

## **India's Stake in AI Policy**

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### **ABSTRACT**

Recent advances in artificial intelligence (AI) are a wake-up call to policymakers in India, with every one of Indian Governments' flagship programs likely to be directly affected within the next few years. With China making rapid progress in AI-based research, it is imperative that India view AI as a critical element of national security strategies. Encouraging nimble AI-based innovation and establishing AI-ready infrastructure are thus necessary to prepare India's jobs and skills markets for an AI-based future and to secure its strategic interests.

The present policies of the Indian Government in the form of flagship Program -Make in India, Skill India, and Digital India revealed many gaps to be supplemented in the form of an urgent action plans to survive the fourth Industrial Revolution. The Global scenario which is a mirror image of the acquisition of all the benefits of this revolution posed a rampant threat to the India's working population & the demographic dividend. The efforts are also pointed towards India's present position in connotation to AI, the pressure in the form of time & capacity to overcome the challenge & also the adeptness in the form of the foresight for planning of investments in this sector as well as the laid out roadmap to achieve the desired effects & encash this global opportunity to become the world Power. It has thrown light on the soft areas to be targeted with immediate effect & proposed some suggestions to overcome the challenges with due diligence to the speed needed to overcome the paucity of time.

*Keywords: Artificial Intelligence, neural network.*

### **INTRODUCTION**

The Indian government is aggressively trying to increase human capital on a national scale, with a specific emphasis on its younger population through the Skill India initiative so that it can attract global manufacturing to India via its Make in India program. The Digital India initiative is a push to expand digital access nationwide. It is very urgent for policymakers in India to seriously focus on the AI's potential and act on it making it adept in developing AI technology.

AI technology has enormous potential to shape India's economic and technological standing & a robust future. In the absence of a specific policy regime, however, India will find it difficult to realize the full power of AI.

In order to formulate the formidable strategies to encash the AI advantage, India runs the risk of falling behind United States and China.

AI have stimulated great interest from both the private sector and governments across the globe, as it entails the possibility of mass-production of consumer products with humanlike intelligence turn into reality.

## **What is Artificial Intelligence?**

“Artificial intelligence” is the term that is used to describe machines that mimic "cognitive" (thought level) functions that humans associate with other human minds, such as "learning" and "problem solving"

The field was founded on the claim that human intelligence "can be so precisely described that a machine can be made to simulate it". This creates philosophical & ethical arguments about the creation of artificial beings endowed with human-like intelligence. These are issues that have been explored by myth & fiction as well. Some people also consider AI to be a danger to humanity if it progresses unabated. Others believe that AI, unlike previous technological revolutions, will create a risk of mass unemployment.

In computer science, artificial intelligence (AI), sometimes called machine intelligence, is intelligence demonstrated by machines, in contrast to the natural intelligence displayed by humans and animals. . Computer science defines AI research as the study of "intelligent agents": any device that perceives its environment and takes actions so that it successfully achieves its goals

Artificial intelligence can be classified into three different types of systems:

1. Analytical
2. Human-inspired
3. Humanized artificial intelligence

Analytical AI has only characteristics consistent with cognitive intelligence; generating a cognitive representation of the world and using learning based on past experience to inform future decisions.

Human-inspired AI has elements from cognitive and emotional intelligence; understanding human emotions, in addition to cognitive elements, and considering them in their decision making.

Humanized AI shows characteristics of all types of competencies (i.e., cognitive, emotional, and social intelligence) & is able to be self-conscious and is self-aware in interactions with others.

AI research has been divided into subfields, such as particular goals

1. Robotics or machine learning– the use of particular goals
2. Artificial neural networks or logic- the use of particular tools
3. Particular institutions or researchers -based on social factors

## **Goals of AI**

As has been naturally endowed to the human brain. General intelligence is among the long-term goals of this field. The traditional goals of AI research include reasoning, knowledge representation, planning, learning, natural language processing, perception and the ability to move and manipulate objects.

