Artificial Intelligence: Modelling advancements for greater good

Comprehensive analysis and review of mechanisms of Artificial Intelligence on economy.

Hansraj College, University of Delhi

Vaani Garg

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ABSTRACT

Artificial Intelligence has started dominating our present and will soon grow into the future as well. Therefore, keeping up with the dynamic environment, the economy will undergo a major transition. The aim of this study is to delve deeper into the impact of Artificial intelligence on the world and sectoral economy.

The study focuses on the impact of Artificial intelligence on employment, finance sector, infrastructural development, international trade, and equality of benefits from AI to countries, as well as will focus on the generalized macroeconomic indicators such as Income and GDP.

Keywords: Artificial Intelligence, Growth, Economy, Big-Data

Author : Vaani Garg

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RESEARCH METHODOLOGY

The study is analytical in nature and attempts to get to effect of Artificial Intelligence on various inclusive aspects in functioning of the entire economy. This study is based on an assessment of key literature of secondary data. Sources such as independent studies, technical journals, news articles, research publications, and various websites were referred to for administrating an immense data mining. Most recent research studies/e-databases available on Google Scholar, ProQuest, etc. have been selected for the purpose of review.

LITERATURE REVIEW

INTRODUCTION

With digital life taking control of human lives, code driven systems and mechanisms can very efficiently, modify and mimic human intelligence to perform extensive tasks and can improve themselves based on the data they collect.

Artificial intelligence, with its superpowered and high functioning systems and robots is all set to replicate— and then exceed—the way humans perceive and react to the world. It's fast becoming the cornerstone of innovation.

he pandemic-induced acceleration of technology adoption has led many sectors, both private and public to leverage **AI** for their advantage and growth. In the last few years, AI has enabled many innovations and driven the proliferation of technologies like IoT, robotics, analytics, and voice assistants.

Artificial intelligence has a lot to offer in diversified yet fundamental sectors of the economy.

Ranging from the productivity boom to the transportation and manufacturing sectors. In the coming years, we might witness the perfect evolution and commercialization of smart and autonomous vehicles. Artificial intelligence has had huge impacts in the healthcare sector, especially since the pandemic last year. AI and other disruptive technologies powered a patient-centered healthcare system. This new care scenario is all digital and highlights the importance of data and analytics. AI is already having an impact on the development and management of global value chains and it can be used to improve predictions of future trends too.

However, Artificial intelligence is highly criticized for its bias and privacy infringement concerns and people do fear an apocalypse, dismantling of human workforce and rise of economic inequalities.

Therefore, in the years ahead, it is necessary to develop an ethical AI ecosystem without human biases and this might alleviate the potential risks of AI in the future.

PRODUCTIVITY

INVESTMENT IN ARTIFICIAL INTELLIGENCE BY GLOBAL POWERHOUSES
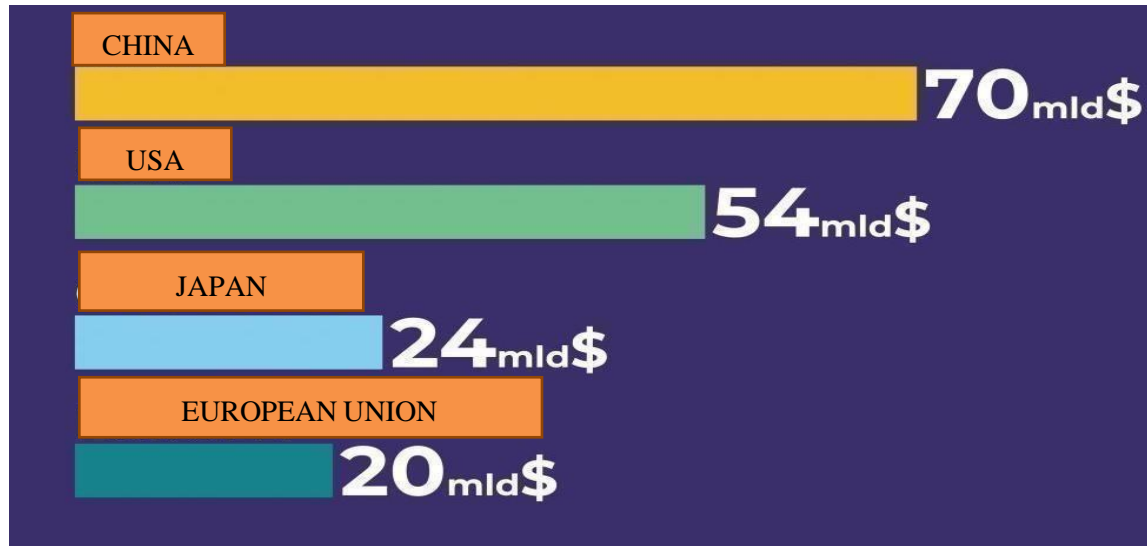
The US and China are the biggest powerhouses when it comes to AI funding and domination. Geographically, economically and technologically United states if the home of Silicon Valley and technological and extremely successful giants like Amazon, Apple, Facebook, Microsoft and Google, to name a few.

China's domination in the field of Artificial intelligence was unexpected. Japan drafted a clear plan in 2017 and was published in the same year with its artificial intelligence technology strategy, which also promised public use of AI by2030. According to information published by the European Commission in February in the White Paper on Artificial Intelligence[1], "Brussels intends to attract over €20 billion in Artificial intelligence investments each year from now to 2030."

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[1] White Paper on Artificial Intelligence- A European approach to excellence and trust, Brussels, COM (2020)

PRODUCTIVITY BOOM

Forecasting demand in precise manners

AI systems have the ability to test numerous mathematical models and options of production and outcome possibilities, and can ensure more clarity and precision in economic analysis while configuring new information such as new product introductions, disruptions in supply chain or boon and bane in demand. According to Accenture, "83% of consumers in both the U.S. and U.K. are willing to have trusted retailers use their personal data in order to receive customized and targeted products, recommendations, and offers." Artificial intelligence is also enabling companies to take personalization of the customers they serve to the next level by manufacturing products and services which are highly relevant to individual consumers.

Automation in Material Procurement and optimization of Manufacturing Process

According to McKinsey machine learning will reduce errors in supply chain forecasting by 50% and reduce costs related to transport and warehousing and supply chain administration by 5% to 10% and 25% to 40%, respectively. AI systems will conceptualize and monitor on quantities of inputs used, no. of cycles, temperatures, lead times, errors, and time required to optimize production runs. The first step in deploying Artificial intelligence will be deployment of an "operator assist" mode, where AI will operate in the background and suggest solutions to the operator. AI systems will use the operators' final decisions to learn how the human mind performs so AI can be optimized according to the same and function in an "***operator replace***" mode.

