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EVALUATION OF DIVERSIFIED USE OF ARTIFICIAL INTELLIGENCE (AI) AND CONSEQUENCE OF FUTURE EDUCATION

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Abstract:

Artificial Intelligence (AI) is a technology which can replicate human brain or intelligence. It allows computer programs to learn from experience through iterative processing and algorithmic training. Day by day, AI has become more useful in almost all aspect of life with smarter look. Today, AI has become a burning issue in 21st century, as how it might affect the job market and general employment. Most of the people want to say that, people will lose their jobs due extensive use of AI. However, people are slowly realizing that, AI has the ability to make jobs more creative, lucrative, constructive, flexible, and easy. AI could lead to more innovative, diversified and skilled economy in future. But, we need to change the whole education system including curriculum and teaching methods as well so many things need to do for schooling. Our mass or general education system need to be aligned with modern and advanced technology, and will changed the whole school system and must be purposeful and sustainable for long term. It is an analytical study in which the researcher has taken effort to evaluate the diversified use of AI and the consequence of human future special emphasis on global education system.

Key Words: AI, IoT, ML, AR, VR, KM, logic, algorithm, networks, robot, singularity

Introduction

AI is a multi-subject area of computer science that creates intelligent machines. AI is the replication of human brain or intelligent by machines, like computers, to accomplished any tasks which require human aptitude or talent, such as seeing, hearing, decisions- making, translating between languages, driving vehicle or boat, operating equipment and many more. Few common and popular use and example of AI are: Siri by Apple,^{1,2} Alexa by Amazon,^{3,4} Maps by Google,^{5,6} and ChatGPT by OpenAI. AI systems is getting smarter with each successful round of data processing; because each communication and interface gives the system a chance to test and measure solutions and get better at the job as it has designed to do.⁷ Since this can be done quickly and that is far quicker than a human could.⁸ AI systems are tremendously effective alternatives for any process involving intelligent decision-making and repeated task since they can become experts and do it much more quickly and perfectly than human.⁹ This makes AI as an exceptionally authoritative and extremely priceless technology since it essentially allows computers to think and behave just like humans and that should be much faster and much more processing power than the human brain can produce.¹⁰ Again Machine learning (ML) is the science of accomplishment machines to interpret process and analyze data in order to solve real-world and real-time problems instantly.¹¹ Deep Learning is an advanced field of ML that can be used to solve more advanced problems.¹² Robotics is a branch of AI which focuses on different branches/sectors and application of robots.¹³ AI is going to dominated car industry by creating self-driving car in very near future.¹⁴ Today's AI programs are applied to practices such as diagnostics, treatment protocol development, drug development, personalized medicine, patient monitoring and any physical or mental care.^{15,16}

Today, Robotics, AI, and ML have made a lot of progress. Automation and extensive use of AI can help any organizations, companies or industries to do better in production or service by reducing mistakes, improving quality and speed, accuracy, integrity, and in the most cases getting better results that are impossible for humans to do. Peter Norvig,

Google's director of research and a pioneer of ML, the data-driven AI method behind many of the company's recent successes, says that the most important thing is to figure out how to make sure that these new systems related to AI, help society as a whole and not just those who control them.

He also added, 'AI has shown that it can do a lot of useful things.' From an extensive study, it has been shown that automation or introduction of AI could boost global productivity growth by 0.8% to 1.4% per year, which is equivalent to more than 2,000 work tasks in 800 occupations. When proven technologies can only automate less than 5% of all jobs, about 60% of all jobs have at least 30% of their tasks that could be done by a machine. So, there will be changes in several professions.¹⁷ As a result, advances in AI and related forms of automation technologies have led to growing fears about job losses and increasing inequality in the society. This concern is widespread in high-income countries. Developing countries and emerging market economies should be even more concerned than high-income countries, as their comparative advantage in the world economy relies on abundant labor and natural resources.¹⁸ Again, declining returns to labor and natural resources as well as the winner takes all dynamics brought on by new information technologies could lead to further lack of control in the developing and labour intensive world. This could slow down the fast progress that has been happen over the past fifty years. It could also threaten the progress made in reducing poverty and inequality in the society around the globe.

The great thinker of AI, Professor YannLeCun, said a fear of AI being a threat to humanity and that is preposterously ridiculous. According to Mr. LeCun, the entire concept of AI taking over the globe is a 'projection of human nature on machines.' In fact, he wants to say that 'keeping AI research 'under lock and key' would be a 'huge mistake.'¹⁹ According to the Meta scientist, when people express concerns about future robots working at or beyond human-level capabilities, 'they are referring to artificial general intelligence (AGI) systems capable of handling a wide range of problems, similar to humans.' He emphasized that AGI development would be slow, with the goal of eventually achieving a level of intelligence similar to that of a rat's brain. AI technology is becoming an increasingly important component for many products and that will be continued in the future; and that will become a fundamental part of many people's life. At the same time, the amount of effort AI puts into the economy is likely to vary from region to region. This may depend more on the type of economic activity that is most common in a region than on the economic status of the region. AI technology has the potential to give benefits to different income chooses and to bring significant gains to both developed and developing countries.²⁰ AI has also the potential to create new and innovative job opportunities, and that leading to a more productive and efficient economy.²¹ Actually any technology usually eliminates employment than that creates. It is the reality that, with the advancement of AI, the world will become more complex and self-centered in the future, as well as there will not be enough jobs for all or it will not ensure employment of everyone. So, new generation should be educated with the advancement technology and useful skilled. Therefore, the current education system must be transformed with a pragmatic solution.²²

Today, AI is everywhere and it will soon be in every corner of the world. Now AI affects almost every aspect of our lives, from choosing what books, chocolates, mobile sets, cars, houses, goods, electronic household items, or flights to buy online to deciding if our job applications are accepted, if we get a bank loan, and even what care we get for any diseases and many more. Complex and advanced AI and related software systems can now find out and help to decide us to all of these things and something more on their own. Today, all big hi-tech companies, like Amazon, Facebook, Google, or Microsoft, have opened new study labs and own R&D cell for AI.²³ So, AI is revolutionizing modern life, but some experts are concerned that it will one day take over the world or threaten human jobs. Millions of general people, mainly industrial workers fears that, AI will take over the globe or result in irreversible job losses. As we know that, economic theory warns the civilization before hand as the growth in technology is likely to make both winners and losers.²⁴ Again, both the winners and losers from technological progress are located within the same society or country; so suitable domestic policy measures can compensate the losers. However, if the winners remain within one country compensate the losers, who are in other countries; that create complicacy and that is politically very difficult.²⁵ In this exploratory paper, I shall try to ascertain the benefit of AI in different sectors, relationship between AI and job creation, impact of AI, future worry of AI along with the most contemporary issues like global future education. It is an analytical study in which the researcher has taken effort to evaluate the diversified use of AI and the consequence of human future special emphasis on global education system.

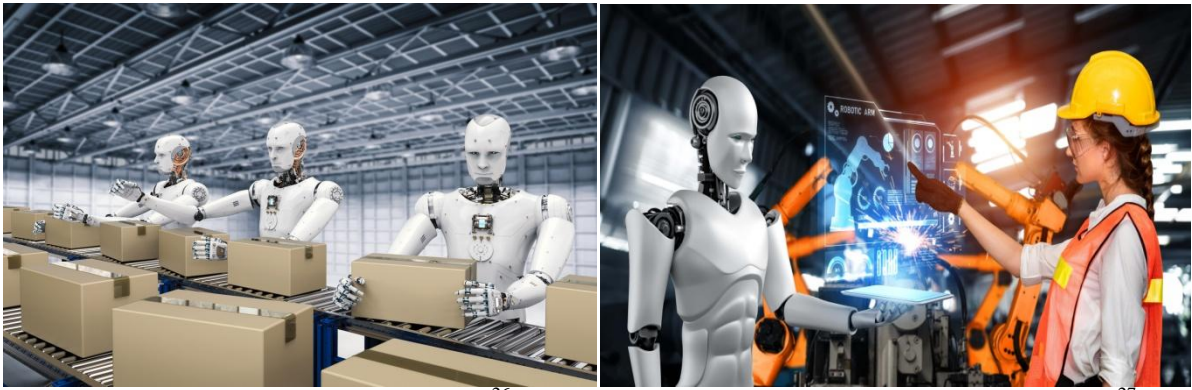


Figure 1: Robots working in industry²⁶ and digital revolution relate technology and human²⁷

History of AI

AI first appeared as a storytelling device in antiquity and has since become prevalent in literature, like in Mary Shelley's *Frankenstein*.²⁸ In the first half of the 20th century, science fiction familiarized the world with the concept of AI robots. It began with the heartless Tin man from the 'Wizard of Oz' and continued with the humanoid robot that impersonated 'Maria in Metropolis'. By the 1950s, we had a generation of scientists, engineer, technology specialist, mathematicians, and philosophers with the concept of AI ethnically assimilated in their minds.²⁹ As humans use available information and reason in order to solve problems and make decisions, so why can't machines do the same thing? Alan Turing, a young British genius who looked into the math behind AI, was one of these people. This was the logical framework of his 1950 paper named as 'Computing Machinery and Intelligence'. In it, he talked about how to make intelligent machines and how to test their intelligence.³⁰ Before 1949, computers didn't have a key trait of intelligence because they couldn't remember orders; they could only carry them out. In other words, computers could do what they were told, but they couldn't remember. Second, it was very expensive to use computers. At the beginning of the 1950s, it cost up to US\$ 200,000 a month to rent a computer. Only big tech companies and prestigious colleges could afford to take a chance in these uncharted waters.³¹ A proof of concept and advocacy from high profile people were needed to persuade funding sources that machine intelligence was worth pursuing.

In 1956, the field of AI research has born at a workshop at Dartmouth College. The attendees became the founders and leaders of AI research. They and their students produced programs and the then, the press described as astonishing;³² as computers were learning checkers strategies, solving word problems in algebra, proving logical theorems and speaking English.³³ By the middle of the 1960s, research in the U.S. was heavily funded by the Department of Defense³⁴ and at the same time laboratories had been established around the world.³⁵ Researchers in the 1960s and the 1970s were convinced that symbolic approaches would ultimately succeed in creating a machine with artificial general intelligence (AGI) and considered this the goal of their field.³⁶ Herbert Simon predicted, 'Machines will be capable, within twenty years, of doing any work a man can do.'³⁷ Marvin Minsky agreed, saying that "the problem of making AI will be mostly solved within a generation." From 1957 to 1974, AI grew and got better. Computers got faster, cheaper, and easier to use. They could store more information and were easier to get to. ML algorithms also got better, and people became better at figuring out which algorithm to use for which task.