**Approaches to AI**

Approaches include statistical methods, computational intelligence, and traditional symbolic AI. Many tools are used in AI, including versions of search and mathematical optimization, artificial neural networks, and methods based on statistics, probability and economics.

**AI Tools**

The AI field draws upon computer science, information engineering, mathematics, psychology, linguistics, philosophy, and many other fields.

In the twenty-first century, AI techniques have experienced advances in computer power, large amounts of data, and now AI techniques have become an essential part of the technology industry, helping to solve many challenging problems in computer science, software engineering and operations research.

Further, even as AI— broadly defined as the desire to replicate human intelligence in machines The creative hunk In the form of the neural network, automated Machine Learning, and automated data pre-processing, are paving their way through the human cognitive abilities to be duplicated or superimposed through replicating programming popularly called as an ARTIFICIAL INTELLIGENCE.

**OBJECTIVES**

Recent advances in artificial intelligence (AI) are a wake-up call to policymakers in India, with every one of Indian Government flagship programs likely to be directly affected within the next few years. With China making rapid progress in AI-based research, it is imperative that India view AI as a critical element of national security strategies. Encouraging nimble AI-based innovation and establishing AI-ready infrastructure are thus necessary to prepare India's jobs and skills markets for an AI-based future and to secure its strategic interests.

With the advanced computing abilities of the high-powered microprocessors, AI came into mainstream. Business all over the world is enthusiastically tapping the advantage of the new AI Technology. The technology has impacted every aspect of each business. AI has been also assigned a special initiative in its 2019 Union Budget to reap its benefits for different Industries. Govt is planning to establish National Center for Artificial Intelligence as a hub along with centers for Excellence.

The objective of this study is to find the gaps in the

1. Implementation of AI in India.
2. The impediments that India can face for its implementation.
3. To study different areas in the form of the loopholes in its effective utilization.

**The Global Review**

The new AI wave has given magical solutions in the form of automated machine learning or automated pre data processing & have taken away 50% to 90% load of the data analyst & scientists.

The US, followed by China, India, Israel, and Germany, rank as the countries with the highest penetration of artificial intelligence

According to recent survey for the twelve countries in BCG study, percentage of early adopting of AI companies are highest in the US (25%), China (23%), and India (19%), and lowest in Japan (11%), Singapore (10%), and France (10%).

The highest percentage in US is likely due to widespread availability of AI technologies there. China with its economic foresight has overtook US in AI funding phenomenally invested half of the global investment in AI startups, according to BCG.

## **Findings for India**

### **Recent advances in Artificial intelligence**

The victory of machine over human in the ancient board game Alpha Go was a big breakthrough for artificial intelligence in recent years. An AI-based computer developed by London-based Google DeepMind, AlphaGo challenged the world champion of the Chinese board game, Lee Sedol of South Korea, to a series of five games in which the machine defeated the human four to one.

AI-based applications today have already touched people's lives in ways beyond foreseen. Until now the AI technology has been driven largely by the private sector and has been focused primarily on consumer goods.

The intelligent keyboards on smartphones, the voice-activated assistants in tablets and desktops, the machines in users' immediate personal space have become far more intelligent than it was commonly expected.

In spite of the less proliferation amid the Nation, thanks to the global digital economy, AI-powered applications and services have quietly become widely available to Indian consumers and relatively few barriers to their ensconcing without much political consideration

Consumers are readily engaged with the proliferation of AI in India by using a range of online services such as Amazon Marketplace and Netflix that learn from consumers' online behavior to make intelligent product and service recommendations, consumers are readily engaged with the proliferation of AI in India

Policymakers, meanwhile, lag behind, not exploiting AI for national security, public services, or other priorities.

As the infrastructure necessary for an AI revolution in India has been neglected by policymakers, Indian academics, public researchers, labs, and entrepreneurs face a different challenge than the Corporations that reside in the space.