PRODUCTIVITY PARADOX

There have been continuous advancements in technology, and artificial intelligence, has accelerated automation, and use of teleconferencing tools, the U.S. and other countries have seen flagging productivity. United States productivity has seen its productivity boost by 1.3% in the past decade as compared to more than 2.8% in the late 1990s and early 2000s. As new technologies get into old businesses, the reconceptualization of business takes a lot of time, efforts and creativity. The AI paradox is thus consistent in a world which is still on the path of transition to technology adaptation, various researches suggest. There

can be other possible reasons for the paradox, a major one being that the optimism about AI is unfounded, that productivity benefits are occurring but not measured accurately, and that gains from new technologies exist, but only for a small fraction of workers.

MANUFACTURING

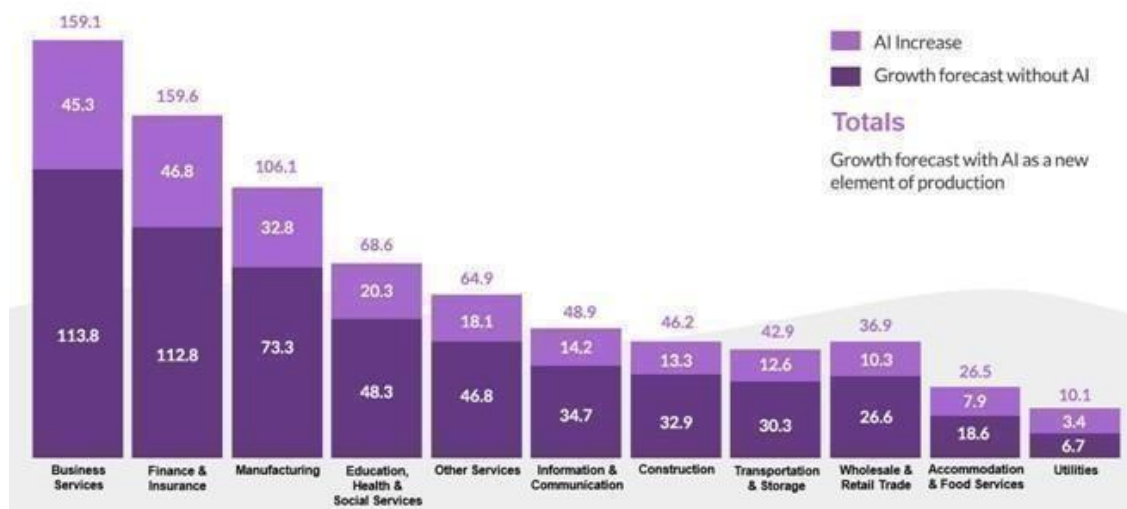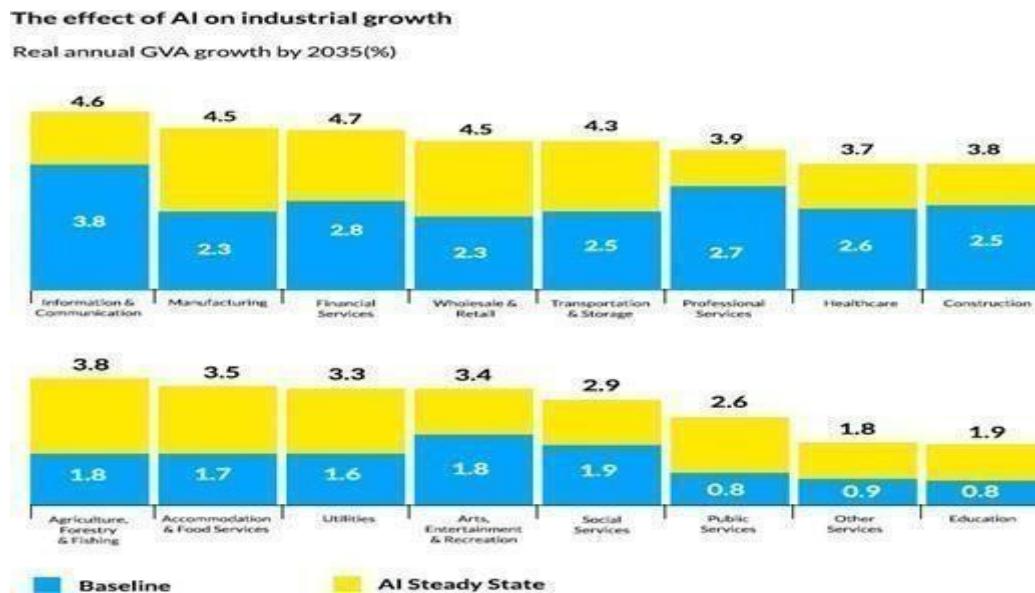- AI's hailer's claim that the technology is only a representation of evolutionary form of automation, and an accurately predictable result of the Fourth Industrial Revolution. AI may be efficient at creating things, improving them, and making them cheaper. But there is no replacement for human involvement in dealing with the unpredicted changes in tastes and demands—or in deciding whether to make things at all.
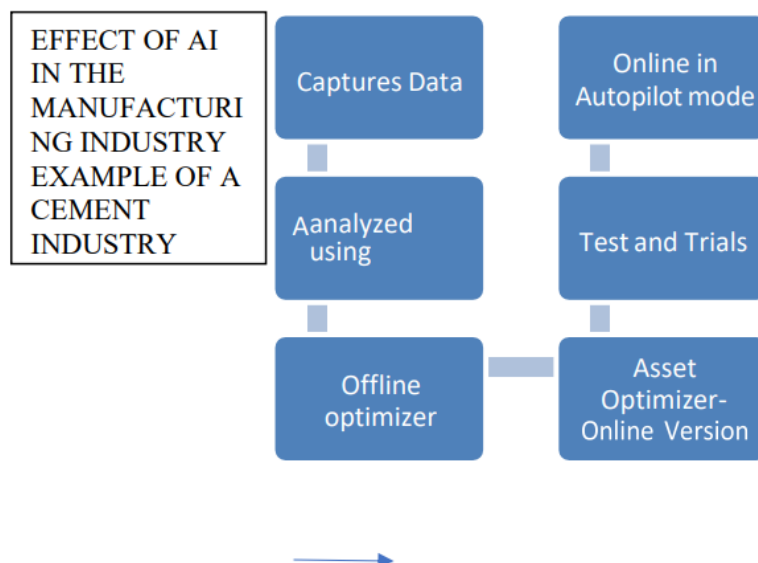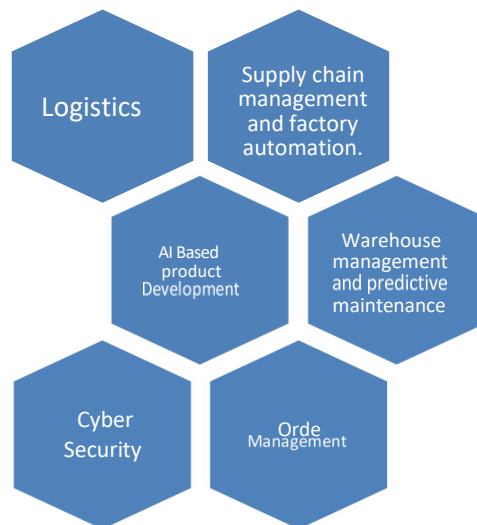
For decades, companies have started "digitizing" their manufacturing plants with distributed and supervisory control systems and, in some cases, advanced process controls. For example, today's amalgamated teams of control-room operators are trained to manually monitor a multitude of signals on numerous screens and adjust settings as and when needed. At the same time, troubleshooting must be done precisely and running tests and trials should be adhered to, to name just a few of the tasks that strain the limits of their human capacity. As a result, many operators take shortcuts and prioritize urgent activities that don't necessarily add value. AI's ability to reserve, improvise and standardize knowledge is much more important. Moreover, since it can make complex operational set-point decisions on its own, AI is able to reliably and timely deliver predictable and consistent output in markets that have difficulty in attracting and retaining operator talent.

