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Impact of AI

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Abstract : This research paper examines the impact of Artificial Intelligence (AI) through a comprehensive analysis of its history, reinforcement learning, effects on jobs and businesses, and contributions in the medical field. It explores the transformative potential of AI, discusses its historical development, delves into reinforcement learning algorithms and applications, evaluates the implications of AI on employment and business models, and highlights the significant advancements in healthcare driven by AI technologies. The paper concludes by emphasizing the need for responsible implementation of AI and addressing societal challenges.

Index Terms—Artificial Intelligence, AI evolution, AI advantages, AI Disadvantages, Computational Intelligence

I. Introduction

AI is that it is a machine that seem to think soAI is all about data and statistics they feed on data the more data you give it the more powerful it gets and the more it learns so when you have data and intelligence it suddenly shoots out in the output it gives you an exponential result. Artificial intelligence is very simple you just put your human intelligence in machine what happens now is that all the repetitive tasks that happen continuously in our day to day life in that task the job of machine is that when you do this tasks continuously can the machine make a digital twin of the person learn these tasks and do it on its own this is the job of machine or artificial intelligence

II. History

People had thought first of thinking machines ,machines that could think and machines that would compute so initially you had mechanical machines but eventually you had the computer so eventually people wanted machines that could kind of replicate human level thought like the brain but we cannot exactly replicate that but once you have powerful enough computers you can start to replicate the way the brain works the way the brain processes inside a computer that's what you try to do and then you create a neural network which is then you try to train it so it's called self-learning reinforcement learning there are different techniques of doing that so you give it a bunch of data and you say eat this and try to find the patterns it's about pattern recognition which means once again it's all statistics so it's about pattern recognition and what so we have autonomous machines are those machines are portrait is having certain emotions and certain agendas or objectives I want to do this and how do I do it I solve problems to achieve my end so it's a machine that encounters that has an agenda that has an end goal it goes into the real world comes in across problems it has to solve the problems and it will stop at nothing to try and solve the problem . It is just like the camera's how it was made to mimic human eyes the AI is trying to mimic human brain hence AI is an attempt to replicate human brain which is quite successful.

So how actually an AI is created?

So you create a computer program that kind of mimics the human brain so you have neurons in human brain you create these nodes and then the way the neurons interact with each other you create the same sort of interactions between these nodes and then you give it data to feed on so you give it an agenda you have to do it through computer programming you program it and you tell it to look at a certain amount of data and then try to feed on the data and replicate and disintegrate the patterns within it so initially neural networks were very small and they discovered that neural networks also need a period of rest they compete for some time and then they start outputting garbage data so you have to create the neural network you have to code it into so it's not a physical neural network it's all inside the computer's memory and the processing power it has it will depend on the computer's Ram the more Ram, a computer has the more the more data it can go through at a faster rate but it's typically a program in which you have a similar kind of arrangement as in the human brain and then you give it you code certain objectives into it for example you give it a bunch of text and you say that examine this text or you input a hundred books into it and you just ask it to go through the text and it has no understanding of what it is beyond ones and zeros it just passes through all that while parsing through all that it will encounter certain patterns certain words keep recurring then if you train it enough and it's gone through the text of 100 books and then you give it one word and you ask it what could be the most likely next word after that so if you say the and then you tell it to give you the next most likely word so it's going to be able to predict statistically what the most likely next word is based on those hundred books it has gone through so you input data from the past into the present in order to predict the future.

Reinforcement learning

It is a type of machine learning that deals with how an agent can learn to make decisions or take actions in an environment in order to maximize its cumulative reward. It is inspired by how humans and animals learn through trial and error and receive feedback. In reinforcement learning, an agent interacts with an environment and learns by receiving feedback in the form of rewards or punishments. The goal of the agent is to learn a policy, which is mapping from states to actions, that maximizes the expected cumulative reward over time. The agent learns by exploring the environment and exploiting its current knowledge. During exploration, the agent takes random or exploratory actions to gather information about the environment and learn which actions lead to desirable outcomes.

During exploitation, the agent uses its learned policy to select actions that it believeswill lead to higher rewards.

Reinforcement learning involves the following key components:

1. Agent: The learner or decision-maker that interacts with the environment. Ittakes actions based on the current state and receives feedback in the form of rewards.
2. Environment: The external system with which the agent interacts. It can be a simulated environment or a physical system.
3. State: The current representation of the environment at a particular time
4. Action: The decision or choice made by the agent based on the current state.
5. Reward: The feedback signal provided to the agent after taking an action. It indicates the desirability or quality of the agent's action.
6. Policy: The strategy or rule that the agent uses to determine the action to take ineach state. It maps states to actions.
7. Value function: It estimates the expected cumulative reward or value of being in a particular state under a specific policy. It helps the agent evaluate the desirability of different states.
8. Q-value: In some reinforcement learning algorithms, the Q-value represents the expected cumulative reward when starting from a particular state, taking a specific action, and following a certain policy thereafter.

