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### 1. Introduction

Artificial intelligence is a transformative technology, which works in the field of computer science and emphasizes on the creation of an intelligent machine that works such as speech recognition, learning, planning and problem solving, robots, games, modelling (Firschein et al., 1973). AI is all about making machines smarter so, they can think, work, and perform humanly task. At present, some of the examples of AI can be about playing chess on the computer to self-driving cars, which relies on deep learning and natural learning process.

AI is becoming more popular with each passing day because of increased data volumes, advanced algorithm and improvement in computing power and storage. Therefore, people in business are increasingly looking for ways to make their products and services more intelligent through AI. Google's search algorithms are a glaring example of an AI-driven tool. Amazon's Alexa is another. Social media platforms also rely heavily on AI. The current evolution of AI technologies is not that scary – or quite that smart. Instead, we keep reading for modern examples of artificial intelligence in health care, retail and more. In the near term, the goal of keeping AI's impact on society beneficial motivates research in many areas, from economics and law to technical topics such as verification, validity, security and control.

When considering how AI might become a risk, experts told multiple scenarios that are most likely to happen in future. Like unemployment, because the labour society is concerned primarily with automation as we have invented ways to automate jobs. We could create room for people to assume more complex roles, moving from the physical work that dominated the pre-industrial globe to the cognitive labour that characterizes strategic and administrative work in our globalized society. Inequality of our economic system is based on compensation, where the contribution to the economy is often assessed using hourly wages.

The majority of companies are still dependent on hourly work when it comes to products and services. However, by using artificial intelligence, a company can drastically cut down on relying on the human workforce, and this means that revenues will go to fewer people. Consequently, individuals who have ownership in AI-driven companies will make all the money. Devastating in

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nature, autonomous weapons are artificial intelligence systems that are programmed to kill. In the hands of the wrong person, these weapons could easily cause mass casualties.

Moreover, an AI arms race could inadvertently lead to an AI war that also results in mass casualties. Security with AI becomes more powerful as it can be used for an outrageous reason. This applies not only to robots that are invented to replace human soldiers or autonomous weapons but also to AI systems that can cause damage if used maliciously. This study aims to understand and provide an overview of the impact of Artificial Intelligence on society.

## **2. Methodology**

This study aims to explore the literature on the impact of artificial intelligence on society and its transformation. Recently AI has penetrated its roots into a range of fields. To cover various societal aspects, literature has been retrieved from various disciplines where AI is applied. These areas include healthcare, automobiles, commerce, governance, defence, entertainment, computation, and sports. These articles are retrieved from peer-reviewed sources based on the keywords suggesting the role of AI, forecasting & assessment of impact, behavioural & ecological aspects of AI, and AI's relation to employment. Various reports from governments or their agencies are also retrieved and reviewed to put forward their opinions, studies, and measures to strengthen their position in AI-led futures.

## **3. Review**

AI has been around for decades. It is now gaining popularity in the technology world for two main reasons: large data sets and computational power. In 2010 Techonomy conference Eric Schmit suggested that in every two days now we create as much information as we did from the dawn of civilization up until 2003". Today we are generating from mobile phones and the Internet of things. We are creating quintillion bytes of data daily. We now also have the computational power to process such large amounts of data. Nowadays, AI is currently is using in education, healthcare. Soon, intelligent machines will replace or enhance human capabilities in many areas, previously considered strictly within the human domain. On the other hand, we tend to make decisions practically every day that must reach beyond a decade, or occasionally even a century, for example, new buildings usually are designed for the occupancy of one hundred years. Because computer systems also have the potential for long term effects on human life and society.

## **4. Impact of Artificial Intelligence on Economy**

The rising tide of Artificial Intelligence adoption across industries will drive significant growth in the next decade, with AI software revenue set to reach almost \$90 billion by 2025. AI's presence is tantalizing to data scientists and business managers alike who seek to let machines do the number crunching to make the business smarter on a holistic level.