The effect of AI on the growth of different industries

The effect of AI on industrial growth
Real annual GVA growth by 2035(%)

Sector	AI Steady State	Baseline
Information & Communication	4.6	3.8
Manufacturing	4.5	2.3
Financial Services	4.7	2.8
Wholesale & Retail	4.5	2.3
Transportation & Storage	4.3	2.5
Professional Services	3.9	2.7
Healthcare	3.7	2.6
Construction	3.8	2.5
Agriculture, Forestry & Fishing	3.8	1.8
Accommodation & Food Services	3.5	1.7
Utilities	3.3	1.6
Arts, Entertainment & Recreation	3.4	1.8
Social Services	2.9	1.9
Public Services	2.6	0.8
Other Services	1.8	0.9
Education	1.9	0.8

Baseline / AI Steady State

EMPLOYMENT

ROBOTS AND JOBS

If one types these keywords on the internet, a person is likely to come across a website called "willrobotstakemyjob.com". Herein, one can type the job occupation and view the statistics based on voting by the users. Type economist and the risk of job automation[2] is shown as "30%" based on 784 votes. Such Public skepticism of the impact of automation on the job market might be driven intuitively rather than based on the facts. But that doesn't mean, they are untrue.

Economists and Technologists are divisive on the impact of automation on the job market.

Dr. Michio Kaku, a theoretical physicist and futurist say "The Jobs of the Future will be what robots cannot do."He further adds "Among blue-collar jobs - repetitive jobs will be wiped out, obliterated."

The automobile and textile industry are in danger. Non-repetitive jobs in blue-collar jobs will thrive – garbagemen, police, gardeners, construction workers – these jobs will survive." Further elaborating, "White collar work that defies common sense – low-level accountant, bookkeepers, agents and teller will be thrown out of work. Workers who engage in 'intellectual capitalism' will benefit in white-collar world. But the

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[2] See Manyika Von James, Chui Michael, Miremadi, Bughin Jacques, George Katy, Willmott Paul and Dewhurst Martin, "*McKinsey Global Institute, A future that works: Automation, employment, and productivity*", 2017, January 17 for more information on this topic

question is what robots cannot do?

The Sci-fi world of movies is becoming reality today. The marvels of deep learning are already realized. Robots are beating humans at their own jobs.

In 2016, AlphaGo developed by Google's sister company DeepMind defeated arguably history's greatest player Lee Se-dol in the world's toughest strategy game – Go (there are more possible positions in Go than atoms in the universe, according to researchers.) by 4-1 margin.

Later Lee decided to retire, due to the rise of artificial intelligence that "cannot be defeated". AlphaGo[3] played with "creativity" and "intuition" learning the game by playing with itself too.

Alphabet's DeepMind states it wants to develop Artificial General Intelligence (AGI). AGI is the next step of transformation for AI. AGI would be as capable of learning intellectual tasks as humans are. To some, it seems apocalyptic something that would put civilizations under greater threat. In reality, AGI remains within the confines of science journals and academic speeches.

However, something that cannot be understated is the disruptive nature of technology.

Machines have made jobs obsolete for centuries. The spinning jenny replaced weavers, buttons displaced elevator operators, and the Internet drove travel agencies out of business, FASTag may soon turn toll booth employees diminish. Moreover, the Coronavirus Pandemic has incentivized many companies to re-strategizing their hiring model. The gains from AI into the profit coffers of the companies are growing manifolds too. A report stated that IT companies were set to slash 3 million jobs by 2022 due to automation, to save $100 billion in costs.

Does that mean it's a robot apocalypse?

However, **economists disagree**. They acknowledge that automation does take away job but it in turn creates more jobs and increase productivity. They say workers find other areas to work.

Challenging the various studies that "dramatize" the effects of adapting to new technologies,

a Wharton study found that robots increase productivity and employment. The 2019 study suggested (based on data from the developed world) that it increases overall employment but reduces the headcount of

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[3] AlphaGo is a computer program that plays the board game Go.[1] It was developed by DeepMind Technologies[2] a subsidiary of Google (now Alphabet Inc.).

managerial jobs. It concluded that Employees whose skills have greater complementarity to robot investments are more likely to experience net gains in employment. A more recent study that takes into account the impacts of Covid-19 and automation concluded that the adoption of new technologies and robotic systems can help firms to overcome the negative effects of the pandemic shock while keeping their workforce safe. However, the low-skilled workers are seriously threatened if skill development and social protection is not given by the governments. The World Economic Forum too voiced that people shouldn't be overlooked by the governments in a rush to rebuild the economy. Study Facilized by WEF showcases that more jobs would be created than lost due to automation[4].

Economist Heidi Schierholtz doesn't believe that robots or automation are having an unusual transformative effect on the labor market.

Experts suggest that technology creates new jobs in many ways. New technologies become new industries and thus create new jobs. Not only this, higher productivity leads to the expansion of an industry which in turn requires more workers. Automation reduces cost; thus, people spend more other industries contributing to their growth too. However, there is no denying that jobs that can be automated completely are lost forever.

However, one must look into the productivity paradox of robots to scrutinize the above theory.

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[4] See- The Future of Jobs Report, 2020; World Economic Forum

INFRASTRUCTURE AND AI – THE RESTRUCTRED REVOLUTION?