Ironically, AI did better when neither the government nor the people talked about it. During the 1990s and 2000s, many of AI's most important goals were reached. Gary Kasparov was the world chess king at the time, but IBM's Deep Blue, a computer programme that can play chess, beat him in 1997. This match got a lot of attention because it was the first time a reigning world chess champion lost to a machine. It was also a big step towards making a programme that can make decisions on its own. On the other hand, interest in neural networks and 'connectionism' was revitalized by Geoffrey Hinton, David Rumelhart and others in the middle of the 1980s.³⁸ Soft computing methods such as neural networks, fuzzy systems, grey system theory, evolutionary computation, and numerous tools derived from statistics or mathematical optimization were developed in the 1980s. AI gradually rehabilitated its reputation in the late 1990s and early 2000s by solving specific difficulties. Because of the tight emphasis, researchers were able to create verifiable results, use more quantitative approaches, and work with academics from other domains (such as statistics, economics, and mathematics). AI researchers' solutions were extensively employed by 2000, despite the fact that they were rarely referred to as AI in the 1990s.³⁹

We now live in the age of "big data," when we can collect huge amounts of information that are hard for a single person to handle. AI has already been very useful in this way in a number of fields, including technology, banks, marketing, finance, automobiles, management, health care, and entertainment. There may be signs that Moore's law is slowing down a bit, but the increase in data hasn't lost any speed.⁴⁰ Breakthroughs in computer science, mathematics, or neuroscience all serve as potential outs through the ceiling of Moore's Law. In the immediate future, AI language is looking like the next big thing. In fact, it's already underway. Faster computers, algorithmic improvements and access to large amounts of data enabled advances in ML and perception; data-hungry deep learning methods started to dominate accuracy benchmarks around 2012.⁴¹

According to Bloomberg's Jack Clark, in 2015 was a landmark year for AI, due to the number of software projects that use AI.⁴² In 2017, from a survey it observed that, one in five companies reported they had 'incorporated AI in some offerings or processes. The amount of research has been done into AI increased by 50% in the years 2015–2019.⁴³ In April 2023, computer scientist Jaron Lanier published an alternative view of AI in *The New Yorker*⁴⁴ as less intelligent than the name, and popular culture, may suggest. Lanier concludes his essay as follows: 'Think of people. People are the answer to the problems of bits.'⁴⁵

We now live in the age of big data, an age in which we have the capacity to collect huge sums of information too cumbersome for a person to process. We can also expect to see driverless cars on the road in the next twenty years or less. In the long term, the goal is general intelligence that is a machine that surpasses human cognitive abilities in all tasks. This is along the lines of the sentient robot we are used to seeing in movies.⁴⁶ It seems implausible that this could be achieved within the next fifty years. Even if the capability exists, the ethical concerns would pose a formidable obstacle to completion. When that time arrives, we will have to have an in-depth discussion about machine policy and ethics. Nonetheless, we will permit AI to consistently advance and run amok in society.⁴⁷ AI control computers and machines to mimic the problem-solving and decision-making capabilities of the human mind. AI is shaping the future of humanity across nearly every industry. It is already the main driver of emerging technologies like big data, robotics and IoT, and it will continue to act as a technological innovator for the foreseeable future. The application of AI in this regard has already been quite fruitful in several industries such as technology, banking, marketing, and entertainment, health care, automobile, agriculture, etc. Today, we can also expect to see driverless cars on the road in the next ten years.⁴⁸ In the long term, the aim in general intelligence is that create a machine that surpasses human cognitive abilities in all tasks including emotional activities.

The Impact of AI on Society and Near Future

There is almost no significant business that modern AI or 'narrow AI', that performs objective functions by using data-trained models and frequently falls into the categories of deep learning or ML, and that hasn't already impacted. This has been especially true in recent years, as data gathering and analysis have increased significantly as a result of robust IoT connectivity, the proliferation of linked devices, and ever-faster computer processing. Big things are bound to happen with companies or concerns spending billions of dollars on AI products and services in each year. It has been found that, tech giants like Google, Apple, Microsoft, and Amazon spending billions to create those products and services, universities making AI a more prominent part of their curricula, syllabus, and developed countries military forces upping their tactical AI game. According to Andrew Ng, former Google Brain leader and Baidu top scientist, 'a lot of industries go through this pattern of winter, winter, and then an eternal spring.' He also stated that 'we may be in the endless spring of AI'.⁴⁹ Today, some sectors are at the start of their AI journey; whereas others are expert travelers. However, both have a long way to go. Whatever the impact AI is having on our present day lives is hard to overlook. Nobody can stop or slow the very fast journey of AI. Today, AI enabled machines are capable of performing some of the specific jobs better and faster than humans and imitate human actions nicely. There are four types of AI. Such as: Reactive machines AI is the most superficial level of AI. Reactive machines can do basic operations. They cannot form memories or use past experiences to make decisions like the IBM's Deep Blue.⁵⁰ Whereas, limited memory AI can store existing data and create better output by using the data like Tesla's self-driving cars. Again, theory of mind AI can connect with human thoughts and interpret them better but these are still work in improvement or progress. On the other hand, self-aware AI will have an independent intelligence, and it will make its own decisions. These machines will be smarter than the human minds and it is coming soon and going to make new history of civilization.

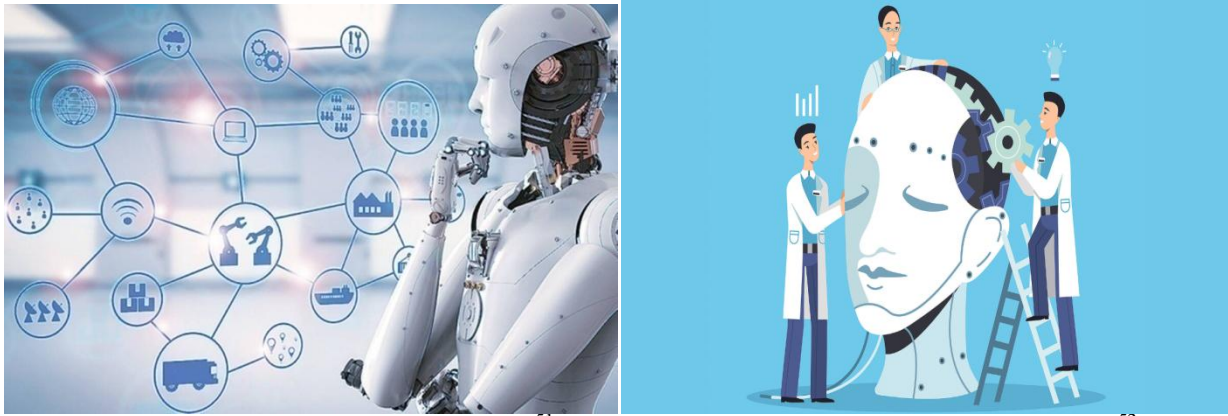


Figure 2: AI define humanity's future⁵¹ and AI is going to shape the future of humanity⁵²

AI has been helpful to manufacturing for a long time. Since the 1960s and 1970s, AI has been used in robotic arms and other industrial bots. This shows how well the industry has adapted to AI's abilities. Most of the time, these industrial robots have worked with humans and to do limited task/jobs like, putting things together and stacking. Predictive analysis sensors keep equipment running smoothly. Transportation is one industry that is certainly teed up to be drastically changed by AI. AI will affect how we get from one place to another in many ways, including self-driving cars, AI trip planners, and AI traffic systems. Even though self-driving cars aren't perfect yet, one day we'll be able to get from one place to another without any stress or worry. Even though it might not seem possible, the AI healthcare drug system is already changing how people talk to doctors. It can easily analyze large amounts of data. Today, AI helps find diseases faster and more correctly, find new drugs faster and more efficiently and even keep an eye on patients through virtual nursing assistants. And, it is fact.

Today, AI in education is going to transform the way people of all ages can learn. Currently, AI is using machine learning (ML), natural language processing, and facial recognition aids in digitizing textbooks, detecting plagiarism, and gauging student emotions to determine who is struggling or bored. AI tailors the learning experience to the particular needs of students now and in the future. Journalism is also utilizing AI and will continue to profit from it. The Associated Press, for example, uses Automated Insights to generate thousands of earnings reports stories per year. However, as generative AI writing tools like ChatGPT enter the market, concerns regarding its application in journalism arise. Most people fear receiving a robo-call, but artificial intelligence in customer service may give the industry with data-driven solutions that deliver important insights to both the customer and the supplier. Chatbots and virtual assistants are AI systems that enable the customer service business.

Even though Amazon has more than 100,000 robots buzzing around in its warehouses, picking and packing are still done by people. This will soon change, though. The New York Times quoted an expert named Mr. Lee as saying, "People want to get very big numbers. In the past, they had plans of reducing their workforce by 5 to 10% at a time. Now they are asking, "Why can't 1% of the people we have do it?" More interestingly, the AI we have today is useless in two important ways: it can't be creative and it can't feel love or kindness. It's sort of a "tool to boost human creativity." Those jobs that involve repetitive or regular tasks must learn new skills so as not to be left by the wayside. Amazon will even pay its workers to get training for jobs at other companies.

Professor of computer science at the University of Illinois, KlaraNahrstedt has stated, "We must invest heavily in education to retrain people for new jobs if we want AI to be effective in many domains. Today's AI is considerably more focused and intentional. People will soon need to study programming the same way they learn a new language. If we don't know programming or coding in the future, things will just get more challenging. While many people who are made unemployed by technology will eventually find new jobs, it won't happen immediately. People gradually recovered, much as they did when America switched from an agrarian to an industrial economy during the Industrial Revolution, which was a major factor in the "great depression." The immediate impact was enormous. As we consider, it's not always as painless as people would like to believe when jobs disappear and new ones come around.⁵³ If we understand what the technology is capable of and we understand the domain very well, we may start to make connections and say, 'Maybe this is an AI problem, maybe that's an AI problem. It's wise to say 'I have a specific problem I want to solve'.

Some of the most intriguing AI research and investigation are taking place in many areas around the globe, including reinforcement learning, and which deals with rewards and punishment rather than labelled data, and generative adversarial networks (GAN), and that allow computer algorithms to create rather than simply assess by pitting two nets against each other. The former is demonstrated by the prowess of Google DeepMind's AlphaGo Zero,⁵⁴ the latter by original image or audio generation that's based on learning about a certain subject like celebrities or a particular type of music. On a far grander scale, AI has the potential to have a significant impact on sustainability, climate change, and environmental challenges. Cities will ideally become less congested, less polluted, and more livable, thanks in part to the employment of smart sensors. We all know that once we foresee anything, we may impose policies and norms. Sensors on automobiles that convey data about traffic conditions, for example, could identify possible difficulties and optimize car flow. However, in the future, the road will play a significant role.

Today, it is a truth that AI's reliance on large data is already having a significant impact on privacy. Cambridge Analytica's Facebook antics and Amazon's Alexa spying are two examples of technology gone wild. Critics believe that without proper rules and self-imposed constraints, the situation would worsen. In 2015, Apple CEO Tim Cook derided competitors Google and Meta for greed-driven data mining.⁵⁵ He stated that advancing AI through amassing massive human profiles is a sign of laziness rather than efficiency. To be truly intelligent, AI must respect human values, including privacy. If we do this wrong, the consequences will be severe.' Actually, AI is reserved for routine tasks rather than a cataclysmic transformation such as the arrival of robot overlords. AI can benefit society if used wisely. However, as with most developing technologies, there is a significant risk that commercial and governmental use will have a negative influence on human rights. As a result, enormous volumes of data can be collected and used in benign ways, such as spam filters and recommendation engines, to try to forecast future behavior. However, there is a significant risk that it will have a negative influence on personal privacy and the right to be free from discrimination.

'There are still big breakthroughs that have to happen before we reach something that resembles human-level AI,' said internationally renowned AI scientist Stuart Russell in 2018. Russell also stated that AI is not yet capable of fully comprehending English. This demonstrates the current distinction between humans and AI. Humans can interpret and translate machine language, but AI cannot do the same for human language.⁵⁶ However, if we reach a point where AI is able to understand our languages, the AI systems would be able to read and understand everything ever written. He also added, 'Once we have that capability, you could then query all of human knowledge and it would be able to synthesize and integrate and answer questions that no human being has ever been able to answer. Because, they haven't read and been able to put together and join the dots between things and that have remained separate throughout history.'⁵⁷ John Laird, a longtime professor of engineering and computer science at the University of Michigan, stated that the objective of his study has always been to create what is known as cognitive architecture, which he believes to be inherent to an intelligence system. For instance, we are aware that the human brain is more complex than a collection of uniform neurons. There is a true structure in terms of several elements, some of which are connected to knowledge, of how things are done in the outside world. It's referred to as procedural memory. Then there's knowledge based on general facts, a.k.a. semantic memory,⁵⁸ as well as knowledge about previous experiences or personal facts; which is called episodic memory.