The advancements in AI have been made possible thanks to the confluence of three different, albeit related developments (Ernst et al., 2018):

A phenomenal drop in computing costs has led to an explosion in installed computing power and storage capacity. Simple smartphones today are significantly more powerful than the computer that brought the first man to the moon. The costs for producing an iPhone 7, for instance, currently stands at around US\$220; in the 1980s it would have been around US\$1.2 million in today's terms to pay for the memory capacity of such a phone.

Second, the development and widespread adoption of the Internet and other forms of digital communication has led to a significant increase in the supply and storage of digital information, including in central locations (cloud computing), which allow the comparison and analysis of substantial amounts of data for statistical purposes that are necessary to develop tools based on AI principles.

Finally, the drop in capital costs for digital technologies has significantly lowered barriers of entry for start-ups, making it less necessary than in the past to mobilize massive amounts of capital before starting a new venture while at the same time offering substantial first-mover advantages. This shift in business models towards small, rapidly growing tech companies were often driven by university spin-offs funded through innovative financial products and supported by a seemingly endless supply of highly educated software engineers. A paradoxical consequence of the digital nature of latest innovations is that the lower barriers to entry have allowed new players to uproot incumbents while at the same time quickly leading to new forms of industry concentration (Bessen, 2017).

The current wave of technological change based on advancements in (AI) has created widespread fear of job losses and further rises in inequality large opportunities in terms of increases in productivity can ensue, including for developing countries, given the vastly reduced costs of capital that some applications have demonstrated and the potential for productivity increases, especially among the low skilled. At the same time, risks in the form of further increases in inequality need to be addressed if the benefits from AI-based technological progress are to be broadly shared. For this, skills policy are necessary but not sufficient. Also, new forms of regulating the digital economy are called for that prevent further rises in market concentration, ensure proper data protection and privacy and help share the benefits of productivity growth through a combination of profit-sharing, (digital) capital taxation and a reduction in working time. The paper calls for a moderately optimistic outlook on the opportunities and risks from artificial intelligence provided policymakers, and social partners take the particular characteristics of these new technologies into account. (Méda, 2016).

Most observers are not reassured, however. Many analysts are warning that advances in both robotics and artificial intelligence over the next few decades could lead to significant job losses or job polarization and hence widen income and wealth disparities (Korinek&Stiglitz, 2017). A recent

report by Bank of America Merrill Lynch in 2015 pointed to the potential for a rise in inequality as a result of increased automation. The report cited research by Oxford University, which found that up to 35 per cent of all workers in the United Kingdom, and 47 per cent of those in the United States, are at risk of being displaced by technology over the next 20 years (Frey and Osborne, 2017). According to the World Bank (2016), in developing countries many more jobs are at risk: 69 per cent in India, 72 per cent in Thailand, 77 per cent in China and a massive 85 per cent in Ethiopia.

## **5. Impact of Artificial Intelligence on Ecological Studies (Environment)**

The field of ecology being vast and variant revolves around analysis and statistics for the betterment of studies and technology, hence results. The complexity found in various ecological systems possesses many challenges in front of both, researchers and managers including a collection of data on a large scale and analysing the very same, having there an extensive sample space and unpredictable and ever-changing ability of organisms to evolve. In addition to that, the range keeps expanding.

Due to the enormous challenge as the work itself, there has always been scope for tools that can facilitate ecological reasoning rather than just helping in the collection and analysis of data. AI-derived techniques and modelling have revolutionised ecology in the aspects of both primary and applied studies and has played a significant role in the development of the same. The implementation of artificial intelligence in ecology aids the apparent impotence in organisation and analysis of broad ecological knowledge, making the overall process more efficient and cures the limitations of data collection. Researchers have been successful in utilising methodologies like expert systems involving knowledge engineering, which can be referred to as a process of extracting and implementing an expert's knowledge in a computer program. (Coulson et al., 1987).

Development in ecological sciences because of AI include "OOPS" I.e. object-oriented programming systems, which is coded programming based on representing objects and building models using them in a particular data structure using variables, understood by the ecologists.