AGRICULTURE

Artificial Intelligence (AI) with its ability to change the world spans the agricultural domain as well. Agriculture is regarded as a major contributor to economic growth and development in the world economy. This sector pertains to being the provider of nourishment, sustenance, and daily bread in the economy and plays a crucial role in employment generation as well. Making use of new technologies such as artificial intelligence (AI), blockchain, drones, and the internet of things (IoT) has the potential to improve productivity and efficiency at all levels of the agricultural value chain. By

incorporating developing technology into this sector, we can achieve goals of increasing farmers' incomes and boosting agricultural production while decreasing waste and improving supply chain efficiency and transparency. AI gives room for opportunities to technologically innovate infrastructure present in the agricultural sector[5]. AI can enhance crop planning at both the micro and macro levels through AI- powered algorithms that connect weather forecasts, warehousing, and logistics, as well as dynamic soil data infrastructure. It can introduce smart farming solutions, including IoT-based solutions for irrigation, enabled, dynamic soil health mapping at the agricultural level. AI-powered agricultural health management improves crop health. Platforms for agricultural input guidance, pest control as well as agricultural surveying, and agribusiness using drones' apps for input can be developed via Artificial Intelligence. It can also be used to improve warehousing and logistics, quality and traceability, as well as market connectivity platforms. Artificial Intelligence thus, has the potential to generate fast development in digitization throughout the agricultural value chain. Not only does AI drive digitization it also helps in incorporating intelligent crop planning and smart farming techniques hence, improving the overall efficiency of the output generated. AI can even improve agricultural datasets, such as soil health records, crop yields, weather, remote sensing, warehousing, land records, and prove to be beneficial in pest control. One of the major issues faced by farmers is the lack of farm datasets often leads to higher costs of services.

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[5] See Singh, Abhishek, *"AI for the farmer",* 2020, November 26 for more information on this

The use of AI for irrigation, weeding, and spraying using sensors and other techniques implanted in robots and drones reduce the use of water, pesticides, and herbicides, preserves soil fertility, and aids in the effective use of labor to increase production and quality. The use of AI in agriculture will lead to the development in the agricultural sector that will further enhance rural development leading to rural transformation and eventually structural transformation. With the world's population on the rise, the agriculture industry is in trouble, but AI has the potential to provide a much-needed answer. AI-based technology solutions have enabled farmers to generate more output with less input while also improving output quality and assuring speedier go-to-market for produced commodities.

AI can act as a catalyst in enhancing agricultural production, reducing supply chain restrictions, and expanding market access. It has the potential to benefit the whole agriculture value chain. AI in global agriculture is expected to represent a $4 billion potential by 2026. AI in agriculture enables the most efficient use of agricultural data, allowing equipment such as smart drones, autonomous tractors, soil sensors, and Agri-bots to work and offer superior farming productivity.

In India, industries have collaborated with the government to create an AI-powered agricultural production forecast model that would give farmers real-time advising services. To offer correct information to farmers, this system incorporates remote sensing data given by the Indian Space Research Organization (ISRO), data from soil health cards, weather forecasts from the India Meteorological Department (IMD), and soil moisture and temperature analyses, among other things. This initiative has been carried out in ten aspirational districts throughout the nation, including Assam, Bihar, Jharkhand, Madhya Pradesh, Maharashtra, Rajasthan, and Uttar Pradesh.

In this way, AI can pave way for more Agri-startups and industries collaborating with the government can further enhance the infrastructure available in the agricultural domain. AI has developed agricultural infrastructure in a way that today there are sophisticated tools and machines through which farmers can predict analytics and practice precision farming. AI has enabled efficient risk management in the agricultural arena with proper pesticide route planning.

As most cutting-edge technologies are only employed on big, well-connected farms, the future

of AI in agriculture will require a strong emphasis on universal access. Increasing connection and outreach to even tiny farms in distant locations throughout the world will secure the future of machine learning automatedagricultural goods and data science in agriculture.

AI AND HEALTH INFRASTRUCTURE

With an evolving world facing several health issues due to numerous factors such as climate change, modern lifestyles, and many other reasons, there emerged a huge need for artificial intelligence to aid the health care sector[6]. The primary reason for this comes out to be the fact that humans alone, without the help of advanced technology, might not be very efficient with such delicate areas wherein utmost perfection may be required. A lot of these technologies direct use in the healthcare field, but their relevance and uses are different and unique, afew examples out of which will be given and explained further under this subtopic.

Some AI technologies that are highly crucial to health care are specified and explained in brief as follows:

1. **Natural Language Processing-**

   It is a mechanism that enables the computers to understand human language. In the healthcare field, maximum data (about 80% as per statistics) is flawed and in unstructured format. NLP in this situation, has helped sort, correct and well, properly compile the data. It being an automated process, helps uncover the gold mine of information hidden within unstructured data and ultimately contributes to enhanced patient care.

2. **Machine Learning-**

   It refers to mechanizing models according to different categories of data and then learning by training models with help of the fitted data. In healthcare, machine learning is used through a method known as 'precision medicine' which predicts what treatment protocols may succeed on various diseases and patient attributes.

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[6] See- The Potential for artificial intelligence in healthcare, Thomas Davenport, for more in-depth information

Another form of machine learning that has been used since the 60's is the 'neural network' which helps determine whether a patient will have a particular disease. Oncology uses Radiomics which is very much related to neural network, the combination of which gives accuracy in diagnoses.

3. Physical Robots-

This might seem very surprising to one, but yes, robots are actually used in medical procedures. Earlier they were only used in laborious, pre-defined tasks like welding, lifting, repositioning, assembling in warehouses etc. But with the advancement of technology, robots have recently become more collaborative with humans. They are now being used in surgical procedures such as gynecologic, prostate, head, etc.

4. Application in diagnosis and treatment-

Although AI might not have been proved to be very accurate in diagnosing diseases and is also complained about to be very difficult to store such extensive knowledge in, but the trend gradually might change soon, with many laboratories claiming to have developed AI software with high degrees of accuracy and even being better than what humans can do. But this is yet to be confirmed, whether they would actually be able to take in so much of data, and not fail in their work because of data explosion, with the evolving medical sciences and new discoveries being made every day.

More or less, one thing that is clearly visible is, that AI is still in the process of being established completely in the healthcare sector and there is no assurance as to when it will be completely reliable and will be able to accommodate the currently available data and all the alterations that may take place in the near future.

When we discuss all of this, we might stumble upon a question- "**What is the future of AI in healthcare?**"

AI technology is being developed and applied to the healthcare sector. Currently AI models are available only for big and significant tasks, but one thing that can be anticipated is that this will change in the future. AI in the future will be a part of healthcare from 'nuts to machines', meaning that starting from micro to even major

and consequential tasks will be covered by AI programs.

If we try to be non-restrictive with AI, it will not only be applied to support the healthcare professionals, but also to the patients and administrative section of healthcare. As these technologies have different importance to both the categories- doctors as well as patients, eventually they will redefine the roles played by both of them in the healthcare sector.

To conclude, AI might respond as a very good complement or even a substitute to human driven actions in the world of medical sciences, but that will only be possible when technology is advanced to such an extent that all the increasing and evolving data will be accommodated by the model, because otherwise, in no time such a software will become pointless and one can do nothing but replace it either with another substitute software or to human hands as it has been since ancient times.

