computer only stimulates and do not take decision based on intelligence as we humans used to do. He also rejected the test developed by Alan Turing to determine whether a machine can think intelligently like a human being. He instead argued that machine can easily pass the Turing Test by simply manipulating the symbols of which they have no idea or understanding in reality.

Thus, even if a machine is able to convince you by making conversation in Chinese language, it does not mean that the machine is able to understand the conversation. It is just following steps programmed in it. Since the machine cannot understand, how can we claim that a machine can develop intelligence which would be parallel to human intelligence? Even if a machine successfully passes the famous Turing Test which it has passed now, we cannot make this claim that the machine really understands our conversation and has a proper understanding of what we meant by our conversation.

Many countries are pushing ahead with this idea of AI very rapidly. One crucial thing to ask is about its name itself. When we use Artificial intelligence, we assume of intelligence which is parallel to human intelligence but is not natural. This artificial intelligence is developed based on different kind of data that it acquires or provided to the machine. Based on that data the machine generates its intelligence which is artificial. However, if we try to locate the process of intelligence generation of humankind, it is more or less similar to that of an artificially intelligent machine. Our surroundings very much influence our nature and thought the process and the kind of things we see, listen and feel. Our surroundings work like data for us and based on that data we develop ourselves most of the time. It may be argued that some people may act differently even if they are placed in different surroundings. But, then this exception may also be applied to the artificially intelligent machines where with the help of some unique algorithms we can make machines performing those things which would be in contrast to the data a machine has gathered from its surroundings. The critical question that should strike our minds is why to call the intelligence of a machine as artificial when both the human, and machines have almost the same process of intelligence building that is based on data. The intelligence of a machine could be named something else but certainly not artificial just because it has earned the intelligence in the same way a human earns it. To

argue that just because something is not natural and therefore it is artificial would not be an appropriate statement.

Coming to the philosophical question as to what kind of philosophy an engineer or someone who is involved in making of algorithms that would be used in AI machine, should use? Someone who is driven by Utilitarian philosophy would not scarify the interest of many against the interest of an individual or few numbers of people. That may result into serious harm to the owner of a driverless car equipped with AI in the case where the car has to hit either the pedestrians on the road or to save them the owner of the vehicle has to bear the brunt of the collision. The classical *Trolley Dilemma* developed by Philippa Foot is no more a dilemma to read and think only.

With the induction of driverless car, we have to decide where we have to decide the interest of few verses interest of many. If we left this crucial task solely upon the companies who are engaged in the business of car making, they would always prefer to save the owner of the car. The interest of the passengers on the road would be marginalized entirely in such situations. Though the use of AI is full of paradox, its potential to answer some very fundamental issues such as governance, effective delivery of social services cannot be ignored.

Where India stands in the age of AI?

AI is gaining currency in India on a very serious note. The government of India has constituted a committee under the Ministry of Commerce and Industry, to look into this matter under the chairmanship of V. Kambakoti. The report submitted is titled as, '*The Artificial Intelligence Task Force*'. The committee has examined the responsible use of AI as well as ethical and social safety issues. NITI Aayog is also entrusted with the responsibility to explore the mechanisms through which the potentials of AI can be harnessed effectively. In its report, '*National Strategy for Artificial Intelligence: #AIFORALL*'. NITI Aayog has identified five key sectors where AI can be used to foster the idea of Good Governance. These five sectors are Healthcare, Agriculture, Education, Smart cities and infrastructure, and, smart Mobility and Transportation. Here I would like to illustrate a few examples in order to support my argument that we can harness the potentials of AI in solving some very fundamental challenges of our society.