Human Error and Use of AI

The advantages of analytics are well established. Analytics has assisted organizations in transforming shopping experiences, mapping train and truck routes, discovering extraterrestrial life, and even predicting diseases. However, in recent years, organizations all over the world have grappled with how much human error has entered their analytics efforts, often with disastrous outcomes. Human error in data processing has far-reaching consequences for organizations, from crashing spacecraft to sinking ships, transferring billions of dollars to unintended recipients, and causing deaths due to pharmaceutical overdose.⁵⁹ Human mistake in data analysis can occur for a variety of reasons, including a lack of expertise, exhaustion or loss of focus, a lack of information, or the all-too-common biases in data interpretation. The most prevalent human errors, on the other hand, are related to humans reading, processing, analyzing, and interpreting data. AI can successfully tackle human mistakes by doing the heavy job of parsing, analyzing, drilling down, and dissecting enormous amounts of data. It can also do high-level arithmetic, logical, and statistical functions on a scale that human led, whereas self-service analytics cannot. AI-driven analytics has numerous advantages, ranging from giving actionable insights in minutes to removing errors or biases in self-service analytics.

We may expect to see increased adoption of AI in analytics around the world as more business executives look to AI for insights that fuel their businesses. There are five most common human errors observed as discussed below and that can be eliminated by using AI easily.⁶⁰

Confirmation bias. If you're always on the lookout for a yellow car you'll never miss it. Confirmation bias influences how we seek, understand, and recall information. Gut feeling frequently overrides statistics in the corporate environment, and data is altered, omitted, misrepresented, or misread to support one's own opinions. And when data contradicts ideas, the material is criticized and dismissed. Artificial intelligence avoids this method of cherry-picking data by examining past data for trends, patterns, and outliers, yielding reliable, bias-free conclusions.⁶¹ Lockheed Martin,⁶² one of the world's leading aerospace companies, uses historical project data, also called dark data, to manage its projects proactively. By correlating and analyzing hundreds of metrics, the company was able to identify leading and lagging indicators of program progress, predict program downgrade, and increase project foresight by 3%.

Inability to break silos. Business dictionary has defined the Silo Mentality as is a mindset present when certain departments or sectors do not wish to share information with others in the same company. It's sometime happen and this type of mentality will reduce efficiency in the overall operation, as well as reduce morale, and may contribute to the decrease of a productive company culture.⁶³ Too many organizations have trouble with data-related problems, such as keeping track of various sources of data, not being able to work together on data, having data that isn't accurate or that is hard to get to. Using relational data modeling techniques, AI can easily break down silos by communicating with and connecting big data sets from different applications, databases, or data sources. For example, multiple state governments in India decided to work with the National Green Tribunal on Project Elephant to study and stop elephant deaths on railway lines that connect multiple states. They did this after a national newspaper, The Hindu, published a report showing the time, frequency, and common routes of elephant deaths. The newspaper put together this story by getting information from the departments of railways and forest reserves. In fact, AI-driven analytics have a lot of benefits, like being able to give actionable insights in minutes and getting rid of mistakes or biases in self-service analytics. There is a lot of information about the perks of analytics. Analytics has helped businesses change the way people shop, map routes for trains and cars, find life beyond Earth, and even predict diseases. However, silos occur in various departments or business units in the organization, and AI could be employed in any of these business operations to break down silos.⁶⁴

Downplaying losses. It's human nature to be loss-averse. Toyota downplayed the impact of faulty brakes in its cars, resulting in some Toyota models being pulled off Consumer Reports' list of recommended vehicles. BP downplayed the impact of the Gulf of Mexico oil spill by putting out polished ads apologizing for a 'minor spill,' until it received severe backlash from then President Barack Obama, and who said the company should have used its PR budget to clean up the spill instead.⁶⁵ Downplaying loss fosters tunnel vision and impairs leaders' ability to make good judgments. And this might be costly to the organization in the long run. Because of the analytical DNA of artificial intelligence, it analyses and interprets data as it is and does not choose positive patterns over negative trends, effectively eliminating the human predisposition to favor positive outcomes. As a result, AI-powered analytics is a perfect ally for executives seeking to make decisions based on comprehensive facts rather of a partial image. AI's thirst for enormous volumes of training data will increase the relevance of data, altering how we must think about data protection.⁶⁶

Inflated predictions. Another drawback with human-led analytics is that it tends to make statements about the future that are too optimistic. Humans tend to overestimate how much money an organization will need, how much damage will be done by a natural event, or how much the deficit or inflation will be based on their own assumptions and past experiences. On the other hand, AI-led analytics tends to be more accurate because it makes predictions based on what is moving or stopping something and what is happening in the outside world. The US Navy uses AI and ML to plan preventive repair for its ships and planes and to predict when parts will break down.⁶⁷ This enables sailors to spend more time focused on missions and less time on repairing aircraft when they fail.⁶⁸

Inability to go beyond surface-level analytics. Businesses that take the time to investigate and identify the underlying causes of problems often outperform their competitors by orders of magnitude. Analysis of the causes of an issue can help pinpoint its origins, suggest solutions, and suggest ways to head off similar issues in the future. Humans aren't able to collect, analyze, and drill down through so many layers of data to find the root cause of a problem when there are too many data sources, structures, and silos.⁶⁹ AI-driven analytics can bypass these barriers by smoothly digging into numerous levels of data concurrently.

In addition, AI can also overlay several possible situations to come up with the most probable cause of a problem.⁷⁰

Relation and Contribution of AI with Different Sectors

AI is a progressive technology and there are several benefits of AI in diverse industries, business, service fields and different aspect of life. Every industry is starting to realize how helpful it can be to use technology. Apps that use AI technology are already popular in many areas. The world is becoming more digital because of technology. Today, different businesses and sectors will be able to run more smoothly and efficiently by using AI. By adding AI to our business, we will be able to take advantage of its benefits. It is already being used by a lot of organizations, businesses, and companies. In the next few paragraphs, we'll talk about how AI can change different fields and businesses.

An automated information system (AIS). AIS is any set of hardware, software, and equipment that can handle information with little or no help from a person. The system can include a computer, software, devices for making phone calls, and a lot more. AIS handle different kinds of information based on what it is used for. For example, a library might have a Library Management System that helps the staff keep track of and organize the books. If a book isn't returned on time, the system sends them an alert with details like the borrower's name and cell phone number. On the other hand, an accounting company may use a different type of AIS that helps them collect and process financial data, calculate and send invoices, and figure out taxes. An AIS also makes it easier to share this kind of information. For example, a Library Management System could send a message to the customer about the specific book and any fees that were charged.⁷¹ There are general AIS types that are common across industries, and we'll discuss a few of them below.

- **Management Information System (MIS):** An MIS is designed to help an organization's management team with operations. Managers use MISs to generate reports that allow them to see the status of the company's operations, human resources (HR), sales, and the like. Examples of MISs include human resource management (HRM), sales management, and inventory management systems.
- **Transaction Processing System (TPS):** The information processed by a TPS is related to business transactions, such as sales, expenses, inventory, and payroll. Its primary job is to store and update transaction records for reporting or further processing on an MIS. Payroll and billing systems are some examples of TPSs.
- **Office Automation System:** While MISs and TPSs focus on aiding select users or departments, Office Automation Systems support processes at every level. They can perform clerical tasks like scheduling meetings and calendar management and managerial processes, such as report generation and performance evaluation.
- **Expert System:** Expert systems are a more advanced AISs that apply AI. They are designed to provide expert insights based on the data entered into them. In the healthcare industry, medical expert systems can diagnose common diseases without the help of a doctor.

Payroll, bills, inventory management, human resource management (HRM), and medical expert systems are all examples of AISs. AISs are also part of our lives outside of the job or business setting. It instantly tells people in certain places that a child has been taken. Notifications aren't limited to text messages or emails but also include TV, radio, and electronic signs. AISs are also used by disaster management groups to let people know about floods, earthquakes, and other events that could affect them.⁷² Even Siri, Alexa, and other AI-based systems are classified as AISs since they use all of the data; we enter on a daily basis to make recommendations. AISs are already embedded in our personal and professional lives. They assist people in making better, faster decisions, thereby saving time and, in some circumstances, lives. However, we cannot ignore some of the difficulties that AISs provide. One of the key issues is the security risk that these systems, like any digital device, pose. Hacking, data leaks, and various forms of cybercrime can afflict AIS users.⁷³ As such, AIS providers and users are encouraged to implement robust cybersecurity measures.⁷⁴ AIS are benefits us:

- **Better decision making:** With AISs, managers can make calculated and data-based decisions that can have lucrative results for their whole organization.
- **Faster decision making:** Aside from making better decisions, people who use AISs can also make decisions quickly. That is crucial, especially for time-critical events, such as ordering stocks before inventory runs out, spotting child abductors before they harm the victim, and evacuating residents from disaster-prone areas.
- **Efficiency:** Employing AISs reduces the need for allocating HR to mundane tasks. AISs can be left alone while employees perform high-level activities.

Education. AI has the potential to be tremendously beneficial in the education industry. Many learning programmes benefit from the use of technology in their conception and implementation. It can also be used to create games and software. It is possible to revamp and overhaul the entire educational system and teaching methodologies using Artificial Intelligence. It starts with the issuance of certificates and degrees in schools and institutions. AI-based apps can help both institutions and students. You have the potential to influence the teaching and learning process by incorporating them into the educational field.⁷⁵ As a result, the procedure as a whole gets benefited. It changes and adapts learning tasks to help all students become better students. AI makes sure that the needs of children with special needs are met. AI is used in education in a lot of different ways right now, from chatbots that help students 24/7 to personalized learning algorithms that change to each student's needs. AI-powered tools are also being used to do things like grade assignments and give comments automatically. AI is also being used to look at a lot of data to find patterns and insights that can be used to help make new strategies and plans for education.⁷⁶

Travel and Transportation. AI has made advances in many industries since it was invented. The ever-changing travel industry is also taking advantage of AI to revolutionize the way it operates.⁷⁷ As a result, nowadays, travel companies highly leverage AI-powered tools and solutions for various processes from travel planning to landing in the destination.⁷⁸ Today, AI has turned into a mega-trend in the travel and transportation industry. It does not only suggest the company with the shortest route for the drivers, but also helps in making travel arrangements remotely.⁷⁹ Companies are getting around with the help of AI. Also, many travel companies have put AI into their systems to take advantage of how much people use their phones. Recent study shows that 82% of people look up local landmarks and restaurants on their smart phones. Let's talk about Google Maps. In many places, we may not have heard of AI. It can scan roads by using an advanced algorithm to look for and suggest us more competent routes and guide us about future traffic conditions in real time, whether we are in a car, on a bus, train, or on foot.⁸⁰

Manufacturing. AI helps the production industry improve by helping it deal with problems on the inside. Currently by using AI, manufacturing plants can fully automate, make decisions, integrate, and channel their processes in an easy and efficient way. Technology can have a big effect on how things are made and help them move along faster. Experts say that AI could help boost production by 40% by the end of the year 2035. AI's benefits include making choices based on data, which makes the process more efficient, boosts production, and lowers operational costs. It can also help make things easier to scale up and make product creation better. Using AI, manufacturers are able to assess the condition of equipment and predict when maintenance is required. When we use machine learning for predicted maintenance, we can cut downtime and costs for repairs by 30%. Deep-learning-based systems can improve defect spotting by up to 90%, making sure that product quality stays perfect. AI gives plants, lines, and warehouses full vision from every angle. This gives users the information they need to find quality problems, cut down on waste, and make other changes to production. This makes it possible for producers to speed up production by 20% and improve quality by 35%.⁸¹

Agriculture. Let's think about how flour or rice gets to the shopping store in a bag. It took a lot of steps to get there. Agriculture is one of the most difficult fields to do things right in. AI and autonomous farms can help predict what customers will want and how the supply chain will behave on a regional level, as well as what raw materials are needed for a certain yield. With this technology, you can find the large-scale weather trends that can affect the harvest. For example, excessive rain or heat might harm crops. AI will help in the same way in other gardening and farming fields. Such as fertilizer, getting rid of bugs, viruses, germs, and other hard farming and gardening problems. AI saves agriculture from things like climate change, population growth, problems with finding jobs in agriculture, and food safety. Because of AI, agriculture has hit a different level. AI has made it easier to grow crops, watch them in time as they grow, harvest them, process them, and sell them. Various high-tech computer-based systems are made to figure out important things like weed identification, crop yield, crop quality, and many more.⁸²

Healthcare. According to CB Insights' forecast, 86% of health organizations will adopt AI technologies in the close future. Actually, implementing such advanced technology in the healthcare industry will undoubtedly be beneficial in a diversity of ways. It can be used to manage medical records, analyze tests, X-Rays, virtual nurses, data entry, and many other things. When employed in healthcare institutions, AI is a wonderful tool. Experts believe that the combination of artificial intelligence and the Internet of Medical Things will yield significant benefits. The technique will revolutionize disease detection and research by detecting disease at an early stage. AI-driven apps, frequently powered by healthcare chatbots, are assisting consumers in determining that they live healthier lifestyles.