BIG DATA: THE FUTURE GOLD MINE

Big Data is large and complex data sets from new data sources. The Three Vs of Big-Data that unable a better understanding of its importance are as follows-

1. **Volume**

   Big- Data is high volume of low intensity unstructured data. Such as, Twitter data feeds, clickstreams on a web page or a mobile app, or sensor-enabled equipment. Such data runs into terabytes and petabytes.

2. **Velocity**

   The rate at which the data is generated is getting quicker due to instantaneous functioning model of data bases.

3. **Variety**

   Traditional Data were structured but now data varies in form (unstructured many a times) like audio, text, video etc. which requires new models of assessment.

Today, Data is Lauded as the "new oil" of the markets. Big-Data is the Capital. The field application of Big-Data transcends to all areas of our society from Economic research to Marketing to Deep Learning to Innovation.

A 2013 Research published in PNAS[7] (Proceedings *of the National Academy of Sciences*) showed how Facebook Likes, can be used to automatically and accurately predict a range of highly sensitive personal attributes of the test subject including: ethnicity, religious and political views, personality traits, intelligence, happiness, age, gender and more.

Such is the intrinsic value of data.

The value of Big-Tech companies is derived from the data they can store, process and translate in form of products. This "value" must be discovered. Today, Machine Learning, Data Analytics is translating such unstructured data into useful products.

The following Case Study of **Netflix** shows how Big-Data transformed their product creation and delivery, profits and more.

When a user first clicks onto Netflix Research site, she reads

"Netflix has been a data-driven company since its inception." Further on…

"Our portfolio of work involves diving into large, complex data to answer ambiguous business questions."

This shows how much data-centric is the company.

In October of 2006 Netflix released a large movie rating dataset and challenged the data science community to develop systems that could beat the accuracy of 'Cinematch' by certain amounts.

The winning algorithm improved performance by over 10% than Cinematch.

In 2013, The Guardian headlined **"**Netflix takes TV gamble with $100m House of Cards remake." At that time Netflix had out bided HBO in taking the rights of the remake of the show 'House of Cards'[8].

Netflix's CEO Ted Sarandos then said, "we want to become HBO faster than HBO become us." The statement aged like a fine wine.

However, two questions need to be addressed here.

One, was $100m House of Cards remake a 'gamble', a mere creative decision? and two, how has Netflix molded its product model to become second largest media/entertainment company by market capitalization?

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[7] Making Sense of big data, Patrick J. Wolf, PNAS, October 2013
[8] See Benett, James , *The Netflix prize",* 2016 for more information on this

While The Guardian article naively put forth the purchase of "House of Cards" rights as a "gamble". Executives at the company knew it would be a hit before anyone shouted "lights, camera and action."

At that time, Netflix had 33 million users. It already knew that a healthy share of its users had streamed the work of Mr. Fincher, the director of "The Social Network," from beginning to end. And films featuring Mr. Kevin Spacey had always done well, as had the British version of "House of Cards."

With these three circles intersecting, Netflix was able to make very good analysis on original programming. The show was a hit. Since then, Netflix stock price has soared.

Big bets are now being informed by Big Data, and no one knows more about audiences than Netflix.

Owing to its vast user base, the company can keep a tab on the viewing patterns of its users. For example, when do users pause, rewind, forward, which thumbnail works best, the time at which they view (like series are viewed on weekdays and Films are viewed on Weekends) and more such insights.

By feeding these data insights in the algorithms it has curated accurate recommendations, auto-generated thumbnail and titles, streaming optimizations, pre- production design like which localities to shoot, post-production activities like quality control check, developing trailers and catalogues and more to forecast and hook consumers based on their unique behavior patterns.

Such insights help it to allocate content budget. There is a job post at Netflix called "Tagger" whose job is watch every show/film and feed 'deep tags' to better describe the title of a show.

Netflix is employing its MI/AI tools towards scaling translations and localization of title assets (dubs, subtitles) for languages around the world, learning signals from script to deduce whether to translate script into show, expanding tastes through discovery of new type of entertainments.

However, the grueling challenges it faces in future cannot be undermined - the highly competitive content-market, changing viewing patterns, user loss and more. Only time will tell, whether the effective use of big- data will help it translate its problems into profits.

TRADE AND TRANSPORT

TRANSPORTATION

The future progress of AI in transport is anticipated to be booming. Although there's no certainty of the precise

nature of those developments, AI is anticipated to formalize transport modes to be safer, cleaner, smarter and easier. AI is applied in vehicles, infrastructure, for drivers or transport users, and also to deliver smooth transport services. It's because AI can help to detect market trends; identify risks; ease holdup; reduce greenhouse emission and air

However, with the potential benefits that AI offers, there are some real challenges. AI applications raise numerous ethical, social, economic and legal questions, like who is responsible for an accident; the way to protect AI systems from cyberattacks; or the way to ensure data protection and transparency. This portion of the article paper will delve deeper to look at the impact of AI within the following sectors:

1. Road transportation sector

AI has the potential to make road transportation much more efficient, ease traffic congestion, free driver's time, make parking easier, and encourage car- and ridesharing. One classic example are apps like Ola and Uber.

These apps have used AI systems to connect the cabs to the consumers. AI also helps to keep road traffic flowing, it can also reduce fuel consumption caused by vehicles idling when stationary and also assist in improving air quality and concrete planning.

2. Aviation sector

AI can make a difference, whether in terms of processes or speed, is ground handling. Some examples of high potential use cases include safety checks, aircraft movement operations (pushback and towing), aircraft turnaround operations (fueling, catering, loading and unloading, de-icing and anti-icing), and ground transportation on the ramp (passengers, baggage, cargo and mail).

Further potential areas of AI research and development could embrace automation for better air traffic management and to ensure a higher degree of air ground integration. As well as allowing for certain tasks to be alleviated, enabling pilots and traffic controllers to focus on safety critical tasks. However, as aviation may be a safety and security critical industry, the introduction of

of AI in aviation, can raise several issues that must be addressed, for instance the

protection of private data linked to the utilization of automated aircraft.

However, situations within the travel sector are always unique, no predetermined system can safely battle these

circumstances with 100 percent of success rate. Hence AI systems should be accurate and versatile to the current situations to avoid any malfunctions or accidents.

3. Maritime operations

typically require swift adaptation to changing conditions and decisions have to be taken through many well researched parameters. Example: Automatic identification systems (AIS)[9] transfer data like the ship's number, position, course, speed and destination. Insights gained from these AI systems help in traffic management and also in confirming a high degree of air-ground integration. And to make sure these AI driven technologies meet the regulations and that they are subjected to high safety and

security requirements, data is gained from analyzing its current operations and regular

Maintenance programs are also undertaken. This makes ships more energy-efficient and help it to

satisfying emission control standards, for example:

Detection of anomalies in marine operations start improving safety at sea and help in facilitating the management of accidents and environmental risks from shipping. Marine

accidents if prevented can thus help in avoidance of oil spills, loss of precious cargo goods, etc.