Microsoft Company in India has developed a sowing App that works on the principles of AI. This is being done in collaboration with ICRISAT. Farmers do not need to install any app or require any Smartphone. All they need is a simple phone which is capable of receiving text messages. Climate data from 1986 to 2015 were analyzed coupled with image reorganization of the soil, satellite images etc. This gives farmer's important advisories such as sowing date, sowing depth, soil treatment. This program was used in Andhra Pradesh and Karnataka and successfully noted the increase of 10 to 30 % in yield. NITI Aayog and IBM have partnered to develop a crop yield prediction model using AI to provide real time advisory to farmers. The data from remote sensing (ISRO), Soil Health card, IMD's weather prediction, and crop phenology, etc. to give real-time precise information to farmers. This pilot project is being implemented in 10 districts across the states of Assam, Bihar, Jharkhand, Madhya Pradesh, Maharashtra, Rajasthan, and Uttar Pradesh.

The education sector in India is not aloof of this new technological innovation. However, despite having a considerable growing economy for a sustained period of time, India still lacks to manage an adequate literacy reach among its population. This problem is further exacerbated by low quality education and high drop rates from schools and colleges. Maharashtra government in collaboration with Microsoft is taking the rout of AI to solve this complex puzzle. It has decided parameters such as academic performance, socio-economic condition, and demography, the infrastructure of the school and colleges and ability of the teachers assigned for teaching work. Application powered by Azure Machine Learning process, this a variety of data is being analyzed to find a pattern. Based on the predictive patterns government has planned to solve these complex challenges. So far, the government has identified 195000 probable dropouts from the school in Visakhapatnam for the academic session 2018-19.

Another initiative can be seen where Delhi traffic police have shared the proposal to use 1,000 crores project with Lieutenant Governor of Delhi and got the approval for the same. The whole idea is to use high-resolution cameras equipped with a sensor that can count real-time traffic volume. Around 7,000 to 8,000 cameras would be deployed with multidirectional infrared and colorless laser sensors will count the volume based on image pattern analysis. This real-time traffic information would help immensely to traffic officials to come up with new alternative ways for reducing traffic congestion. In a city like Delhi, there is a pattern of traffic congestion and traffic officials use their own experiences and limited human resources to deal with it. However, given the option of real-time traffic volume, live feed through AI equipped cameras which can read and analyze the traffic data and make a prediction as well, things would be easier not only for commuters but for police officials as well. Many of the Indian banks are now deploying AI machines in their branches to provide a customer friendly environment along with smooth completion of the work. The HDFC bank has deployed an AI equipped chatbot which works 24*7 and provides seamless products and features information. The most important thing to note here is that it keeps learning and evolves itself better than its previous performance based on data it receives. The Bank claims that its AI based chatbot has already answered more than 5 million queries around a million customers with more than 85% accuracy. From knowing the IFSC code of the bank, address of the Branch, documents require for loan and account to steps to get a loan, etc. are few of services for which customers are no more required to stand in a queue merely to access this information. The best part of this service is that customers can get all this information instantly by just having a simple conversation with EVA.

The machine is interacting with hundreds of people on a daily basis and gathering the information. Based on the collected data machine is continuously improving itself as well. Imagine a person who is not well versed with how to get things done in the bank and where to go in a bank for a particular task. The AI equipped robot is helping such people by letting them know which counter they should approach. Chat boats are also used by Indian banks such as SBI, Axis Bank and others to a large extent. Here again, the machine has come to know what sort of information people usually ask based on data it has gathered through different

interaction. KYC, mobile number and address updated are a few minimal issues which can take a lot of time if the bank is overcrowded or you don't know where you should approach. Now, banks are using AI to deal with such problems. Unlike human being who might get irritated and respond rudely if he/she is being asked the same questions for multiple times and this happens in banks, the chatbot does not entail this irritation problem. Many new firms are increasing across the world including in India which are attracting creative and innovative minds. Rubique (Fintech), Niki.ai (E-Commerce), Embibe (Education) are some of the successful examples of AI and entrepreneurship coming together in India.