The ability of AI to diagnose pathology is one of the best instances of AI in the field of health care business.⁸³ It creates systems powered by AI or ML algorithms for pathologists to observe tissue samples in order to make much more precise and exact diagnoses. The use of AI in the field of healthcare, the aims is not only improving the accuracy of diagnoses but also improve the treatment procedures with more accuracy.⁸⁴

AI operated health care system can handle most tasks previously handled by humans and it can do faster and cheaper way. This significant benefit has eased stakeholders, related activities, especially hospital administrators, doctors, and patients. AI has continued to revive and reinvent itself. There are now modern ML solutions capable of acting, learning, understanding, and predicting related to diseases and patients. This is a step further than the surgery-assisting robots and linking genetic codes previously driven by AI. However, AI development has some risks and challenges like, AI system errors put patients at risk of injuries. Again, the patient's data for AI reference puts the patient at the risk of privacy invasion.⁸⁵ Benefits and advantages of AI in health care are as follows:

- As we know that, most of the developing countries struggling to keep up with the fast-paced global technological advancements have limited or no access to standard healthcare facilities and systems. For population of such country has the high risk of dying. From the report of WHO, between the world's richest and poorest nations are limited or no healthcare accessibility is responsible for the 18.1 year gap in life expectancy.⁸⁶ These disadvantaged areas can enjoy an efficient healthcare ecosystem by AI innovations. AI-backed digital systems can facilitate patient diagnosis, treatment and medication of those areas.
- Today AI powered mobile health apps are helping and used as the application of sensors, mobile apps, social media, and location-tracking technology to obtain data pertinent to wellness and disease diagnosis, prevention, and management to the users.^{87,88} Those are low-priced and user friendly. Mobile health technologies are evolving from evocative monitoring tools to digital diagnostics and therapeutics that synergize tracking with behavioral and other interventions to directly affect health outcomes.⁸⁹
- AI can develop easy information sharing system. We can realize and utilize the potential of AI for precision diagnosis and medicine. ML and algorithms must be able to analyze large amounts of data quickly and purposefully. AI can locate particular patient data more effectively than conventional care and giving doctors more time to concentrate on medications and treatments. It also helps doctors for quick and viable decision-making.⁹⁰ As example, a glucose broadcasting system enables citizens with diabetes to monitor their glucose levels in real time and acquire reports to discuss and manage their advancement with physicians or support groups. Again, wearable device data can indicate the likelihood of contracting a particular disease.⁹¹ Our day-to-day life is saturated with health data that was previously out of reach. Over the last decade, new devices and fitness technology companies are attempting to tap into this data, uncovering a treasure trove of useful information that, when applied correctly, has the potential to revolutionize the way we approach healthcare and chronic conditions like asthma, diabetics, etc.⁹²
- Today, AI-driven medical equipments and tools now rely on people's data to assess the previous and present health issues of patients. And by comparing those disease details, healthcare professionals and doctors are positioned to diagnose more accurately. The database in several healthcare mobile apps has computed millions of symptoms and diagnoses. Those can predict the potential health issues an individual can encounter in the future.⁹³ For example, Verily from Google is an application created to forecast hereditary and non-contagious genetic diseases.⁹⁴ With such useful health tools, health experts can correctly predict and prepare for possible threats in the future by taking the right steps early stages. So, by using such tools, it is possible to better operational management, predictive analysis and decision-making.
- Today, due to AI algorithms, healthcare processes become faster and at a fraction of the original costs. AI has really changed the game in terms of speed and costs for the patient examination to diagnosis, and even appropriate medication. Such as, AI can identify the biomarkers that suggest disease in our bodies. Moreover, AI-algorithms have minimized the manual work involved in specifying these biomarkers. AI algorithms and ML are considered more cost-efficient compared to traditional health care methods.⁹⁵ Patients can take required trips to the laboratory, along with AI algorithms providing prediction and results which based on personal information. This is responsible for the increased implementation of AI across the all type of health care area. According to a new survey of 500 U.S. health industry leaders from hospitals, health plans, life sciences and employers, on their attitudes and adoption of the technology. The result is significant, compared with 2018 findings, that, a nearly 88% increase in the number of respondents who said their organizations have a strategy in place and have implemented AI.⁹⁶

- We know that, most of the patients have a poor experience due to crowded and chaotic healthcare facilities. Utilizing AI can help patients quickly navigate and manage through data, obtain reports, and be directed to where to go and who to see, thereby avoiding the usual chaos and confusion in healthcare settings.⁹⁷ A recent study reveals that, according to 83% of patients, poor communication is the most unpleasant aspect of their experience. AI can provide information to patients round-the-clock. To provide accurate, up-to-date medical information, today's advanced AI health care apps or system asks questions, looks at the answers, and looks at symptoms and risk factors that are already known.
- AI advancement has taken a huge leap in robotic applications in health care. The same is the case for ML implementation in surgery. There are dedicated AI Surgical Systems that can execute the tiniest movements with maximum accuracy. This means we can do complex operations efficiently with reduced risks and side effects, blood loss, or pain. Again by use of AI post-surgery recovery can make faster and easier.⁹⁸ Today patient are subjected to Antibacterial Nanorobots which eliminate all infections in their blood before operations. Nowadays, AI-backed information on the patient's present situation is available to surgeons in real-time. It helps the doctor about the patients' condition, especially before surgery when patient is under general anesthesia.
- Advanced robots can assist both patients and medical staff. Such as, exoskeleton robots can help paralyzed people regain their mobility with little or no help from caretakers. Today, smart AI-backed prostheses are fitted with sensors that serve as more immediate limbs than traditional models.⁹⁹ Service robots from ML implementation can handle daily tasks and keep the company of patients. There are dedicated companion and conversational robots that carry out necessary tests and checks like sugar levels, blood pressure, controlling temperature, and taking pills. More advanced robots developed to help depressed patients, babies, old or week patient. With these capabilities, they can analyze the mod of the patients and help them feel more positive.
- Today, intelligent robots are launched into healthcare and patient home settings. As new algorithms are integrated into patient care processes, it will be essential for nurses to gain experience in interpreting multiple data results and integrating new information into nursing practice. AI controlled health care Tools must benefit patient care. Ideally, they allow nurses to spend more time at the bedside and gain a better understanding of the patient's illness and needs.¹⁰⁰ However, tools must be easy to use, and output interpretation must be intuitive. Researchers around the globe are creating robots to help people drive, impact suicide rates, support clinical tele-health applications, and more.¹⁰¹

Customer Service and Call Centers. One of the most significant benefits of AI is seen in the customer service sector. AI has been widely used in a variety of areas, including retail, finance, and insurance. The AI-powered technological solution will assist businesses in providing real-time and personalized customer support. Technology can also improve the efficiency and enjoyment of the employment experience. AI can help call centers and customer care teams. We can obtain relevant information more quickly with AI software. With sophisticated technologies at our disposal, we can develop new techniques and determine what works and what doesn't. Call center AI software can benefit our company by handling client interactions more efficiently.¹⁰² So, AI can help customers/usersto find their information easily and to help them by solvingtheir problem smoothlytoachieved higher customer satisfaction. AI can automate simple tasks, provide in-depth analysis, and also help agents achieve a faster response time, better first-call resolution, and happier customer service agents who have the tools to do their job better.¹⁰³

Cybersecurity. Cybersecurity is becoming a bigger problem all over the world. With everything being digitalized, it's hard for organizations to deal with the security problems that are happening right now. When AI is used in defence, it can make a huge difference. With this, hackers will be easier to find before they even start an attack. AI can change and learn from the problems in the business world today. So, improved security is the only way to make sure that AI technology is used safely. So, experts are using the benefits of AI in defence to cut down on some frauds and hacks. With advanced cloud security that is driven by AI, the future looks much better for businesses than for cybercriminals. Today, cybercriminals don't need to know a lot about technology. AI-based ransomware and other types of malwares are so good at spreading and hitting their targets that everyone is at risk. Another growing threat is the AI war, which is industrial and political espionage and data gathering. AI tools like ML and natural language processing help analysts react to threats more quickly and with more confidence. AI can help keep track of hardware failures. Some multinational companies already have a team of experts in cybersecurity, IT infrastructure, and budgets to build products for

working with massive data. So, coming up with a good plan to deal with threats In most security setups, the speed of the attack and sometimes the way it changes can make it hard to respond to threats in real time.¹⁰⁴

Construction. AI can open many new avenues in the construction industry. Advanced forms of AI are making related operations in a simple and user friendly ways. By using AI in this field, it is possible to reduce human effort and achieve efficiency. Moreover, AI is proficient in collecting and processing data and predicting outcomes.¹⁰⁵ AI technology can be advantageous at various stages of the project's design, construction, and post-completion. AI and ML are pushing the construction industry's potential to new heights at every stage of engineering and construction, from design to preconstruction to construction to operations and asset management. AI can be used from project conception and design to bidding, financing, transportation management, and operation, equipment, and asset management.¹⁰⁶

Software Development. In the field of software development, world is surely going to see a significant disruption from AI with new tools and libraries, and that will enable the generation of code, which will use natural language. Moreover, technology makes sure that we can automate anything as we desire.¹⁰⁷ Using information from AI-based tools can lead to new ways of building software and using it to help a growing business. Most AI systems use technologies that work together. For example, speech synthesis and speech detection technologies are often used together. The size of software companies and the size of their software teams show that collaboration is an important part of making software.¹⁰⁸

Finance. Today, financial institutions like bank, insurance, hotel are taking advantage of AI to provide improved and necessary information and recommendations to customers/users and help them to take more thoughtful decisions. AI and financial Experts believe that, AI and the finance industry are a great match. The most crucial factors driving the financial sectors are accuracy, real-time data reporting, and processing data in large volumes.¹⁰⁹ The technology is perfect for these tasks, which is why the financial industry is recognizing its speed and accuracy and using ML, adaptive intelligence, algorithm trading, automation, and chatbots in its financial processes. There are currently Robo advisers available through several financial investing sites. These advisers employ AI to create a unique and tailored profile for each investor based on their financial goals. Banks that use AI can greatly improve the client experience by providing 24/7 access to their accounts and financial advisory services. One of the most important business cases for artificial intelligence in banking is its capacity to detect and prevent fraud and cyberattacks. Consumers need secure accounts from banks and other financial institutions, especially with online payment fraud losses anticipated to reach \$48 billion per year by 2023, according to Insider Intelligence. AI has the ability to examine and identify abnormalities in patterns that humans would otherwise miss.¹¹⁰

Gaming. One of the biggest advantages of AI is in the gaming industry for making quick enhancements. In the world of gaming, AI is about creating more responsive, adaptive, and challenging games. From NPCs to path-finding, AI is revolutionizing the gaming experience.¹¹¹ AI has totally changed the gaming world by making games that respond to players, learn from them in real time, and be made in a short amount of time. AI used to be a hobby, but now it is a tool that many people find very useful. With AI, it's easy to make models that are very complicated. When it comes to video games, the technology will help makers make huge online worlds for players to explore. What's more important is that developers can use the technology to model policy questions and scientific studies that actually happen in the real world. AI could be used to make game levels that are procedurally generated, which means that they are made as the person plays the game. This way, players don't have to play through the same levels over and over again, which can help keep the game new and interesting.¹¹²

E-Commerce. Nowadays, we have seen that, an image of the same product on an e-commerce platform as we are searching for, on some other e-commerce site. AI is the right answer of this. Organizations implement ML algorithms to develop stronger customer relationships. The ML algorithms can also help in customizing customers' experiences. Such advance technology can also help organizations to increase sales and earn more profit.¹¹³ Today, by best utilization of AI has been found by Amazon. They become one of the most powerful e-commerce platforms and are known to have implemented AI into each and every step of the customer's life cycle.¹¹⁴ Actually, Amazon has built the whole business depending on AI with many AI subprojects.