## **GROWTH PROSPECTS OF AI IN INDIA**

### **Cloud-computing -niche for India**

Data storing capacity & data security are the main impediments in the path of prospering of AI in India. Having establish our own Cloud-computing infrastructure we can assure the large storage

of data to our own dispense & remain rest assured for its security as well. As this facility largely resides in servers beyond India's borders, we are unable to store vast amounts of data and possess the massive amount of computing power required by AI.

Almost all of the online tools such as Amazon Web Services (AWS), elastic cloud to the Google machine learning infrastructure that have made AI accessible to the entrepreneurial community rely on infrastructure that exists outside of India.

It is only recently that cloud infrastructure providers have made efforts to invest in this technology in India: Microsoft has pledged to invest in three data centers for its Azure cloud infrastructure, and Amazon has promised to locate some of its AWS infrastructure in India in 2016 due to easier access to cutting-edge technology leading to corporate flight. Lack of data storage capacity in our own country poses a great risk for the Indian Corporates.

### **Investment in AI**

India can have prospective potential for its investment in AI which can collate its human capital as the intelligentsia to come out of the mundane tasks & focus effectively on the critical issues of the business. This can also help in effectively using the creativity of the company's employee for the furtherance of the economic objectives.

The most successful AI projects of the past half-decade showcased by Google's DeepMind, IBM's Watson, and Baidu's Institute of Deep Learning, are the examples of nurturing an ecosystem beyond the four walls of the organization.

Google, IBM, Microsoft, Facebook, and other global technology giants have invested significantly over the decades in machine intelligence.

It is an ongoing challenge for Indian IT entrepreneurs, when India gives birth to the next Google or Microsoft. India has to attain the infrastructure omnipresent in the United States, and makes its existent in China for its sustainable development.

Taking into account the vast linguistic diversity across India the deep-learning capabilities necessary to use machine intelligence may prove elusive.

Thus, the policy focus in India should be more on the organizational structure, facilities, and customs required for these technological demons than to create an Indian Google.

### **Funding AI Research**

As the native on-demand cloud computing infrastructure is absent, the recent advances in AI research are not available in Govt funded Research laboratory. Research in AI across the globe has a long history of public funding. In last two decades, with the advent of the Internet economy, there has been a significant shifting of research toward private-sector.

As reported by KBS World Radio, South Korea recently announced an \$840 million public-private partnership, spanning six corporations to drive AI research and innovation, all for building a "platform for intelligence information society,"

Privately funded research in AI in India is relatively new where Infosys, for example, recently announced its decision to support AI research efforts at the “Indraprastha Institute of Information Technology”, Delhi, apart from its commitment to open-source AI research efforts led by SpaceX founder and Tesla Motors CEO Elon Musk (and others) under the OpenAI Project.

With Arya.ai and just a handful of other Indian AI start-ups beginning to make their mark domestically, India has yet to see its private sector make a significant global impact in AI.

## **UNDERSTANDING AI'S IMPACT ON INDIAN JOBS**

While India dreams of its own manufacturing revolution through its Government's Make in India program, it is important for policymakers to closely examine how the advent of industrial robots and their impact on manufacturing have transformed companies in other developing nations.

If AlphaGo's victory over Lee Sedol is the source of fear for job losses to technology, it is imperative to ponder how AI-influenced automation is beginning to make an impact on Indian jobs.

Bureau of Labor Statistics in 2013 on future employment projections, Darrell M. West of the Brookings Center for Technology Innovation predicted that jobs will decline over the next decade in manufacturing and information technology among other sectors.

By recent interview with Tata Consultancy Services' CEO, in early 2016 he hinted categorically on projected decline in hiring software replacing employees in Indian IT Companies. This is in spite of when the enterprises are using more bots & robots.

The IT services sector is not the first to see a deleterious impact from AI on jobs. Manufacturing Industry was the first to bear the consequences of what has been coined as the “second machine age” or “**fourth industrial revolution.**”

China being the last world economy in creating jobs in manufacturing with the rampant use of Robots as the automated manufacturing is in practice, the mass creation of jobs would also face this problem, though not in near future.