TRADE SECTOR

Trade relies on the transportation sector. No goods can reach the consumers from the producers unless there's presence of a well-developed and efficient transport infrastructure.

As discussed within the previous section "The impact of AI on the transportation sector", a boom within the existing transportation facilities will have a direct positive increase in the efficiency of the trade sector.

Going deeper into this subject, this section would target how AI can increase trade efficiency during the docking period.

At ports, there is an increased awareness at lower costs and potential of new technologies for port call optimization. Many of them already use a combination of information technologies including internet, cloud

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[9] An Automated Identification system transmits a ship's position so that other ships are aware of its position. This system is used by vessel traffic services as well.

computing, geographic information systems and computer simulation technologies, to optimize transportation. Analyzed data opens up possibilities for forecasting and real-time planning, strengthening port operators' decision-making and supporting the port's economic growth. Applying advanced digital technologies to the whole port environment is known as the 'intelligent' or 'smart' port sides, to optimize allocation of relevant resources, services and supervision, as well as autonomous of port equipment.

Businesses can use AI to improve warehouse management, demand prediction, and improve the accuracy of just-in-time manufacturing and delivery. Robotics can increase productivity and efficiency in packing and inventory inspection. Businesses can also use AI to improve physical inspection and maintenance of assets along supply chains.

AI is already having an impact on the development and management of global value chains. It can be used to improve predictions of future trends, such as changes in consumer demand, and to better manage risk along the supply chain. By allowing business to better manage complex and dispersed production units, such tools improve the overall efficiency of GVCs. For example, businesses can use AI to improve warehouse management, demand prediction, and improve the accuracy of just-in-time manufacturing and delivery. Robotics can increase productivity and efficiency in packing and inventory inspection. Businesses can also use AI to improve physical inspection and maintenance of assets along supply chain.

INTERNATIONAL TRADE

Without a doubt, the automation and optimization of current supply chain operating models by artificial intelligence (AI) will increase chances for global trade. Artificial intelligence (AI), which includes a number of underlying technologies such as neural networks, deep learning, natural language processing, computer vision, supervised and unsupervised machine learning, transfer learning, and others, has the potential to affect virtually every economic sector and aspect of trade, particularly services. Throughout the industrial world, these many types of AI are used in diverse ways to generate focused solutions such as descriptive, predictive, prescriptive, and prognostic analytics.

Numerous factors will influence how the development of AI will impact global trade. One concern is how AI

will affect the macroeconomy and how that would affect trade. For example, if AI increases productivity growth, this will boost economic growth and employment and open up fresh channels for global trade. There are numerous potential reasons why productivity growth is currently slowing down internationally. When analyzing the probable connection between AI and low productivity development, one factor that is particularly pertinent. An economy must have time to adapt to new technologies and employ them effectively, especially sophisticated ones like artificial intelligence (AI) that have an impact on the entire economy. This covers the time needed to accumulate a substantial enough capital stock to have an overall impact as well as for the complementary investments required to fully benefit from AI investments, such as the availability of qualified personnel and sound business procedures.

DISRUPTIVE AND POSITIVE EFFECTS

WAGES AND INCOME INEQUALITY

New technologies, such as Artificial Intelligence, are expected to revolutionize manufacturing processes, but they may also have a significant impact on developing economies. By shifting more investment to advanced economies where automation is already in place, new technology risks widening the gap between rich and poor countries. This might have a detrimental impact on jobs in emerging nations by threatening to replace rather than supplement their rising workforce, which has historically offered a competitive edge to less developed economies.

This divergence between emerging and established economies can arise through three independent channels: production share, investment flows, and trade terms.

Production share: Wages in advanced economies are higher because total factor productivity is higher. These higher wages encourage firms in advanced economies to use robots more intensively in the first place, especially when robots can easily replace workers. The advanced economy will profit more in the long term as robot productivity improves. The more robots that replace workers, the greater the disparity.

Investment Flows: The rise in robot productivity creates considerable demand for investments in both robots and traditional capital (which is assumed to be complementary to robots and labor). This demand is higher in advanced economies because of the increased usage of robots (the "share-in-production" channel outlined above). As a result, investment in developing nations is redirected to fund this capital and robot accumulation in advanced economies, leading to a transitory decrease in GDP in emerging countries.

Trade Terms: A developing economy will most likely concentrate on industries that rely on unskilled labor, which it has more of than an advanced economy. Assuming that robots replace unskilled labor while complementing skilled people, the developing region's terms of trade may see a persistent decrease following the robot revolution. This is because robots will displace unskilled employees disproportionately, cutting their relative pay and lowering the price of the item that employs unskilled labor more intensely. The decline in the relative price of its major product, in turn, acts as a second negative shock,

lowering the motivation to invest and potentially leading to a drop in both relative and absolute GDP.

Robot productivity improvements promote divergence between industrialized and poor nations if robots can readily replace workers. Furthermore, while these improvements will tend to increase incomes, they will also tend to increase income inequality, at least during the transition period and possibly in the long run for some groups of workers in both advanced and developing economies. There is no one-size-fits-all solution to divergence. Given the rapid pace of the robot revolution, developing countries must invest more urgently than ever before in increasing aggregate productivity and skill levels, so that robots supplement rather than replace their labor force. Over the last 40 years, automation technology has been the dominant cause of economic disparity in the UnitedStates. According to the National Bureau of Economic Research analysis, pay

decreases among blue-collar employees who were replaced or degraded by technology can account for 50 percent to 70 percent of changes in U.S. earnings since 1980. According to the report, Artificial intelligence, robotics, and other cutting-edge technologies have widened the wealth and income disparities and this problem appear to beworsening. College-educated white-collar professionals have

generally avoided the destiny of degreeless employees with people with a postgraduate degree saw their pay improve. However, low-education workers saw their pay fall dramatically.

According to a January 2016 Oxford University research, 47 percent of US employment might be lost to automation, as could 69 percent of jobs in India, 77 percent in China, and 57 percent globally.

Machine learning enables machines to make conclusions based on massive amounts of data

about (often extremely challenging) human decision-making. Thus, inequality frequently rises as capital income rises. The rise in capital income as a result of AI technology's productivity should lead to an increase in inequality in the future. Furthermore, AI technology has the potential to cause "technical unemployment,". People who are technologically jobless lose their capacity to make a living, creating inequality in a society where wages are rising. Another concern is that employment quality and pay will deteriorate, further reducing the income of a segment of society while overall income rises, worsening inequality.

A prescription for this problem of rising wages and income inequality is through government intervention. There

is a strong likelihood that salaries for some groups of employees will need to be augmented using

income redistribution. Furthermore, it may be required to broaden the scope of publicly provided products.