Business. The rise of AI as an enabling technology for economic growth and social empowerment has compelled researchers to thoroughly investigate existing difficulties and report on accompanying potential. AI is being used by businesses in a variety of ways to increase efficiencies, save time, and reduce costs. AI is increasingly becoming a valuable resource for businesses across industries as it advances.¹¹⁵

If we run a business that works in the automobile industry, it's clear to us that, the developments and possible entry into this area can be worthwhile. In this way our company can become part of a visionary future for AI in the automobile industry, which is drawing ever closer. We can simultaneously take advantage of the benefits in various other branches.¹¹⁶ We have the choice to provide relevant assistants and automation to support company vehicles. By doing this, we help our staff drive more easily and may appear a little more appealing to potential candidates. Future freight transportation for our company might also involve autonomous driving.

Energy Sector. In the energy sector, which is currently in flux due to, among other things, changing extraction methods, AI is rapidly being used in numerous sections of the energy industry. It is increasingly important in controlling networks, among other things, in this context. As a result, it contributes to automation and improvement. Furthermore, AI is being used to improve the efficiency of energy creation, as well as to aid in the shift to renewable energy sources. In the energy sector, AI can also be used on the client side to collect important data for a more efficient consumption configuration. It also contributes to enhanced sustainability, which is a major driver for the energy revolution, within this context. AI is also used to better meet the wants and needs of clients. If our company is in the energy sector, we can take use of these chances to improve our operations and production. We may get a competitive edge by doing so. Machine learning and artificial intelligence have huge potential in general to manage the problem of energy supply and demand balance. Aside from the two key areas of trustworthy predictions and smart grids, many additional factors come into play for which significant gains are predicted, such as power theft prevention and detection and prediction of power outages.¹¹⁷

Automobile Industry. AI should play a bigger role in the car business over the next few years and into the next few decades. This will become clear, among other places, in the production of cars and the automation and help with driving. In the car production business, for example, there is a goal that AI could figure out whether or not all the steps are working or have worked as planned. If a broken part is installed, AI can help find it and fix the car. AI could help manufacturers keep evaluating their own goods in this way. So, it would help with overall quality control and make things run more smoothly at the same time. At the moment, this isn't possible in a reliable way, but this picture of the future is already in the works. On the other hand, AI is already helping drivers do their daily tasks more easily. One way this happens is through the driver assistance system, which sounds an alarm when certain dangers are found or when the distance between the car and other cars or items gets too close. Again, AI makes it possible for some parts of driving to be done directly by the car.¹¹⁸ Today, it's found in some vehicles that, there is an option to allow the vehicle to park itself using the steering assistant and with no additional help from the driver.

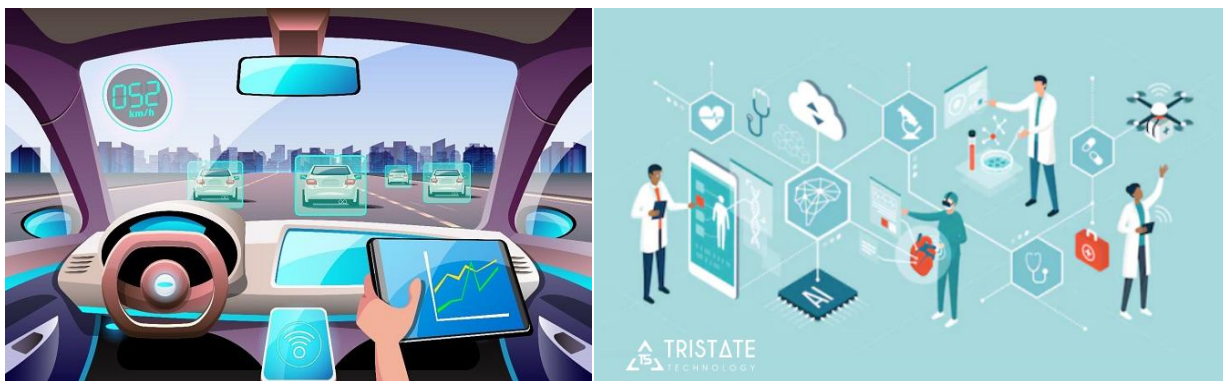


Figure 3: Benefit of AI in automobile¹¹⁹ and benefit of AI in healthcare¹²⁰

Some models have similar ideas about how to deal with traffic jams. The AI sometimes takes the wheel in the most literal way. In cars, AI also includes cruise control and systems that help you stay in your lane. Cars of the future may be able to drive themselves. At the moment, AI-based fully driverless driving isn't quite possible, but it's a goal for the future. Here, the driver doesn't do any steering at all; instead, a system made for this reason does it. The use of automated parking and traffic systems in everyday driving can be seen as the start of progress in this direction. There are different levels of technology when it comes to driving by itself.¹²¹ Depending on the level, the driver has the option to intervene or is prompted by the system to do so. In case of highest automation tier this is neither required nor possible, and the driver becomes a passenger. So, autonomous driving is conceivable for, but not limited to: passenger cars, public transportation, and freight transport. However, prototypes and test for some of these ideas already exist.¹²²

And in near future, we will see more automation in automobile. The legal framework that is supposed to apply in the techno loving country for various possible fields and becoming favorite, developed, and realized.

It's challenging to discuss automotive machine learning initiatives without including self-driving automobile solutions. Automakers like Toyota and General Motors, as well as other major technology companies like Lyft and Waymo, have spent billions of dollars to developing self-driving cars. Autonomous buses and shuttles are already being used in cities and airports in many countries, driverless trucks are already delivering goods over large distances, and autonomous flying taxis appear to be a reality shortly. And there's a strong reason for the car industry's quick adoption of machine learning.¹²³ Lots of people wonder how driverless cars can recognize potential threats and react to the environment in real time. Actually, self-driving cars using neural networks and specific algorithms; which has power autonomous vehicle perception. Exactly these neural networks enable driverless vehicles to orient themselves on the street and avoid collisions.¹²⁴ Today, the automotive industry is seeing increased competition, cost pressure, and volatility, Even a small disruption can make or break an enterprise's image. The inclusion of AI and machine learning capabilities can be a game-changer for the automotive industry. It is possible for automotive manufacturers to deploy AI technologies for designing and building new prototypes, improving supply chain efficiency, and enabling efficient maintenance of both factory equipment and vehicles on the road.¹²⁵ And the high time to adopt these AI technologies is now. If you have an opportunity to leverage the same, act on it before it's too late.

Telecommunication Industry. AI has already arrived and is widely used in the telecommunications industry. It is important in network administration, among other things, especially in network maintenance and governance. Experts believe that in the future, AI will be responsible for making redundant certain individuals who have previously performed this function. AI can be especially useful in enhancing customer service in this sector. It can ensure that consumers do not have to wait as long for any company to respond to specific issues.¹²⁶ It can concurrently make various other processes more efficiently and also ensure that errors in customer service are gradually avoided.¹²⁷ AI systems are trained by 'feeding' the algorithms with appropriate training data sets. For machines, data is the same as experience is for us humans. There should be as much of this as possible to achieve an optimal training goal. The best AI training data is therefore obtained from a large number of different people.¹²⁸

AI and Future Education

Whenever we open our Facebook, YouTube, newsfeed, do Google searches, getting help from chatgpt, or even get a product recommendation from Amazon, or book a trip online, AI is working in the backdrop. AI has penetrated business, service sector, automobile, healthcare, and social media, and now it's going to be the next big thing in the field of education. As we know that, education is the catalytic tool that has the strength to transform the future of a nation. The relationship and connection between education and society is frequently ambiguous and one-way, with education and skill expected to fit in with social, economic, political, and global trends. It should not be antagonistic to them and should not represent anything different. As a result, the relationship between education and socioeconomic structures, human resource development, and education position assist us in forming a forecast of future mid-level and higher education related with the 4IR. In this 4IR era, the aim and goal of mid-level and higher education is to ensure the quality of learning through teaching and practice, to enable learners to gain useful and sustainable knowledge and skills through on-the-ground practice and exploratory research, and to sustain the development of societies through service. In the 4IR era, mid-level and higher learning institutions should prioritize innovation, both evolutionary and revolutionary, and deepen technology system restructuring by breaking down all barriers to innovation and modernization.¹²⁹

The condition of education and training in the Fourth Industrial Revolution (4IR) is multifaceted and complex but also offers exciting opportunities that have the capacity to revolutionize society and whole nations for better health and a superior state. The 4IR is powered by AI, and it will change the workplace from being unique based on jobs to being unique based on people. 4IR is making sure that people and machines can work together again. This will close the gap between the arts and social sciences, as well as between science and technology. We need a quick response from a middle-level or higher education school because 4IR technologies have the power to help people or do a lot of damage to the environment.¹³⁰ This will necessarily require much more interdisciplinary teaching, on ground practice, research and innovation. So along with 4IR, education 4.0 is a focused, purposeful and viable approach to learning and is transforming the future of education using advanced technology and automation.¹³¹

To stay up with the times, traditional formal educational approaches must be revisited with a future perspective. Teachers and students/learners must be familiar with the abilities required by today's rapidly evolving technology and global society. As a result, students/learners should now be led rather than directed, and material should be made available rather than given to them. However, there should be ethical usage of the internet and optimal use of technical advantage with humanity. The purpose and goal of both general and vocational education should be to guarantee that students/learners have the knowledge and skills necessary to compete in the global workforce.¹³²

Our education should have a goal, be long-lasting, and be based on what we learn. So, we need to come up with outcome-based education modules to meet the accreditation needs of students and competency-based education modules to help students learn information and skills effectively. We need to build and improve the system so that it can cut costs, be easy to use, and automate all of the middle-level and higher-level schooling processes. Every education system and institute should have project management, reporting, and analytics tools so that we can make sure that future and modern education processes and procedures take care of things like scheduling, virtual classrooms, accreditation, strategic planning, modern learning, skill development, etc.¹³³ We should adopt a strategy and formulate such useful plan and that can ensure preferable future for today's students/learners.¹³⁴ In keeping with the changing situation of today's competitive world and induction of super technology in every aspect of life, education curriculum formulation and development has to be prepared with supreme care and giving intense importance of technology, IT, AI, IoT, ML, big data, **cloud and edge computing, social media** and other knowledge and skill.