A country like India where we have a large number of institutions such as IITs NITs, IIS and others full with human resources, India seems to have the strength and prowess in harnessing the power of AI. Effective and Efficient Implementation of AI can only be possible if we draw the attention of researchers across the discipline on a common platform. To confine AI in the domain of any one particular discipline would not be beneficial because the discipline of Law is as much relevant as the discipline of philosophy. A mere technological input in a machine is not enough which is going to interact with the people in society on a daily basis. Looking at the diverse culture and value system of a country like India, cross-discipline research is strongly required. Therefore, the research has to integrate the disciplines like philosophy, sociology, anthropology, political science, Law, IT and other technical branches of engineering. It is noteworthy to mention here that many countries such as China, Japan, and the European Union have already marked significant footprints in this domain. European Union has already set the process of making ethical standards of AI and legal norms in motion. The vital thing to learn here that before it is too late; India must mobilize all of its existing resources to grab the unflinching potentials of artificial intelligence wisely and carefully.

Key Challenges

When computer technology was introduced in this country, many apprehensions arose regarding the employment particularly the manual works which were earlier used to be performed by men and now with the entry of computer they were most likely to be replaced by the computers. This fact is undeniable that many jobs got replaced rampantly with the computer taking place in every possible working organization. According to the World Bank report, builds on Frey and Osborn's. Original methodology, automation threatens almost 69 % of the jobs in India and 77 % of jobs in China in times to come. One of the most pressing concerns about the consequences that AI would carry is a large number of displacements of workers particularly unskilled low wage worker. Without making prior arrangement to deal with such circumstances implementation of AI doesn't seem to be easy and smooth. The other problem is the distribution of wealth created by machine. How would such wealth be distributed in the workforce? This would further widen the gap between rich and poor because as of now the production line of machines working on the principles of AI is in the hands of few rich elites.

However, companies across the world are training their existing fleet of workers with new principles of AI. What is important to note here is that skilled and educated

professional can be reskilled according to the need and designs of machines working on the principles of AI but what about the poor unskilled workers who are deployed in large numbers for different purposes in various industries. Mr. Vishal Sikka said that we are training our existing employees for these new skills. He was CEO of Infosys and now vice chairman of the same leading company in IT. He is very positive and passionate about the use of AI in India. He firmly believes that AI can amplify human potentials. In his opinion the “hype cycle will die” and AI will “produce a tremendous number of applications and have a huge impact.” His entire conversation regarding AI can be read at (<http://knowledge.wharton.upenn.edu/article/ai-needs-broader-realistic-approach/>).

According to a report published by The World Bank, India has only 2.3% of the total workforce that has formal skills training. A similar report suggests on the same line about the low skilled percentage of the workforce in India. When we compare the percentage of formally skilled workforce globally, India scores the least at 2% against Korea (96%), Japan (80%), Germany (75%), UK (68%) and China (40%). The 2016-17 annual report of the Ministry of Skill Development And Entrepreneurship says that less than five percent of the total workforce in India has undergone formal skill training. In such scenario, a large number of poor unskilled laborers of Indian industries may be exposed to extreme vulnerability. Income and wealth disparity are the concern for countries like India because such things already exist in India and, therefore, if AI is not implemented wisely, this has all the traits to augment this wealth and income disparity further.

Herbert Simon, a Nobel Prize winner held that “Machine will be capable, within twenty years, of doing any work a man can do,” and therefore new technologies have the potentials to make many jobs obsolete. This was Simon writing in the 1950s and computers were not very much developed as they are now. It is not an easy task to predict as how much job AI would create in terms of Cloud computing, Data mining or would replace and therefore we should not apotheosize or aggrandize this statement that AI would eat all the existing jobs in one go. Interesting to note here is that what Simon presumed did not happen in the sense that we still have end number of jobs which requires human workforce for various reasons. Also, new technology did create many jobs and information and Technology industry in India is perhaps one of the most leading key industry in terms of providing job opportunities and contributing to the economy of the country. If we have to name a single most resilient and booming sector which has earned a reputation and created employment across the world, it is precisely the IT technology. IT sector in India is not only generating opportunities for employment but also contributing to the Indian economy in the number of ways. Information and Technology is contributing around 7 % of Gross Domestic Production in Indian Economy. NITI Aayog in its report highlighted the fact that if AI is integrated with our economy it has all the potentials to add around \$1 trillion to the Indian economy. We can't predict what would happen precisely, but we can at least claim that AI is not that disastrous as some people argue in the field of employment. The crucial question remains the same, and that is about the poor, unskilled workers. What would be the fate of those workers? In both, the revolutions brought with the entry of computer, and now with AI, it is the low scale,