Ecology is a qualitative study rather than quantitative research is difficult to be incorporated into mathematical expressions (Brooks, 1999). Artificial intelligence provides tools for the meaningful manipulation of qualitative knowledge like ecological relationships into a computer-friendly quantitative form, which can be used to arrive at a qualitative decision. The limits of artificial intelligence in the development of ecology, are yet to be discovered, as the application is premature, and is expected to be exposed in the coming decade.

## **6. Impact of Artificial Intelligence on Agriculture**

As per the United Nations Food and Agriculture Organisation, the world population will increase by 2 billion by 2050. In contrast to this only, 4% of additional land will be cultivated by then. Also, this won't be enough to feed the entire population. Thus to deal with such critical worldly problem of underproduction, modernization of agriculture is prerequisite. AI is highly likeable to change the current old school outlook of the agricultural landscape.

AI technology can be used on numerous occasions like harvesting, airborne surveillance, remote sensing, proximity sensing, pest and weed control and advisory services etc. Currently, Microsoft is working to provide advisory services regarding sowing seeds, usage of fertilizer, and so on to 175 farmers in Andhra Pradesh, India (Bagchi, 2019). This initiative has led to a 30% high yield per hectare on an average when compared to the previous year. Harvest technologies like Harvest Croo have developed an independent berry picking machine through which AI mimics human cognition. The Israeli start-up Prospera found in 2014 has developed a cloud-based solution which correlates between data labels and makes predictions through this information. There are a plethora of such examples where AI technology is helping in making farming smart and changing the world. AI technology still encounters the problem of funding and lack of validation and only if these hurdles are overcome, the current agricultural scenario may modify/ improve.

## **7. Impact of Artificial Intelligence on Government**

Artificial intelligence is emerging as the most significant asset for humankind. Similarly, it is also helpful for the government of any country and is playing a crucial role in our day-to-day life. In a survey, conducted it was founded that AI is capable of reducing administrative burdens, helps in resolving difficulties related to the allocation of resources. Many AI studies can generally be divided into five major categories:

1. Answering Questions
2. Filling Documents
3. Request Routing
4. Translation Process
5. Drafting Documents

So, the above-mentioned categories helped governmental organizations a lot in completing tasks more efficiently. (Mehr et al., 2017)

Further advancements of AI can be seen as a path to drive the future of any economy in an era of modern technologies which requires big data— Accenture estimated that AI has the ability to increase economic growth rates twice by 2035. However, every proper technique also comes with a price. In case of AI in public sectors, it can raise questions regarding privacy questions around

privacy, increase in pace and adopting digital tools, and whether humans can cooperate or maintain the speed according to machinery or not. Research highly varies in finding the warning AI is for jobs over the next two decades over a range of 9 to 47 per cent.

## **8. Impact of Artificial Intelligence on Education**

As the world continues to invest in AI, it will affect the education system also. As we discussed earlier, experts think that by 2025, Artificial intelligence will create more jobs than it displaces, but the new jobs created will need more skills compared to old jobs. As new skills emerge, governments, educational institutions and employers should consider how they can most effectively develop learning programmes that equip people with the skills they will need to keep up with the modern economy (Perisic, 2018).

Hence, the educational institutions will need to train the students for the industries. Business disciplines, such as accounting, auditing, finance, and marketing, may be challenged. Those disciplines that have fixed and codable rules, policies, and processes can be automated (Siau, 2017). Once artificial general intelligence (or strong AI) starts to emerge, students in higher education may be pursuing their interests and robots now staff hobbies (e.g., arts, history, music, philosophy, political science) since many of the jobs that the students are training for!

Also, there is a need for focus further research on the new role of teachers on new teaching paths, with a new set of graduate attributes, with a focus on imagination, creativity, and innovation; the set of abilities and skills that can hardly be ever replicated by machines. (Popenici & Kerr, 2017).