To understand the gap in technological advancement and the application of technology in day-to-day life in a Developed nation like Japan and a developing one like India we have to understand the development path and thedifference in the policies of the two countries.

India became an independent sovereign nation in the year 1947 and Japan surrendered to allied powers in the year 1945 after being bombed (by atom bomb) by US. Japan after it's surrender was essentially controlled by the US and most of the post war policies and development program were modelled by the US or around the US, this resulted in a strong trade relation between the two nations that helped Japan and Japanese companies acquire technology from there western trade partners. The inflow of technology was not free in reality Japanese government from an early staged tried to encourage native manufacturing of technological advance goods which was assisted by the highly acclaimed post war Japanese education system which supplied its then growing manufacturing sector with much needed skilled labor in form of technicians and engineers.

Such measures were not only common in Japan but also in other Asian countries like China, South Korea, Singapore and etc.

Like Japan, China our next-door neighbor which also came out of its civil war around the same time when we became independent and also faced the same set of challenges ranging from extreme poverty, illiteracy, divided society, and colonial exploitations. China also followed a same path that most prosperous Asian countries have done but they didn't jump from primary sector (Agriculture) directly to service sector (like India). Rather, they focused on a stage-by-stage development program firstly strengthening the agriculture sector and then the manufacturing sector and then the service sector (many times the manufacturing and service sector development and advance were parallel to each other).

Countries in the west and US have strong laws guarding the privacy (especially in EU) which protect the data of average joe like me and you even from the big bosses in the government.

The difference is not only in the law of the land but also in the psychology of the populous, in India individual freedom is still a new concept and that's why there are no strong companies working explicitly in data protection

and analysis business aimed at large samples.

ECONOMIC INEQUALITY

AI has had a major jump in its use and application, with people from literally every country, whether developed or developing, trying to make their work easier with its use. It helps increase efficiency, productivity and economic growth.

But as we know, the affordability of such technological advances is not very evenly distributed, AI leading to rising economic inequality[10] is not unimaginable. From global level to comparison between segments of people even within a country, AI is feared to have disruptive effect on economy and the society. As we have known since always, whenever we talk about AI, we always get a thought that AI might replace all the work that humans have done till now, and this thought is coming very close to reality now. With AI replacing manual work already, unemployment rates are increasing rapidly, that consequences to economic disparity. Along with that, the labor wages are also going down for those who are into occupations that have largely covered their work with newly developed AI software models.

Talking on the global and country-wise level, AI may have increased the economic output for many developed countries by several folds due to their reach to such technology, but same cannot be said

for the developing countries. Many of these developing countries (which we can say come on the lower levels of even this category) are for sure struggling to survive this race. Their accessibility, affordability and even if they manage to get them, their ability to use such software effectively, is not at par with the global standards.

With the increasing tech service with each day passing, this problem is getting exacerbated. As one can say, it is one of the reasons why "the rich are becoming richer and the poor are becoming poor. "But what can we really do to solve this issue? One thing is for sure, that we need to ensure that the benefits of AI should be equally shared all over the world but along with that we also have to ensure that AI needs to be very safe since it is going to be used to multiple people all over, and the changes of their faces and identities remainingunknown to each other are high.

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[10] Szczepanski, Marcin, *"ERPS: Economic impacts of artificial intelligence"*, 2019, July

In order to solve this issue, the first step that comes into our mind, is educating people and making them well-versed with AI. It may sound difficult, but as we desire to grow more as individuals and as countries, it is the only way to keep up with the tight competition, and is rather a necessity than just being sufficient condition. A lot of cost may be incurred to educate masses of people, but we can take that as underlying cost for future developments and profits. This way, people rather than being negatively affected by AI replacing theirjobs, can simply take its help to even boost their work and enjoy higher benefits of it, even at micro levels.

Another major concern is that the use and benefits of AI are highly concentrated in the hands of few powerful nations and their people, which calls for action to decentralize power, wealth and automation of AI. This not only applies to AI technologies, but also to all other technological tools. AI must be truly democratic in all its essence.

As we briefly introduced another concern above, with such widespread use of AI in the future, there are higher chances of all of this becoming risky and unsafe. In order to curb this problem, mechanisms must be made by various countries and individuals to police such networks and channels in order to ensure safety of all the people from every corner of the world.

More or less, the presence of economic inequality due to AI may be solved in the future with certain steps taken worldwide, but that will also come with a new set of problems which will require extra efforts by theentire world together to get settled.
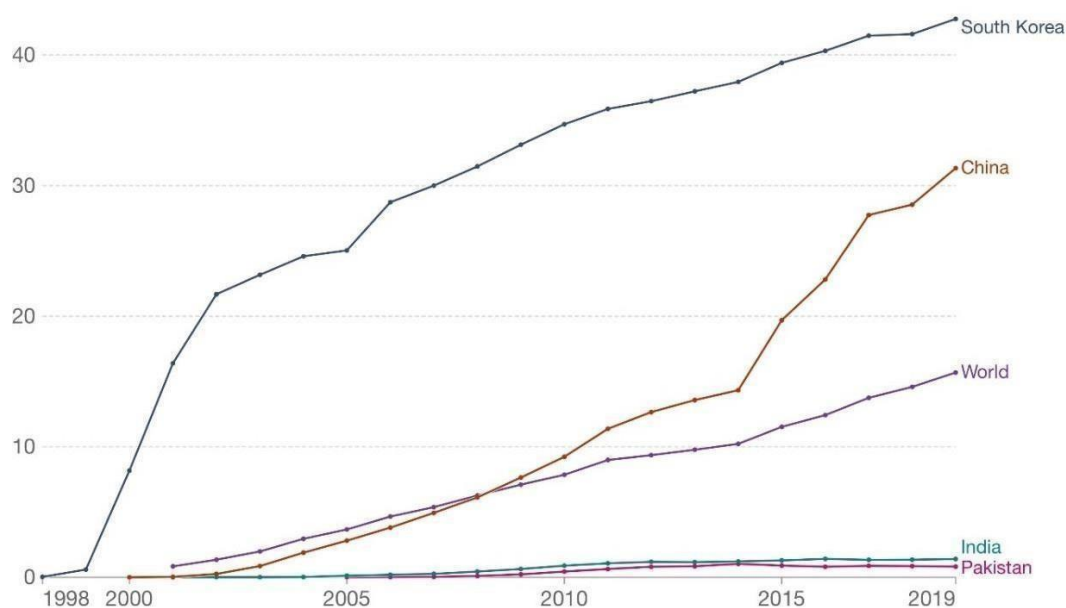
It is not all that bad and our country is trying to bridge the technological gap by firstly providing internet access to every citizen of our nation, and digitalizing the PSE (Public Sector Enterprises) day-to-day work. But when we look at the ground reality and compare the statistics, we discover that the government initiative is lacking and is not able to deliver what it promised, the growth of India in any important indicator (in this context) has not been exceptional rather the same since 2010.