poor untrained workers who have to face the brunt of machine revolution. In the case of India things could further exacerbate because unlike the developed countries we are still lagging in terms of education, employment, health, and other basic requirements. Automation of jobs should not be seen in homogeneity because AI would impact the different level of jobs differently and therefore we need to pay serious attention to the lower strata of the working force which if left in the wave of AI revolution would hardly survive. We have to devise a just alternative for every level of employers in the workforce whose employments are being replaced.

Further, we need to understand that jobs should not be in singular form always. Rather, jobs consist of a number of tasks performed by different entities. If some of these tasks are being replaced with the coming of AI, it is not that the entire job is gone. AI or for that matter any other technical innovation is only automating some of the tasks which might have been assigned to a few people earlier. For example, in the case of air pilot, the introduction of the automatic plot has not made the role of human pilot obsolete. Rather, in most of the industries, people are being employed to supervise the action of the machine.

Another concern that is coming very heavily with AI is an issue of privacy. AI is threatening to the privacy of an individual in multiple ways. As we already know that AI is all about the game of data. To operate effectively, AI needs a lot of data. The examples we discussed above in this paper clearly shows that AI is learning with the data provided by different individuals. What if I don't want my data to be used by a machine? What if I don't want my behavior towards a particular cause to be observed by a machine and then making a prediction based on such observation? Many of you might have noticed that if you surf about a particular thing on the internet for one or more days, Google will start showing you that stuff in the form of different Ads everywhere on the internet. It is precisely the demonstration of machine learning your mind. We have no control over such things. The issue of Informed consent becomes very pertinent here. We have end number of cases where our data are used for other purposes without our consent. Google has admitted that it traced user location data even when the user has turned off his location. Wherever we go, Google keeps tracing our location and most of us might have noticed that Google map keep asking our feedback about our previous location even if we have turned off our location. Further third-party apps also intrude to our location history.

Suchan Seth argues that recently, host of researchers from Cambridge University, India's national institute of technology and Indian Institute of Science presented a paper where an AI equipped camera can recognize even a partially obscured faces based on deep learning technology of facial recognition. Many of us used to go demonstration and protest against the authority but at the same time do not wish to reveal our identity. With the use of such cameras, things would no longer remain in our hands. We are very well aware of the treatment to Ad-hoc employees of any institutions in India including Indian Universities. Ad-hoc employees do not wish to reveal their identity because they are grappled with the fear that if they are caught in the protest against the authority they might be terminated from their respective jobs.

The apprehensions of Hobbesian state further gain momentum with AI. Although I am using the case of China

here but the kind of issue I am raising here has all fertile land to grow in India as well. We have already seen how a group of young scientists are developing a camera which poses a severe threat to the right to privacy of an individual. Use of Biometrics in the form of Aadhaar has already raised the eyebrows of many who are very skeptical about the possible misuse by the government and private agencies. Though the use of Aadhaar has been justified on the grounds of targeted delivery of public services provided by government and elimination of fraud by providing a unique identification number to every individual, the fear of leak of personal data and use to throttle the freedom of an individual has gone up is haunting many social activists. China is pioneering in this domain by introducing the concept of Social credit system whereby the citizens are being monitored by artificial intelligence, facial recognition, smart glasses, and other technologies. So, if you are involved in activities which appear anti-government in the eyes of executive, you are a regular traffic rule violator, or you are a part of a group that protest and criticize the government on social media and streets your social credit would be reduced to a significant level which will attract punishment in different forms. Your internet speed could be throttled, you may not get a loan from the bank, you may be kept out of best hotels and this punishment can go to the extent where you might be barred from going outside country as well