## **9. Impact of Artificial Intelligence on Innovation**

Artificial intelligence has traits which can help in increasing the efficiency of the economy existing. Moreover, it can contribute more to the field of "innovation" in the market. These innovations have the ability to affect both productions as well as a wide range of products along with the services provided by it. If we consider the case of "atomwise" which is a new company and mainly focuses on the identification of drug candidates by the use of neural networks to depict the bioactivity of specific individual molecules and atomwise's example shows two methods in which use of artificial intelligence can be easily seen in fields of innovation. (Cockburn et al., 2018).

AI is also impactful as it is cost-efficient as well as more accurate when it comes to technical issues as discussing or learning any point for long will eventually lead to a better understanding of the same with the help of which anyone can have preliminary information about the work they are trying to do.

## **10. Impact of Artificial Intelligence on Military and Defence**

Artificial Intelligence (AI) is becoming a critical part of modern warfare. Compared with conventional systems, military systems equipped with AI are capable of handling larger volumes of data more efficiently. Additionally, AI improves self-control, self-regulation, and self-actuation of combat systems due to its inherent computing, decision-making capabilities. AI is deployed in almost every military application, and increased research and development funding from military research agencies to develop new and advanced forms of artificial intelligence is projected to drive the increased adoption of AI-driven systems in the military sector.

Existing capabilities in AI have significant potential for national security. For example, current machine learning technology could enable high degrees of automation in labour-intensive activities such as satellite imagery analysis and cyber defence (Allen & Chan, 2017). For instance, the US Department of Defense's (DoD) Defense Advanced Research Projects Agency (DARPA) is financing the development of a robotic submarine system, which is expected to be employed in applications ranging from detection of underwater mines to engagement in anti-submarine operations. Additionally, the US DoD overall spent USD 7.4 billion on artificial intelligence, Big Data, and cloud in the fiscal year 2017, while China is betting on AI to enhance its defence capabilities and is expected to become the world leader in this field by 2030. Future progress in AI has the potential to be transformative national security technology, on a par with nuclear weapons, aircraft, computers and biotech. An analysis by Markets and Markets indicates that the market size of artificial intelligence in the military is expected to reach USD 18.82 billion by 2025, at a CAGR of 14.75% from 2017 to 2025. Here are eight major military applications where AI will prove its importance in the years to come.

AWS or autonomous weapon systems, another revolution in military operations. While Civil Society and the international community is concerned with the systems, military planners and researchers see the potential utility in autonomous systems, expecting them to perform tasks in ways and contexts that humans cannot or that they may help in to save costs or reduce military capabilities (Roff & Moyes, 2016). Questions arise about the level of acceptability of autonomous weapons in certain critical functions such as identification, selection and application to force to targets. So what comes as a conclusion is that, There are pros and cons in the application of AWS in military systems which are yet to be discovered.

## **11. Impact of Artificial Intelligence in Healthcare and Medicine**

Role of AI technology in healthcare and medicine leaves us with an overwhelming question whether AI is just overhyped practice, or it can help clinicians in delivering the required results. AI in this field collects information by patients through testing and interviewing them, processing and analyzing and subsequently helps in diagnosis and treatment of diseases. Majorly it helps in the treatment of cancer, neurology and cardiology.

The first application of AI technology in this field dates back to 1976 when Gunn used computer analysis in the diagnosis of acute abdominal pain. (Ramesh et al., 2004)

AI increases the ability to comprehend the pattern and needs of people for health care professionals. The startup named sense.ly has created a virtual nurse Molly who helps monitor the patients and their doctor visits (Novatio, 2019). AI also increases the availability of data and increment in the development of analytical techniques. In 2016, an app Alexa for Amazon was developed by Boston Children's hospital that provides health information and suggestions to the parents of sick children. The national institutes of health have developed the AiCure app to supervise the use of medication by the patients. These examples compel us to believe that AI will play a vital role in future. Apart from these innovations, the major obstacle that remains is to bridge the gap between human cognition and digital data/AI and improving the decision making the process by AI technology as per some clinicians.