According to Levy, professor emeritus at the Massachusetts Institute of Technology, the greatest area of concern for policymakers ought to be the impact of AI on jobs in the middle-skill category—assembly line workers, clerical workers, and the like.

The other issue with the dislocation is dislocation caused by automation, will also have significant impact on an individual's potential for upward mobility. The reason being these jobs get obsolete very fast.

Though India does not suffer from a brain drain of top-quality, AI talent from university research labs to the industry, it must be wary to avoid this concentration of intellectual energy & need to encourage the shift towards Industry in order to balance the Equitable growth.

Another threat that is sensed by some robotics ethics expert, while calling for an interdisciplinary effort to frame ethics standards for robots and AI, is the possibility of the “loss of human control” likely to result from advances in AI.

There is also a marked dreaded fear about the anxiety over AI mirrors over advances in cloning, genetically modified foods, nuclear weaponry, and other areas of technology.

### **Challenges in AI Implementation in India**

1.The challenges and opportunities of AI’s advances call for urgent responses. Because the challenges that are faced are not in tune with this regime of programs, progressively planned for the implementation AI technology is inadequate to meet the present speed & scope of AI implementation. It is imperative that every one of Govt’s flagship programs is likely to be directly affected by AI’s inexorable advance.

2. The state of Automation in manufacturing will likely lead Make in India to fallshort of its promise of job creation.

3.The pace of obsolescence in skills will likely cause Skill India to miss its goal by a wide margin

4. The fears of so-called digital colonization may become realized if consumer’s data and online behavior in a Digital India are at the mercy of AI-powered platforms and services located entirely outside India.

5. The AI-powered global economy could wipe away India’s demographic dividend if its new education policies fail to anticipate and adequately adapt for the future.

6.Furthermore, India could face a strategic and near permanent disadvantage in the balance of power against China, given Beijing’s considerable capability and ambition in its defense-driven artificial intelligence research agenda.

7.Indian IT companies building AI-related skills and capabilities and on the need to train Indian IT workers has focused disproportionately on the importance to service the next wave of enterprise IT automation in the West.

### **Limitationsin Policy Making**

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The pace of obsolescence in skills will likely cause Skill India to miss its goal by a wide margin

The fears of so-called digital colonization may become realized if consumers data and online behavior in a Digital India are at the mercy of AI-powered platforms and services located entirely outside India.

The AI-powered global economy could wipe away India’s demographic dividend if its new education policies fail to anticipate and adequately adapt for the future.

**SUGGESTIONS**

1. The Government in Power should deploy equitable fund towards AI related Research, Development & Implementation.
2. The Government should build supporting infrastructure to help impart Skill based education & training. AI could make a significant impact toward building skills and capabilities for domestic applications of AI.
3. The curriculum/training has to be designed to incubate newer skills Proactively.
4. We must establish our own Cloud-computing infrastructure so that we can assure the large storage of data to our own dispense & remain rest assured for its security.
5. Government should put emphasis on using AI in Public Sector such as to detect tax fraud and money laundering.
6. The focus has to impart IT skills related to AI to cater to serve the next Wave of enterprise IT automation in the West, in order to mitigate the effect of geographical diversity in the country.
7. India should develop natural language-processing capabilities to automate multilingual communication and interactivity across a whole range of government services.
8. New Education Policy.
9. The National Education Policy must take a long-term view of the skills economy, evaluate the continued relevance of the current system of sequential education, and make radical recommendations on alternative models of education that would match the economy of the future.
10. Piloting and experimenting in such new models of education must commence in the immediate future before the current system becomes completely obsolete.
11. Govt should exercise the policy to use AI-based training and teaching software in various skilling and educational applications.

Only good education will be critical to acquire the necessary skills and to become competitive & to survive in this evolved labor market.