By equipping today's workforce with the proper tools, we can contribute to the development of a society and nation that is more adaptable, multifaceted, and purposeful, in which everyone plays a significant role, thereby enhancing a model of education that is self-sustaining. We must recognize the transformative power of digital technology in education and be conscious of end-to-end mid-level and higher education digitization and automation to make our education smart and future-ready.¹³⁵ Our educational institutions and curriculum should be design with smart tools so that, it can ensure 24/7 virtual learning, 'made to order' learning and to easily connect with department/faculty with interpersonal connection facility. Because today students/learners should have all facility to prefer, admit, enroll, discuss, conduct assessments, even examine online easily and spontaneously. Education 4.0 encompasses and ensures few important aspects of learning and skill developing issues. We can ensure those with some specific ways and means.¹³⁶ Those important learning and skill developing aspects and means and ways have been described below in brief:

Ensure more individual/personalized learning: Individuality of every single student/learner and their own pace of learning are important at the age of 4IR and Education 4.0. Having a personalized way of teaching will have a greater impact on students to achieve their outcomes easily and effectively.¹³⁷ There are several tools accessible with AI, IoT, and Cloud computing that squeeze the entire teaching and skill development process as per the individual learner's demands with unique learning pace. At the same time, the Department/Faculty will be able to readily identify and correct individual students' strengths and weaknesses, as well as opportunities and threats, and will be able to provide individualized feedback in real time.¹³⁸

Ensure more remote learning opportunities: Nowadays, with the growing use of technologies in educational interventions, approaches to learning and teaching have evolved to take place in different environments with a variety of strategies and techniques.¹³⁹ The core of Education 4.0 is to make learning and skill development programs available anywhere, at any time, by using a set of e-learning tools, and ensuring remote and self-paced learning for all learners. As we all know, blended learning is often (though perhaps overly simplistically) defined as a combination of face-to-face and online components. Active learning, on the other hand, is frequently described as an educational strategy that involves students in higher-order thinking tasks that typically need collaboration with others. So, the Active Blended Learning (ABL) concept is a blend of both, and it is particularly effective in the present age of 4IR. The ABL concept, in which learners are actively involved in learning outside of classrooms, is gaining traction.¹⁴⁰ This way, learners end up mastering both practical and experiential learning and nowadays it become popular.

Ensure optimum active learning system: Comparative studies often try to find ways to teach the same way in online, mixed, and face-to-face settings. But the real benefits seem to come from the way educational materials, pedagogy, and learning time work together. The best blended studies let students learn in ways that aren't possible in other types of classes. Active learning is one of the best ways to have a good and satisfying school experience. It can lead to fewer students failing; better test scores, better problem-solving and critical thinking skills, more students coming to school, and happier students.¹⁴¹

So, it can also reduce the accomplishment gap between disadvantaged and non-disadvantaged students. The move towards active learning makes classrooms look like real-world work and social settings that foster cross-disciplinary connections. As we seen that, students perceive that active classrooms promote creativity and innovation.¹⁴² When learners participate in active learning environments, they tend to break their peers in more traditional classroom settings.¹⁴³

Ensure availability of education tools: We know that, Education 4.0 offers a clear route to students/learners by making tools and techniques available and handy in their learning environment. In fact, students/learners will be able to choose the tools and techniques through which they want to acquire knowledge. As example, collaborative and engagement tools flipped learning or blended learning, etc.¹⁴⁴ However, appropriate collaborative learning support is necessary for group learning in a flipped classroom setting, especially in the out-of-class learning phase. The flipped classroom can be a pathway into the disciplines that can be used in overcoming the disadvantages of the one-shot and other barriers to collaboration.¹⁴⁵

Ensure project-based learning: In project-based learning (PBL), students work in groups to solve challenging problems that are authentic, curriculum-based, and often interdisciplinary.¹⁴⁶ Learners make decisions about how to approach a topic and which activities to pursue. They collect data from various sources and synthesize, analyze, and generate knowledge from it. PBL is made possible by technology. Students use word processors, spreadsheets, and databases to complete tasks such as outlining, composing essays, evaluating numerical data, and keeping track of material gathered. E-mail, electronic mailing lists, forums, and other online applications make it easier to communicate and collaborate with people beyond the classroom.¹⁴⁷ The Internet allows researchers to conduct studies in museums, libraries, and other remote physical sites. Students study in a fun and exciting way thanks to Education 4.0's project-driven approach. It rejects theoretical knowledge and encourages students to gain time management skills, organizational skills, collaboration skills, and time management skills, all of which are essential for their future work.¹⁴⁸

Ensure easy and accurate assessment: Predicting student performance is currently one of the most particular concerns for learning environments such as universities and schools, as it leads to the development of effective mechanisms that can improve academic outcomes while avoiding destruction. AI can play a crucial part in education 4.0 by discovering new determinants in student performance and applying personalized learning, answering routine student inquiries, leveraging learning analytics, and predictive modeling.¹⁴⁹ A more practical way of assessment comes into place with Education 4.0.¹⁵⁰ There are both online and offline assessments and students get assessed on projects, assignments, and fieldwork. Again, to find the available vulnerabilities against any system, it is mandatory to conduct vulnerability assessments as scheduled tasks in a regular manner.

Ensure information/Data at the fingertips: There are greater insights into the students learning journey with data analytics and reporting in Education 4.0.¹⁵¹ The statistical research lets teachers find out where each student stands and help them improve. A balanced scorecard is the basis for the organization's or institutions social ties' causal graph. The structure unit of a university or school is used as an example. Getting numeric measurement data has been hard in middle school, high school, and college, especially in technical education, because the devices and tools needed are often too old, prone to mistakes, hard to use, or just too expensive.¹⁵² It creates hindrance of those educations.

Remodeling of education curriculum: We need to develop adequate techniques and procedure for our educational institutes, so that we can prepare our students in accordance with Education 4.0 to face the future challenges. This must be in line with industry standards. Future-oriented issues should be given extra attention and emphasis. A skill-based curriculum is the rule of the day in this age of digitization and automation. Employers are in need of competent workers and rely on colleges and educational institutions to train current employees.¹⁵³ In addition to information technology skills, Engineers should have expanded design skills that include interoperability, virtualization, decentralization, Real-time capability, service orientation, modularity, etc. for effective implementation of Industry 4.0. Therefore, Engineering Education 4.0 (EE 4.0), which produces engineers for Industry 4.0, must be modified to satisfy the demands of Industry 4.0, which emphasizes the integration of all engineering disciplines.¹⁵⁴

Building digital skills: One of the primary goals of Education 4.0 is to give students with understanding about disruptive technologies such as machine learning, as well as the abilities to apply this knowledge to real-world situations. As a result, both students and professors demand teaching and learning aids that make such issues more accessible.

Educational institutions should focus on training their faculty to develop digital skills in order to develop fully capable pupils for their workplace. Soft skills, which include problem-solving, social skills, and process skills, should be made indispensable.

Opt for digital tools for virtual learning environments (VLEs): This is becoming more popular around the world as students and staff receives remote access for instruction via LMS. Learning and teaching, course content access, online chat, discussions, collaborations, peer teaching, and blended learning all take place throughout flexible hours. Artificial intelligence (AI), robotics, cloud computing, the internet of things (IoT), cyber-physical systems, big data, and other innovations are driving the 4IR. Thus, industries have leveraged these technologies to deliver solutions to humanity's expanding requirements; yet, for them to continue adapting their ecosystems to the digital world, competent personnel with knowledge and abilities in those areas are required.¹⁵⁵

Fine-tuning of course delivery: There should be coordination between the faculty and the curriculum taught. Faculty should be willing to use technological apps to help students improve their cognitive learning capacities. They should adopt individualized adaptive learning approaches for a wiser learning approach in order to make the entire process enjoyable and exciting. A solid professional framework with cross-disciplinary career planning should be incorporated. This component will help Indian education prepare a workforce for company 4.0. However, Education 4.0 is being proposed as a new framework to train professionals capable of creating knowledge through scientific research and experience, as well as sharing this knowledge with society and using it to face technological, social, political, and economic challenges.¹⁵⁶

Prepare technology-built classrooms: University, college, and higher education institutions have begun implementing technology in their classes in an effort to produce graduates who will be successful in the cyber-physical systems that are used in all sectors of the economy. This entails revamping the learning process and creating a curriculum that makes extensive use of technology for the benefit of the students. This fourth industrial revolution in education is centered on cutting-edge, intelligent technology, robotics, and AI, all of which have an impact on our daily lives. To recognize the creative, imaginative, and bright students, it is a new challenge to redefine education 4.0, and it is challenging to determine students' outcomes.¹⁵⁷

Once Einstein said, 'Everybody is a genius but if you judge a fish by its ability to climb a tree, it will live its whole life believing that it is stupid.' Today, AI is reality; without appropriate knowledge, education and skill, we cannot continue with the present world. Nowadays, AI systems are using traditional syllabi to create customized textbooks for certain subjects. As a result, textbooks are being digitized and new learning interfaces are being created to help students and teachers of all academic grades and ages. One of the examples of useful AI interface is Netex Learning, which enables professors to create electronic curriculums and educational information across a myriad of devices. Netex includes online assistance programs, audio, and illustrative videos.¹⁵⁸ Now, AI is helping students with independent study throughout more customizable teaching and studying support applications. Software is now able to go beyond simply reciting facts that need to be memorized for consistent tests, by providing a catered experience which matches the level, console, and emotional state of the students. Different learning styles and mindsets can be taken into account in real time, to improving results drastically and helping students for their success. As we know, education has no limits, and AI can help to eliminate boundaries. Technology brings drastic transitions by facilitating the learning of any course from anywhere across the world and at any time. AI powered education also equips students with fundamental IT skills. With more inventions, there will be a wider range of courses available online. And, with the help of AI, students will be learning from wherever they are.¹⁵⁹ As a recent example, the Chinese have been working on creating intelligent education. The Chinese government's ambitious plan would require huge amounts of research in AI to support by professionals trained in the technology and engineering know-how. The Chinese government has set 2030 as the deadline to integrate AI with the Chinese infrastructure and development. In this regard, huge paces are already being made when it comes to educating the general mass using AI.¹⁶⁰ According to an estimate, China led the way, with over US\$ 1 billion invested globally in 2022 in AI education.¹⁶¹

Impact of AI in the Era of 4IR

Now, AI has been around everywhere for a great deal of time. The benefit of AI is steadily improving our everyday life. The technology is being used for robots that welcome at shopping centers or online search engines for offering suggestions.¹⁶² Today, AI simulates human analysis in AI systems. It is the ability of the computer program to think and learn.