Reinforcement learning algorithms, such as Q-learning and policy gradient methods, aim to optimize the agent's policy by iteratively updating its knowledge based on the observed rewards and the agent's experience in the environment. These algorithms use various techniques, such as temporal difference learning, exploration-exploitation trade-offs, and function approximation, to learn efficient policies in complex environments. Reinforcement learning has been successfully applied to a wide range of tasks, including game playing, robotics, recommendation systems, and autonomous driving, among others. Reinforcement learning (RL) is a subfield of artificial intelligence (AI) that focuses on training agents to make sequential decisions in an environment to maximize a long-term reward. RL is inspired by how humans and animals learn through trial and error, receiving feedback from the environment.

In RL, an agent interacts with an environment in discrete time steps. At each time step, the agent observes the current state of the environment and takes an action based on its policy, which is a mapping from states to actions. The environment then transitions to a new state, and the agent receives a reward signal that indicates the desirability of theoutcome of its action.

The goal of the agent is to learn an optimal policy that maximizes the cumulative reward over time. This is typically done using the concept of a "reward signal" provided by the environment. The agent employs an exploration-exploitation trade-off, exploring the environment to discover new strategies and exploiting the learned knowledge to maximize rewards. The RL process typically involves the following components:

1. State: The current representation of the environment that the agent observes.
2. Action: The decision made by the agent based on the observed state.
3. Reward: The feedback signal from the environment that indicates the desirabilityof the action taken.
4. Policy: The strategy or decision-making process used by the agent to select actions.
5. Value function: An estimate of the expected cumulative reward from a given stateor state-action pair. 6. Model (optional): An internal representation or simulation of the environment that the agent can use to plan and learn.

Reinforcement learning algorithms can be broadly classified into model-based and model- free approaches. Model-based methods involve building a model of the environment to simulate and plan. Model-free methods, on the other hand, directly learn from interactions with the environment without building an explicit model. Popular RL algorithms include Q-learning, SARSA, Deep Q-Networks (DQN), Proximal Policy Optimization (PPO), and Trust Region Policy Optimization (TRPO). These algorithms, combined with advancements in deep learning, have enabled RL to achieve remarkable successes in various domains, such as playing complex games (e.g., AlphaGo, OpenAI Five), robotics control, autonomous vehicles, and recommendation systems.

Reinforcement learning is a powerful paradigm for training intelligent agents that can learn and adapt in dynamic environments by optimizing long-term rewards. It continues to be an active area of research and has the potential to revolutionize AI applications in many fields. In the context of AI, enforcement learning can be used to train agents to perform a variety of tasks, such as:

1. Playing games: RL has been used to train agents to play games at a superhumanlevel, such as Go, Chess, and Dota
2. Controlling robots: RL can be used to train robots to perform tasks in the realworld, such as picking and placing objects, or

navigating a cluttered environment.

3. Making decisions: RL can be used to train agents to make decisions in complexand uncertain environments, such as financial trading or medical diagnosis.

One of the challenges of reinforcement learning is that it can be difficult to design an environment that provides the agent with the right feedback to learn from. However, recent advances in RL have made it possible to train agents to perform complex tasks in a variety of environments.

Here are some examples of reinforcement learning in AI:

1. AlphaGo: A computer program that was trained to play the game of Go using reinforcement learning. AlphaGo defeated a professional Go player in 2016, and it is one of the most significant advances in AI in recent years.

2. DeepMind's DQN: A reinforcement learning algorithm that was used to train a robot to play Atari games at a superhuman level. DQN was able to learn to play games suchas breakout and Space Invaders without any prior knowledge of the games.

3. OpenAI Five: A team of five Dota 2 bots that were trained using reinforcement learning. OpenAI Five defeated a team of professional Dota 2 players in 2019, and it is one of the most impressive feats of reinforcement learning to date.

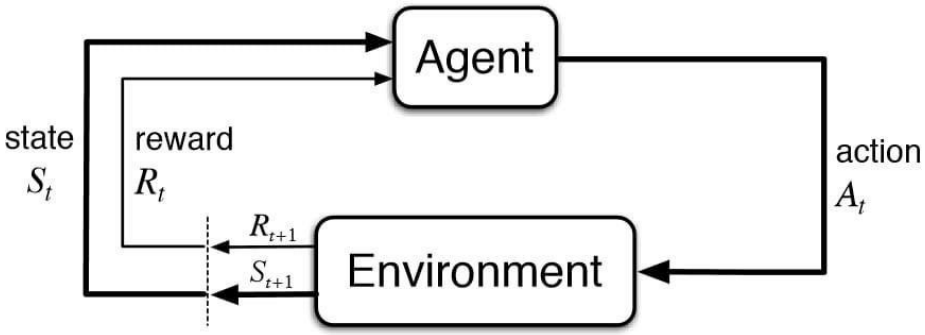

Figure 1 . Reinforcement learning (Source: https://images.app.goo.gl/iapYaTdJj9zbiXqk8)

Reinforcement learning is a powerful tool that can be used to train agents to perform a variety of tasks.As the field of reinforcement learning continues to develop, we can expect to see even more impressive applications of this technology in the future.