The technology-driven services and reliance on new scientific products have become a need and order of the day. We can no more afford to live in isolation and away from technology. Of course, some people might argue that there are people who do not want to embrace the new products which are result of rigorous scientific innovations, but to them, my response is straightforward, compare their level of comfort in terms of conducting day to day affairs and person who is well versed in handling and accessing new technologies. Transfer of money from one account to another or opening a new bank account, getting your queries resolved by chatbots working on the principles of AI has now made such tasks to be solved with one single touch. With the opening of new apps, you can follow a few steps, and your work is done.

As I said earlier also, some people might argue that even when these new app and advanced mobile were not there, these works were being done, and even after the introduction of these high-tech innovations, banks are there to receive you. but one must think before making such arguments, given this opportunity to you where you don't need to travel all the way to bank, waiting for your turn and sometimes might have to come again due to various reasons in the bank, would you not like to avoid all these unnecessary steps and wish to transfer your money with just one single touch sitting at your home? I believe most of us would like to have that technology. But how many of can access to such marvelous technological innovations? The answer would be very few. It is because of different reasons. Some of us might deprive due to our financial conditions because we cannot afford such new digital gadget; some of us may not be able to operate because of our illiteracy. Using a simple feature phone is not the sign of every people is in consonance with the rapid unfolding of the new state of the art innovations. The problem starts getting worse when things are made compulsory and ordinary people are left with no other choice but to withdraw itself from the

development finding its place in mainstream society.

Conclusion

There are some other ethical dilemmas which need to be addressed very carefully. To whom we should hold accountable machine or the person who is behind the making of the algorithms of the machine in case machine does something wrong or unintended? Thomas Arnold & Matthias Scheutz talks about having an emergency stop mechanism. They argue that human should always have control over the machine through an emergency mechanism so that he can prevent or divert a machine from either doing or learning something that could cause a threat to the human being.

Responding to some of these important concerns there are many scholars who are coming with some normative framework as to how we should embrace AI. Iyad Rahwan suggests that the algorithms that would be used in an AI machine should be transparent and should be in consonance with the values shared by the stakeholders of the society. The inherent biases are very much possible in a machine which is learning through observing and monitoring peoples around. The other ethical issue that emerges here is that we are doing labor for free of cost in the development of Artificial Intelligence. Big IT giants like Google and Microsoft are using data of its customers to build a more improvised version of AI. What should be noted here is that we are actually working for AI development for free of cost because ultimately the people are the one who are interacting with technologies in different ways and providing their respective data. The issue of accountability, responsibility, transparency, and biases are some very serious problems that have to be taken care off before the implementation of AI on a broad level.

India presents a very fertile land for AI to grow and solve its complex challenges. India not only is one the most leading country in terms of internet and Smartphone users, but it also has some of the world finest institutions such as IITs (Indian Institute of Technology), NITs (National Institutes of Technology), and IISc (Indian Institute of Science). It has a vast database coupled with institutions that can manage this data and use it to solve some of the complex challenges in India. We have taken a call on to what extent we are allowing the reach of AI in India. India has secured 3rd rank in terms of high-quality research papers on AI worldwide. Why I am concerned about the reach of AI in India is precisely because India is also a very diverse country. Unlike many of the western countries who are more or less similar in terms of their living style, culture, language, and values, India presents a very unique diversity. Any new innovation has to withstand the immense cultural and civilization diversity of this country and it is not an easy task. It is because of this reason we need to think twice before we deploy AI in our society.

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