Everything can be taken to be AI, if it involves a program that does something and that we usually think depends on human intelligence. Innovations in the AI space have led to several benefits across multiple industries.¹⁶³ Today, processes are effective and efficient, convenient technologies are extensively available, and forecasts are more accurate. AI and other technology experts are saying today, the rise of AI will make most people better off over the next decade, but many have concerns about how advances in AI will affect and what it means to be human, to be productive and to exercise free will. The automation revolution will have a tremendous impact on the fundamentals of business and society, as well as on the innovation and productivity potential. Blockchain technology has the potential to impact most industries across the globe in the near future¹⁶⁴; heralding in a new age of consumer trust and optimization. AI can improve data backup and disaster recovery planning and policy from an IT standpoint to ensure smooth company continuity. The elements for successful technology and IT leadership continue to evolve, but the requirement for strong business strategy, vision, and IT management, as well as a knowledgeable approach to risk, compliance, outsourcing, and AI, remains as important as ever.¹⁶⁵

Digital existence is enhancing human potential while upending long-standing human activity. More than half of the world's population now uses code-driven systems, which present both extraordinary potential and challenges that have never been seen before.¹⁶⁶ Will people be better off than they are now as algorithm-driven AI continues to spread? AI will have an impact on the entire agricultural and food value chain, from farm to fork, both now and in the future. Next-generation automotive technologies will be influenced by AI, and this will change how cars, trucks, and powertrains are designed and produced.¹⁶⁷ AI will influence the tech developments of the global aviation and aerospace sectors. It will also influence space travel and communications, airport operations and management, air traffic control systems, and future trends in flight and aviation transport related industries. AI will influence the technology innovation transforming all parts of the construction and civil engineering sectors leading to improvements in cost, safety, efficiency and quality of construction.¹⁶⁸ AI will have an impact on smart phones, tablets, and wearable tech gadgets, as well as how people live, work, and consume services, prompting businesses to establish their own methods for dealing with such use at the back end and capitalizing on it at the front end.¹⁶⁹

The experts predicted networked AI will amplify human effectiveness but also threaten human autonomy, agency and capabilities.¹⁷⁰ Computers might be as smart as or smarter than humans when it comes to things like making complicated decisions, learning, reasoning, pattern recognition, visual acuity, speech recognition, and language translation. Smart systems in neighborhoods, cars, buildings, utilities, farms, and business processes will save time, money, and lives and give people the chance to enjoy a more personalized future.¹⁷¹ The use of AI in healthcare is hopeful, with applications such as diagnosing and treating patients and assisting senior citizens in living fuller and better lives. They were particularly enthused about AI's involvement in broad public-health programmes based on vast amounts of data that may be collected in the future years on everything from personal genomes to nutrition.¹⁷² AI would abet long-anticipated changes in formal and informal education systems.

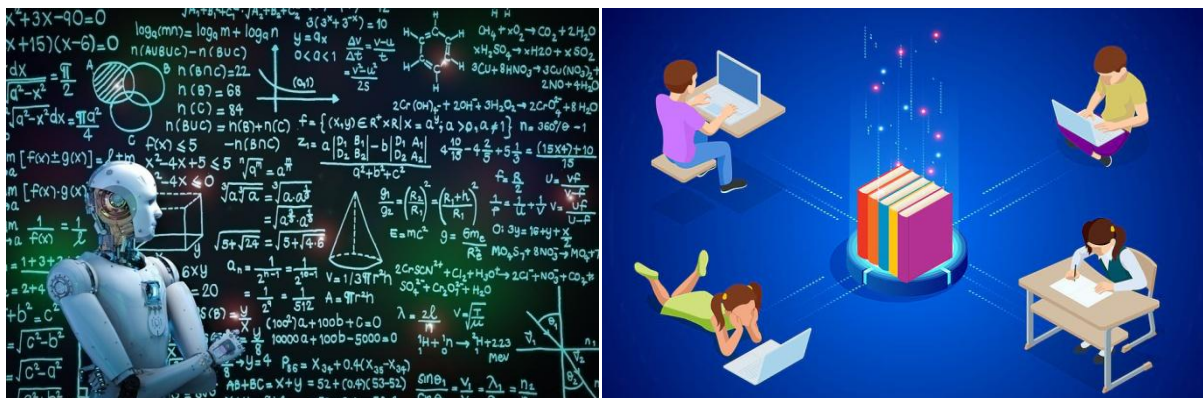


Figure 4: Role of AI in education system¹⁷³ and revolution of future education system¹⁷⁴

Looking around now, we can see that our society is changing as a result of the use of AI and IoT in daily operations. If we go to a healthcare facility, an AI-powered machine will check our pulse, and if we go to an internet store, we will see a recommended list customized by an AI tool. Actually, these are only a few examples of the benefits of AI in our daily lives. AI will provide a lot more in the future. With time, more industries, service sectors, and organizations will embrace this transformative technology to improve every human activity working process.¹⁷⁵

AI can help simplify and speed up processes in the community, society, country, and world by making the workplace more efficient, helping us make better decisions, or giving us direct help. AI can help by finding and fixing problems that people might not be able to see or fix on their own. But some people don't see the benefits of AI because they think it will cause people to lose their jobs and become less smart. In fact, speed, precision, efficiency, and scalability are the most important benefits of AI.

The 4IR will transform industries, service and other sectors so significantly that much of the work that exists today will not exist in next 25 years. It is crucial for us to understand the impact of these changes on all areas of our lives, including academic and learning institutions.¹⁷⁶ Currently, all graduates are confronted with a technologically transformed world in which AI, IoT, ML, Big Data, Cloud and Edge Computing, and social media create diverse opportunities and challenges for conventional education systems. As students consider their post-diploma or post-graduation lives, formal academic and learning institutions are pondering their fate, particularly in regards to employment. Nearly all contemporary technologies propelled by AI are transforming the world to such an extent that social concepts such as 'post-work' are increasingly defining the present era. This period requires skills that are not identical to those required during the Third IR, when information technology (IT) was the primary driver. It is estimated that artificial intelligence will be a US\$ 15 trillion industry within the next seven years. Millions of unskilled and traditionally trained individuals will be laid off.¹⁷⁷ On the other hand, millions of jobs related to modern and hi-tech skilled will be created in the next few years.¹⁷⁸

Future of Robotics and Robots

An algorithm is 'a step-by-step procedure for solving a problem or accomplishing some end.' In the field of AI, algorithms are automated instructions that tell a computer what to do. The instructions are mathematically driven and can be as simple as 'if X, then Y' actions or encompass complex mathematical layers of instructions to execute a task or find an answer to a problem.¹⁷⁹ The algorithm manipulates data in a variety of ways, such as sorting, inserting, replacing, or searching for a data attribute. It solves problems when it carries out the instructions. ML can be supervised, unsupervised, semi-supervised, or reinforcement learning depending on the kind of data being input into the program and the type of outputs that can be expected.¹⁸⁰ When we hear someone talk about a machine that learns, the machine is executing a structured set of mathematical procedures. The machine learns how to correct itself based on data used to train the application or by iterating on data used by the application once deployed. How the machine learns to correct itself depends on the mathematical models selected for the task.¹⁸¹ Data scientists and ML programmers are the team members who select and adjust the mathematical models used in applications.¹⁸² In deep learning, a set of mathematical instructions such as an algorithm, which is called a node, works like a neuron to fire the algorithm, process it as instructed, and pass its information to another node in the computer. That algorithm is then used as input by another node in the neural network. Data move through the nodes in a direction specified by the algorithm. A deep learning model can contain billions of nodes embedded in many layers.

Future robotics and automation will be going to serve as assistants, workmates, teachers, surgeons, drivers, operators, and explorers. As engineers, technologist, and scientists continue to develop and advance robotics, the capabilities of this technology will only increase further. Today, in many ways, robots are already an integral part of daily life. They might even assist us in expanding our horizons on our planet and beyond, helping billions of people live better lives.¹⁸³ **Today, robots become human friend and have been among us for quite some time and are used to separate humans from dull, automated, dangerous or dirty jobs or tasks in warehouses and factories at the work place. When we are talking about replacing humans with robots, then safety is perhaps one of the most important factors.** Robots injuring or even worse, killing their human colleagues, is become even bigger issue as use of advanced AI increases or automation rises and many more factories are adapting automation. Forbes published the interesting story about the incident where a semi-autonomous driving Tesla car¹⁸⁴ collided with a tractor-trailer in Florida, and subsequently killing its driver in 2016.¹⁸⁵ Again in 2015, when an **industrial robot** killed a German factory employee and in 2017 another killed a Michigan worker. However, in the Future of Jobs Report, more than **80%** of business executives said that, they **are accelerating plans to digitize work processes** and deploy new technologies.¹⁸⁶ And, 50% of employers are expecting to increase speed the automation of some roles in their companies. So, in the age of AI, the McKinsey Global Institute declared that, workforce transitions in a time of automation, estimates that as many as 375 million workers or roughly 14% of the global labor force may need to re-skill in **digitization, automation and AI** by 2030,¹⁸⁷ in their report, 'Jobs lost, jobs gained.'¹⁸⁸

An up-skilling worker seems to be the most popular course in all advanced company. For example Amazon's 'Up-skilling 2025'¹⁸⁹ initiative, has announced that it plans to spend US\$ **700million** to retrain a third of its workforce with skills for automation or in AI training. Again, **52% of industrial workers** interviewed in the Digital Factories 2020 and 'Shaping the future of manufacturing'¹⁹⁰ report by PricewaterhouseCoopers (PwC)¹⁹¹ believed their company lacks a true **digital culture**. They decided, **getting workers involved, and trained**, with technologies at the earliest stages can double-up with effective risk assessment and understanding potential safety hazards. **Actually, safety and training** can go hand-in-hand by ensuring each worker is trained to follow the safety protocol and avoid risks of on-site accidents and injuries; whatever their skill level. **Training of the safe use** of robots also goes beyond the technologies' installation. As the national safety guidelines for the manufacturing industry are always changing and periodic training must be delivered to workers to ensure they can operate the machinery safely. The safety of robots must also be guaranteed over the long-term for the betterment of human safety. One way to achieve this is being explored by MIT¹⁹² in collaboration with the automobile manufacturer BMW¹⁹³. By using **simulations to develop algorithms** that help robots predict and respond to humans in close proximity, like, on a car production line. In addition, **effective maintenance** is absolutely crucial to the safe operation of robots.¹⁹⁴ So, the future of AI and robotics will provide several fascinating opportunities with high pay and promising career advancement. The chances for new generation of having a rewarding job in the production and service industry can be increased further by formal education, certification, practical training, work experience, and skill development.



Figure 5: Example of few modern robots (Home care robot, Emotional robot)^{195,196}

Currently social robots are designed to interact in ways that make them human by responding to human interactions.¹⁹⁷ Sophia is an example of a social robot conceived as a companion for older adults that demonstrates the potential of technologic advancements to improve how robots function.¹⁹⁸ In 2018, Sophia was redesigned with mobility capabilities and is now the first robot to be given citizenship in a country (Saudi Arabia).¹⁹⁹ Miko is kind of robot that understand human emotion. Miko's got dozens of emotions (and a few tricks up its sleeve). Not just recognizing you and calling you by name, but responding to your mood and getting to know you a little better each day. Need a joke when you're down? A dance when you're bored? Miko's on it. Because it's not just the smartest little robot you'll ever meet. It's also your friend. Miko's constantly exploring for fun, prompting you to play, and encouraging you to challenge your brain. As comfortable initiating a conversation as starting a dance party, the only thing Miko's missing is a partner-in-crime.²⁰⁰ PARO is an advanced interactive robot developed by AIST, a leading Japanese industrial automation pioneer. It allows the documented benefits of animal therapy to be administered to patients in environments such as hospitals and extended care facilities where live animals present treatment or logistical difficulties.²⁰¹ Professor Einstein is a robot that teaches science and general information.²⁰² ROBEAR is a nursing care robot.²⁰³ Vortex is a programmable robot that teaches kids STEM.²⁰⁴ Pillo is an AI-powered health companion.²⁰⁵ Buddy is a home robot.²⁰⁶

As robots learn to perform nursing functions, such as ambulation support, vital signs measurement, medication administration, and infectious disease protocols, the role of nurses in care delivery will change.²⁰⁷ Research suggests that between 8% and 16% of nursing time is spent on nonnursing activities and tasks that should be delegated to others.²⁰⁸ Again from an example of a robot collaboration is found at Duke University Pratt School of Engineering and School of Nursing.