**CONCLUSION**

After pondering upon the awareness of the futuristic view on the India's Policies such as Make in India, Digital India & Skill India, the Government has to peep into the present & future challenges that are the impediments in the progression of these policies to meet its end effects. The cloud computing infrastructure is the basic key requirement to steadfast the process of machine learning as well as the progress of Artificial Intelligence. The Government & Public sector funding is another area where the country has to take well planned steps to accelerate the research in this vibrant & fast-growing area.

Most important part is the building & maximum use of the Human Capital that requires measured steps in the designing of the educational system & effectively & creatively carrying out its implementation. Only good education will be critical to acquire the necessary skills and to be competitive & to survive in this evolved labor market.

Use of Artificial Intelligence in the Public Domain & such as tax evasion & defence is another area where the futuristic planning is needed.

In each of these areas, the government should collaborate with the private sector and university research labs to leverage existing technologies effectively and to rapidly create new technologies to address specific and well-defined problems.

**Glossary**

**Algorithm** – A set or sequence of step-by-step operations that need to be carried out to perform a calculation, to process a set of data, or to test a logical statement.

**AlphaGo** – A computer designed to play the ancient Chinese board game Go, developed by Google DeepMind.

**Analytics** – A discipline of mathematics and computer science that concerns itself with statistical analysis of data to discover and interpret patterns.

**Artificial intelligence (AI, or machine intelligence)** – The ability of machines or software to behave in a humanlike, intelligent manner.

**AI winter** – A period of reduced funding to artificial intelligence research during the 1970s and 1980s on account of AI progress failing to match expectations.

**Big Data** – Large and complex sets of data that cannot be efficiently processed using traditional techniques. These typically entail millions or billions of records, information that does not have a predefined structure, and complex formats. Examples include website, image, and video banks on the Internet.

**Cloud computing** – Internet-based remote computing infrastructure that can be made available on demand via sharing of computing resources and data storage.

**Cognitive computing** – Technology that can mimic the human brain in how it senses and responds to stimuli.

**Data center** – A facility where computing infrastructure and data storage infrastructure are housed.

**Deep Blue** – A chess-playing computer developed by IBM that made history in the 1990s by defeating the then world champion of chess, Garry Kasparov.

**Deep learning** – A branch of machine learning that involves algorithms that analyze data through multiple layers of complex processing. Each layer's output becomes the input to the next layer to carry out pattern analysis and classification and to establish hierarchical relationships for both supervised and unsupervised learning.

Deep neural networks – A kind of deep-learning architecture based on artificial neural networks that uses multiple layers of processing units that can model complex nonlinear relationships.

Defense Advanced Research Projects Agency (DARPA) – An organ of the United States Department of Defense. It is credited with having funded much of the early stage research in artificial intelligence, most notably through its Cyber Grand Challenge projects.

Expert systems – An artificial intelligence system that can make decisions like a human expert in a given subject matter area or domain. Developed in 1970s and 1980s, these systems lost their name in the 1990s as technology evolved beyond standalone AI systems.

Image recognition – Algorithms used in computer vision and image processing in order to determine whether an image contains a specific object, feature, or activity.

Machine learning – A subfield of artificial intelligence. It refers to the ability of computers to learn without being explicitly programmed. It entails algorithms that can recognize patterns in data, learn from these patterns, and subsequently make predictions based on these data.

Neural networks – Artificial neural networks are an architecture of computing used in machine learning. Inspired by the organization and processing mechanisms of biological neural networks, artificial neural networks have been used in speech recognition, image recognition, and other problem areas involving machine learning.

Speech recognition – The ability of computers to recognize and interpret spoken language. Speech recognition is today the most ubiquitous application of artificial intelligence with applications ranging from automated customer care agents reachable via toll-free phone lines to voice-activated personal assistants on tablets and smartphones.

Virtual reality – Computer-simulated reality that mimics an environment by creating artificial sensor experiences such as vision/sight, hearing, touch, smell.

Watson – Technology created by IBM based on AI/cognitive-computing that acts like a human and can answer questions posed in a natural language. Watson made news in 2011 when it defeated humans on the quiz show *Jeopardy!*<sup>58</sup>

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