## 12. Impact of Artificial Intelligence on Labour Market

Many concerns are there regarding the impact of Artificial Intelligence and the labour market. According to a Research Survey of experts conducted by Pew Research Center, it was observed that half the experts(48%) believe that AI will displace more jobs than it will create and the other half of the experts who responded to this survey (52%) expect that technology will create more jobs than it displaces by 2025. (Smith & Anderson., 2014). This group also commented that the new jobs that will be created would need will more skill-based compared to the current jobs. Human interventions still required for the tasks that are difficult to automate and automize.

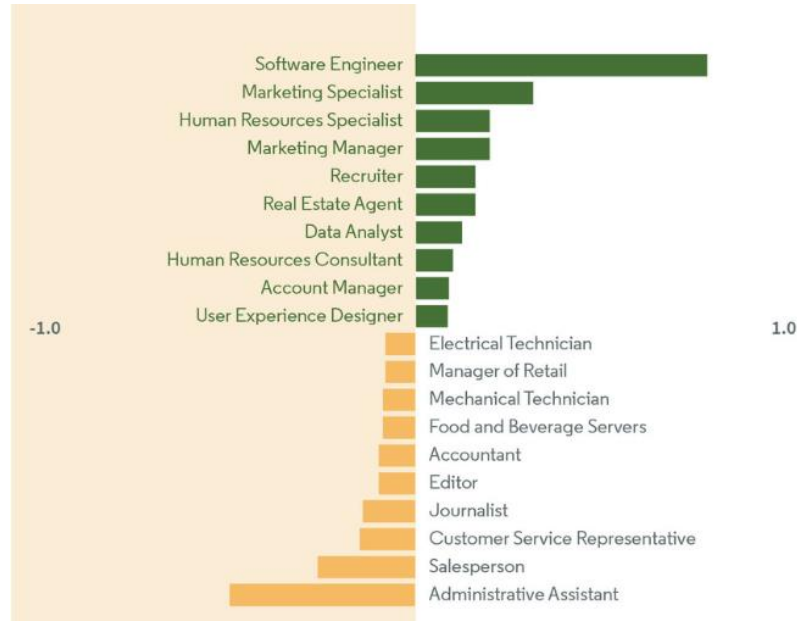


Figure 1:-Growing and declining of occupations globally *Source: Perisic (2018)*



While talking about Occupations, Tech jobs such as software engineers and data analysts are on the increase in most sectors and across all areas, along with technical abilities such as cloud computing, mobile application development, software testing and AI. (Perisic,2018)

However, a proportion of extremely "automated" employment fall into the top 10 most decreasing employment-i.e. employment that has seen the most significant employment share declined in the last five years. These jobs include administrative assistants, representatives of customer services, accountants and electrical/mechanical engineers, many of whom are dependent on more repetitive tasks.

It is estimated that by 2025, the amount of work done by machines will jump from 29 per cent to over 50 per cent-but that new requirements will accompany this fast change on the labour market, high may result in more employment rather than fewer.