Interdisciplinary teams are working on developing the Tele-Robotic Intelligent Nursing Assistant (TRINA), a remote-controlled robot, to address healthcare workers who are at “high risk for infection due to routine interaction with patients, handling of contaminated materials, and challenges associated with safely removing protective gear.”²⁰⁹ TRINA is tested in the nursing simulation lab and currently performs about 60% of predefined nursing tasks; however, it's 20 times slower than a nurse. The nurse will become the information integrator, health coach, and deliverer of human caring, supported by AI technologies, not replaced by them.

In 2017, the McKinsey Global Institute (MGI) published the report “Jobs Lost, Jobs Gained: Workforce Transitions in a Time of Automation.”²¹⁰ Although discussions of AI replacing human workers have taken place since the beginnings of the technology, this report stirred great debate about the global impact of AI. MGI models predict that by 2030, nearly 75 million to 375 million workers worldwide will need to switch occupations due to AI technologies. However, the report also emphasizes that new roles and jobs will be created. American Economic Association researchers agree with the MGI predictions, finding that some tasks will be favorable for automation, but few jobs can be fully automated. They also predict that workers will train into new roles.²¹¹ In 2011, computer scientist Andrew Ng proved that computers can learn what an object is without being told what it represents. His research used 10 million online videos of cats; over time, the computer learned what a cat was. This breakthrough technology is used today in speech recognition systems. Recent research predicts that global AI healthcare spending will equal US\$ 36.1 billion by 2025.²¹² China announced in 2017 its goal to become a global leader in AI by 2030. The U.S. issued the executive order ‘Maintaining American Leadership in AI’ on February 11, 2019, directing all federal government agencies to implement strategic objectives aimed at accelerating AI research and development.²¹³

AI and Next Global Consequence

With every new use of AI comes the scary question of whether or not robots will put people out of work. The judges haven't made up their minds yet. Some experts strongly disagree with the idea that AI will automate so many jobs that millions of people will be out of work. Other experts, on the other hand, see this as a serious issue. Social experts and people who think about AI thought that the organization of the workforce was changing, and that AI was basically taking over jobs. It lets us really build a market based on knowledge and use that to make better automation for a better way of life. It might be a bit abstract, but we should be worried about AI and robots taking our jobs.²¹⁴ Some expert, however, has speculated that algorithms are to blame for the loss of white-collar jobs like business analysts, hedge fund managers, and lawyers. Again, there is some disagreement on how the rise of AI will affect the workforce, but experts agree on several themes to look for. Some experts, on the other hand, feel that when AI is integrated into the working, it will actually create more jobs; at least in the medium term. Wilson believes that the change to AI-based systems will cause the economy to add occupations that will help with the transition. Some additional specialists AI will generate more riches than it consumes. However, it may not be dispersed equitably at first. The changes will be felt subliminally and will not be visible. A tax accountant will not get a pink slip and meet the robot who will now sit at her desk. It is possible that the next time the tax accountant searches for a position, it will be more difficult to locate the same one. Few optimistic analysts predict that AI in the workplace will fragment long-standing processes, resulting in the creation of many new human occupations to combine those workflows and offer satisfaction and progress.

The age of AI and 4IR is a transition, and it could take years or even decades for different parts of the workforce and almost every part of life to get used to it. So, these predictions are harder to make, but few gloomy experts worry that once AI is everywhere, these new jobs and the ones that were already there may start to go away. So, they wonder what will happen to those people in the long run. As we've seen in the past, there were ways to move from farming to making things to providing services. Now, that isn't true. What will happen to most people who work if all jobs are taken over by robots? As we've seen, technology makes more sense from a business point of view. For example, self-driving cars and AI concierges like Siri and Cortana could take away up to 8 million jobs in the US alone as these technologies get better. What about the rest of the world? When all these jobs start to go away, we'll have to ask ourselves, ‘What makes us useful?’²¹⁵ How do we define productivity? We must face the ever-evolving reality and rethink the foundations upon which our civilization is built. What is it that we do that contributes to society and makes us valuable as individuals? Since the technology won't wait for us, we need to have this discussion ASAP. It's time for us to develop a moonshot mindset.²¹⁶ To build inclusive, decentralized intelligent digital networks ‘imbued with empathy’²¹⁷ that help humans aggressively and ensure that technology meets social and ethical responsibilities.²¹⁸ We need some effective and new level of regulatory and certification process to ensure the best use of AI for entire human race.²¹⁹

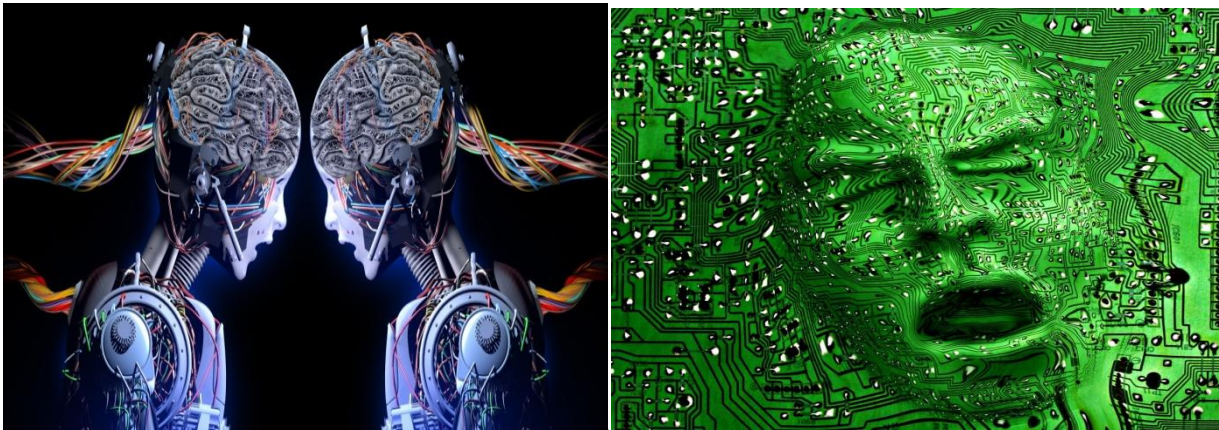


Figure 6: AI and the Singularity²²⁰ and that may collapse the earth²²¹

AI could be data-driven as well as knowledge-driven. The next-generation AI breakthrough is knowledge inference and its application to all contexts. Several significant concerns with machine learning in 5G and future networks may give rise to new areas of research and extensions of present standards to support future networks.²²² So, if AI is going to be used by a lot of people and get better, there needs to be a strong guarantee of security. Since AI will be used in transportation and health care in the coming years, it must be presented in a way that builds trust and understanding and protects human and civil rights.²²³ Policies and protocols, on the other hand, should handle ethical, privacy, and security concerns. As a result, multinational communities should work together to push AI to progress in a way that benefits humanity. As AI becomes more incorporated into the workforce, it seems doubtful that all human employment will be eliminated. Instead, many experts believe that the workforce will become increasingly specialized in the future. These professions will necessitate more of what automation cannot currently deliver, such as creativity, problem-solving, and qualitative skills. Essentially, there will always be a need for people in the industry, but their responsibilities may change as technology advances. Specific skill sets will be in higher demand, and many of these professions will require a more advanced, technical skill set.

Conclusion

Today, things that normally need human intelligence are now within the capabilities of machines. ML and deep learning are only two examples of the AI techniques that can simplify any task. Data has the same value for computers as experience does for humans. There is a great deal we can do using AI to improve the quality of our service and the success of our company. If AI is deployed properly, it will allow us to maximize productivity across all departments, boost sales and customer happiness, and make better use of our resources. This is why, AI is using every sectors or businesses or organizations. Some examples of these sectors include the automotive, healthcare, financial, automobile, manufacturing, production, energy, agriculture, military, telecommunication, cybersecurity, etc. The new era will be governed by different norms and necessitate a new type of economic analysis. The middle of the 20th century was manufacturing economy dominated. The current economic frameworks must be modified and updated to account for describe the next 50 years. Google Maps' usefulness to travelers is mostly due to AI. It has allowed us to create detailed road maps in a fraction of the time and it took just five years ago and to distribute these maps to every part of the globe. Today, we may also rely on AI-powered apps to keep us safe and comfortable while we ride bikes, stroll, or take public transportation. AI has bright future in the financial and banking sector; and those sectors have propelled by real-time data reporting, adoption, precision, and processing by using massive amounts of data. Such massive and complicated task can be accomplished by using AI technologies such as ML, algorithmic trading, adaptive intelligence, chatbots, and automation.²²⁴

Today, self-driving cars use AI to make real-time decisions based on the data as they gather from their sensors. So, AI-controlled self-driving cars are the sign of fact that, the future is getting closer to the concept of driverless car and it is no longer the stuff of science fiction. Recent studies say that by 2040, there will be about 33 million cars that can drive themselves. On the other hand, AI in healthcare is a broad and very popular term for the use of ML algorithms and software, to imitate human cognition in the analysis, evaluation, calculation, presentation, and understanding of complex physical, mental, medical and healthcare data, and ready to go beyond human capabilities by giving new ways to pathology test analysis, diagnose, choose drugs, treat, surgery, or prevent any complicated disease.

In particular, AI has the required talent of computer programs to draw close conclusions based only on the data they are given. Today, AI can solve many problems by intelligently searching through much possible solution. AI is an interdisciplinary science with multiple approaches, advancements in ML and deep learning, in particular, are creating a paradigm shift in virtually every sector of the tech and advanced industry. Actually, AI is the backbone of innovation in modern computing and unlocking value for individuals, organization, company or businesses.

Now, future dangers from AI are significance. AI, IoT, ML, and automation will reduce the need for human workers and the size of the global economy. There is a high degree of uncertainty regarding the conceivable technological development scenarios and their effects. So, there are substantial potential weaknesses and risks that cannot be ignored. Economic analysis based on models suited to this new era has the potential to aid in the development of policies at both the global and national levels and that can mitigate these negative effects. The big threat of AI is 'Singularity' in which AI machines take over and fundamentally alter human existence either by making us dependent on them or eliminating us altogether is another major threat to humanity on a global scale. Today many people believe that, the end of humanity is possible if super-intelligent robots gain access to nuclear weapons or develop biological or chemical agents. Those devastating/horrifying tasks could be carried out at any time, either by super clever robots themselves or by some ignorant human acting out of anger or malice or dictate by stupid person. So, there should be appropriate procedures, rules and regulation to use advanced AI and robots. And such procedures and regulations should include ethical, privacy, and security concerns. Therefore, there should be global coordination to guide AI development in a positive gentle path.

AI is showing to be a real game-changer in the health care field and automobile. It is improving almost every part of the business, from keeping private records safe to using robots to help with surgeries. Like the industrial revolution, progress in AI and similar technologies could be a major turning point in history. But, advancement and diversified use of AI could lead to the end of the manufacturing-export-led development model, which has helped many emerging market economies in the past. The worst-case situation is that most of the progress made in development and reducing poverty over the last 50 years will be lost. In the past, new technologies led to more shared wealth and more equality between and within countries. But present new hi-tech technologies may lead to more inequality on both fronts if policies aren't put in place to counteract them. There is still need for humans in some capacities as AI grows more pervasive in the workplace. Again, creativity, problem-solving, and qualitative abilities, all of such task robots cannot replicate, and such capable and specialized human will be in more demand in future. There will always be some demand for skilled workers, though their specific functions may change as per the requirement of improved and advanced technology. There will be a shift in the kinds of talents and expertise that will be in demand and many of these positions will call for a higher level of technological proficiency. In the future white-collar and middle-class jobs will be more threatened by AI. But, nursing, physiotherapy, cooking, steward, mechanics, electrician, other service or care related occupations are expected to rise in demand. So we need change and shape our curriculum, syllabus, study pattern, teaching style, skill development program, as well as whole education system to meet the future challenge. Implementing AI is expected to streamline work and create more job opportunities for skilled employees with high salary in future.

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