Following is the comparison of some of the data form international sources comparing India to the world and its neighbors on crucial indicators[11]:

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[11] See Artificial Intelligence policy in India: a framework for engaging the limits of data-driven decision making, VMarda, 2018

Broadband subscriptions per 100 people, 1998 to 2019

Broadband subscriptions refer to fixed subscriptions to high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s.
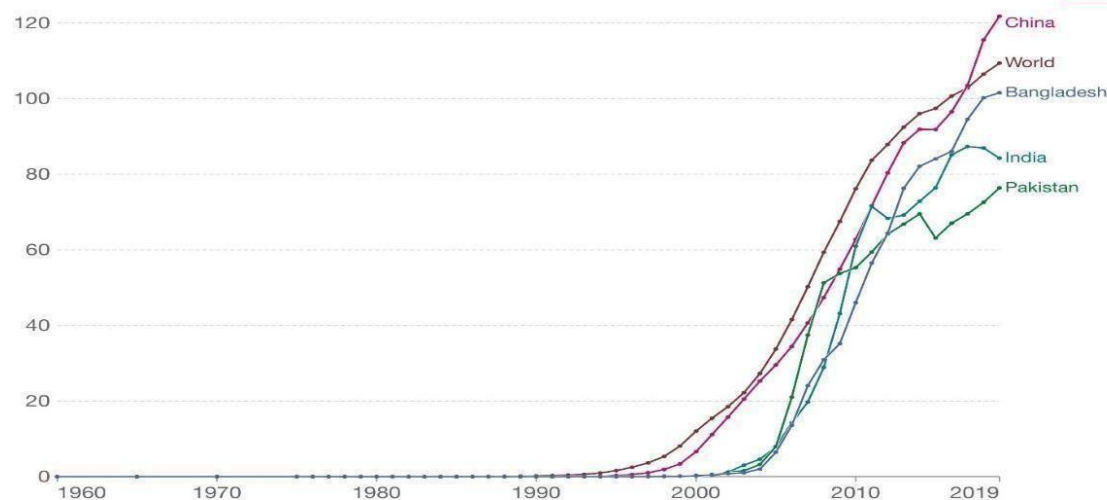
Our World in Data

South Korea
China
World
India
Pakistan

40
30
20
10
0

1998 2000   2005   2010   2015   2019

Source: International Telecommunication Union (via World Bank)
Note: For more details on the definition see the sources tab.

OurWorldInData.org/internet/ · CC BY

Mobile phone subscriptions per 100 people, 1960 to 2019

Our World in Data

China
World
Bangladesh
India
Pakistan

120
100
80
60
40
20
0

1960   1970   1980   1990   2000   2010   2019

Source: International Telecommunication Union (via World Bank)

OurWorldInData.org/technology-adoption/ · CC BY

Secure internet servers, 2020
Number of secure internet servers, measured per one million people. Secure servers are servers using encryption technology in Internet transactions.

Source: Netcraft and World Bank

OurWorldInData.org/technology-adoption/ • CC BY
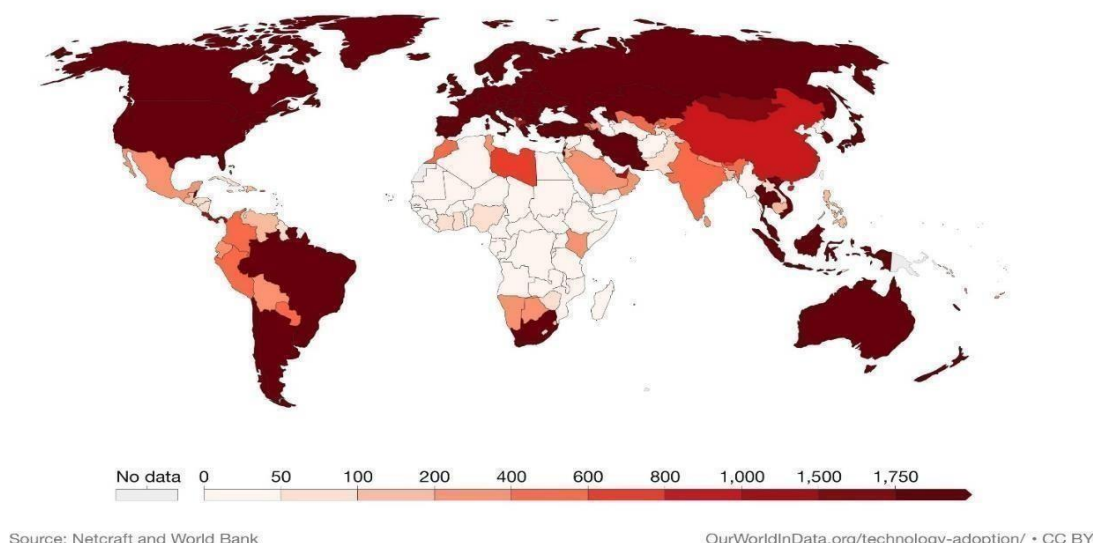
The need for real work in internet equality and internet education is important
And distribution of smartphone or setting up of e-service booths in the hinterland will not help the government in the way they think, educating the youth about the internet and its uses is more important and crucial. The lack of technocracy in government and a legal and education system that does not appreciates innovation is the core problem with our country.

The strengthening of individual freedom and data protection is also important these steps would
lay the fertile ground for a successful data revolution that would create lakhs of job and put India
at par with advance countries.

CONCLUSION

Code-driven systems and mechanisms may efficiently change and replicate human intelligence to accomplish demanding tasks, and they can improve themselves depending on the data they collect. This is happening because digital life is taking over human lives.

Robots and systems powered by artificial intelligence are poised to match and then surpass how people perceive and respond to their environment. They are quickly taking the place of innovation's pillar.

The acceleration of technology adoption brought on by the pandemic has encouraged numerous industries, both public and private, to use AI to their advantage and benefit. AI has fueled the development of numerous advancements over the last few years, including the Internet of Things (IoT), robotics, analytics, and voice assistants.

In a variety of important but diverse fields, artificial intelligence has a lot to contribute to the economy.

This consists from the increase in productivity to the manufacturing and transportation industries. We may see the perfect development and widespread use of intelligent and autonomous automobiles in the upcoming years. Particularly since the pandemic last year, artificial intelligence has had a significant impact on the healthcare industry. A healthcare system with a patient-centered focus was powered by AI and other innovative technologies. This brand-new healthcare scenario emphasizes the use of data and analytics and is entirely digital. The growth and administration of global value chains are already being impacted by AI, and it can also be utilized to enhance trend predictions.

People do worry about the end of the world, the abolition of the human workforce, and the rise of economic inequality, and artificial intelligence is harshly condemned for its prejudice and privacy invasion worries.

ACKNOWLEDGEMENT

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