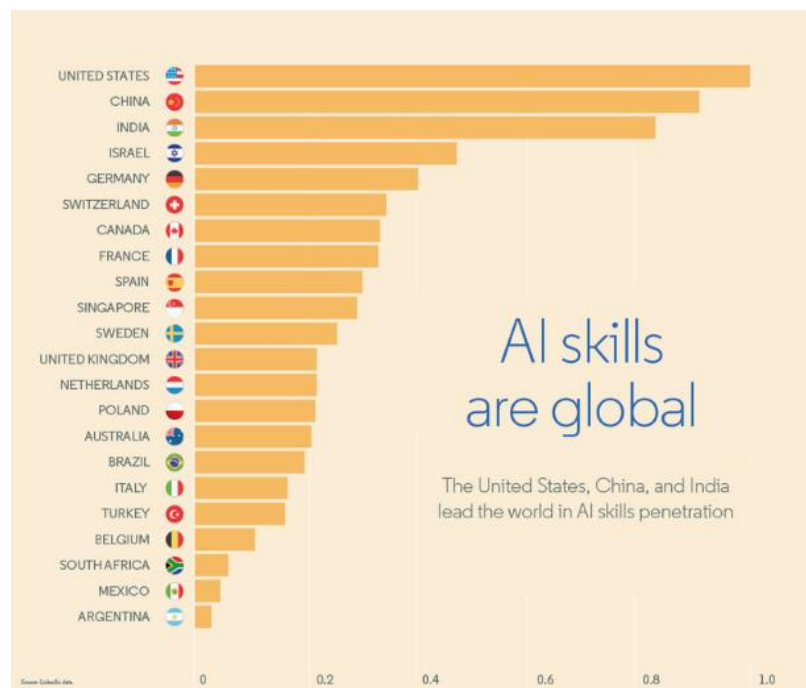


Figure 2:- AI skills are global, and the countries with the highest penetration of AI skills are the United States, China, India, Israel and Germany. *Source: - Perisic (2018)*

### 13. Impact of Artificial Intelligence on Manufacturing Industry

Artificial Intelligence (AI) is a cognitive science with rich research activities in the areas of image processing, natural language processing, robotics, machine learning etc. Historically, Machine Learning and AI have been perceived as black-art techniques and there is often a lack of compelling evidence to convince industry that these techniques will work repeatedly and

consistently with a return on investment. At the same time, the performance of machine learning algorithms is highly dependent on a developer's experience and preferences. Hence, the success of AI in industrial applications has been limited. On the contrary, Industrial AI is a systematic discipline, which focuses on developing, validating and deploying various machine learning algorithms for industrial applications with sustainable performance. It acts as a systematic methodology and discipline to provide solutions for industrial applications and function as a bridge connecting academic research outcomes in AI to industry practitioners. (Lee et al,2018)

The key elements in Industrial AI can be characterized by 'ABCDE'. These key elements include Analytics technology (A), Big data technology (B) Cloud or Cyber technology (C), Domain knowhow (D) and Evidence (E). Analytics is the core of AI, which can only bring value if other elements are present. Big data technology and Cloud are both essential elements, which provide the source of the information (data) and a platform for Industrial AI. While these elements are essential, domain knowledge and Evidence are also important factors that are mostly overlooked in this context. Domain knowhow is the key element from the following aspects:

- 1) Understanding the problem and focus the power of Industrial AI into solving it;
- 2) Understanding the system so that right data with the right quality can be collected;
- 3) Understanding the physical meanings of the parameters and how they are associated with the physical characteristics of a system or process; and
- 4) Understanding how these parameters vary from machine to machine.

Evidence is also an essential element in validating Industrial AI models and incorporate them with cumulative learning ability. By gathering data patterns and the evidence (or label) associated with those patterns can only we improve the AI model to become more accurate, comprehensive and robust as its ages. (Lee, et al,2018)

## **14. Conclusion**

Currently, Artificial Intelligence is bringing a significant transformation in the industry. Conventional ways of doing commerce are changing. "Machines, with human-level competence" the idea is both terrifying and exciting. This concept of machines with human-level competence is emerging and should be carefully monitored.

Artificial intelligence and machine learning are becoming more and more deeply rooted. Hence, the extent of their interaction and involvement will be a topic of research in the nearest future.

Overall, Artificial Intelligence and the Idea of Autonomy both have been a major development in the field of consideration. However, in some cases, there are still concerns about, to what extent the application of autonomy is safe. The Information and Communication Technology (ICT) is the core of new modern, digital world. Although in some of the cases, AI also raises concerns, much like side effects. Like in Military, there has been a discussion on putting parameters on the utility of autonomy. This technology, even in communication & market systems threatens privacy. Information and communication technologies (ICT) are becoming more integrated than ever. AI and its adoption will project high-level capabilities in defence and agriculture areas. The impact of AI on society is subject to its application.

To conclude everything. Artificial Intelligence has been a revolution in every field that I've studied. The application of AI has transformed the conventional ways of almost every area in modern society.

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