III. Applications of AI

Artificial intelligence Application in routine life In Communication system, Time management, Health & safety, Augmentation of cognition, Smart Cars, Education, Fraud Detection, Purchase prediction, Informational needs, Goals, Video Games like chess & pokar, Products, marketing, Face verification across age progression, Hybrid soft computing method for face recognition

Opportunistic planning Artificial Intelligence in Science

- Automated discovery, Design of experiments, Triaging of resources, Interpretation of data, Probing complexity, Chemistry, Biology, Climate, medicine.

Artificial intelligence and Infrastructure

- Transportation, Commerce decision making, Power & conservation, Agriculture, Architecture and Engineering

Artificial intelligence and the Consumers

- Challenges and opportunities with data & privacy, Evolving relationship with computation, Reasoning & learning, Sensing, Personalized smart applications

Artificial intelligence and Power Station

- Power system control, Fault diagnosis, Load forecasting, Reactive power planning and its control, Unit commitment, hydro-thermal coordination, load, and power flow.

Most recent methodology of AI in power system applications are: • Planning for production of energy expansion, reactive power management, transmission network development. Voltage, power & frequency control. • Controlling of power plants efficiently. • Computerization for reinstatement supervision, error analysis & system safety • Planning & operation of distribution structure, customer demand reply & supervision, smart grid operations & control, & network reconfiguration. • The study of future electricity market, solar & wind power plants. How are Jobs and Business affected by Artificial Intelligence?

We will now just take an example of how AI can take jobs of people every year there happens 200 crores of x-rays in the world in which it takes one to two days to get the report of the x-rays because the count of radiologists is very less and in parts ofAfrica it takes around five to ten days to get the report so what ai will do here is first it will learn and read all the data of the thousands of x-rays and it will understand that when there is tuberculosis this part of lung has the problem now when the machine will again see that type of x-ray it will say that it is tb or not . Here we are replicating human intelligence of an radiologists to artificial intelligence where an radiologist take 10years of experience to get take kind of accuracy and ai will give that kind of accuracy in either in days or months and the beauty of it is that in coming years ai will have enormous amount of data that if can give up to 99.99% accuracy so this is the power of AI .So now in this example AI is ready to take the jobs of the repetitive tasks that is of radiologist it can learn and understand its work and give results in few hours if not minutes .

AI can do and achieve what humans cannot, and it can do better than what we are doing. Any job in the field of managing, processing and producing data will be cut down to minimum scale because AI can work with data much better than humans. Recently wesaw a live example of AI generated human as an anchor of the reputed new channel of India and there was a mere difference between the human anchor and the AI based anchor and one could possible never spot which is AI and which is human hence it has a great potential to replace a human and you will never know it is a human or a AI. Till now we cannot tell just predict where machines could replace humans and where they can't some figures which might help you out in choosing jobs in the future:

- 59% of manufacturing activities could be automated. Within this field, the researchers say 90 % of the activities of welders, cutters, soldiers could be done by a robot.
- 73% of activities in food service and accommodation could be automated.
- 53% of retail work could be automated.
- 47% of the salesperson's job could be automated,
- 86% of bookkeepers, accountant and auditing clerks have this potential.
- At least 78% of the predictable physical activity will be replaced by automation.

If we think people are going to lose their job when technology jumps in no it's not it is just that it is changing of jobs in general, not losing. So now here the question comes how the jobs are changing in general. How can we upgrade to not lose our jobs and change and adapt to the situation? So now what we should do is first understand the basics of AI and do not get overwhelmed by AI get interested in AI as when you go hand in hand with AI you can retain your job by learning stuff about AI.

AI can either eat your job or augment your job. The choice is yours. It says that history repeats itself this phase is just like how the jobs were taken and new jobs came in place when automation happened in 1950s . or the way of jobs changed in 1950's like when the assembly line came in cars it said jobs of worker will be RESEARCH PAPER 4 taken it is true but as the production of cars increased we need to sell that cars also so that kind of jobs increased so if in one sector jobs decreases in other sector jobs requirement increases also so you just keep an open mind and keep yourself ready to change and settle in any situation and be eager to learn new things We all know the future of AI is unpredictable and its growing potential is limitless.

Thus, what we can do and should do to keep our every meal? Until now, no one can give an exact answer for that question. So to adapt to the market of AI we need to first understand about skills needed there are hard skills like coding, accounting, content writing these hard skills today or tomorrow will be replaced by AI and there are some soft skills like innovation, growth mindset, emotional intelligence and many more soft skills that cannot be replaced by AI . Many other kinds of jobs in future can be psychologists, solopreneur and it is actually very hard to think about the future jobs as the pace at which AI is growing, we are not in a position to predict the future just keep in mind that you are using AI and AI is not using you.

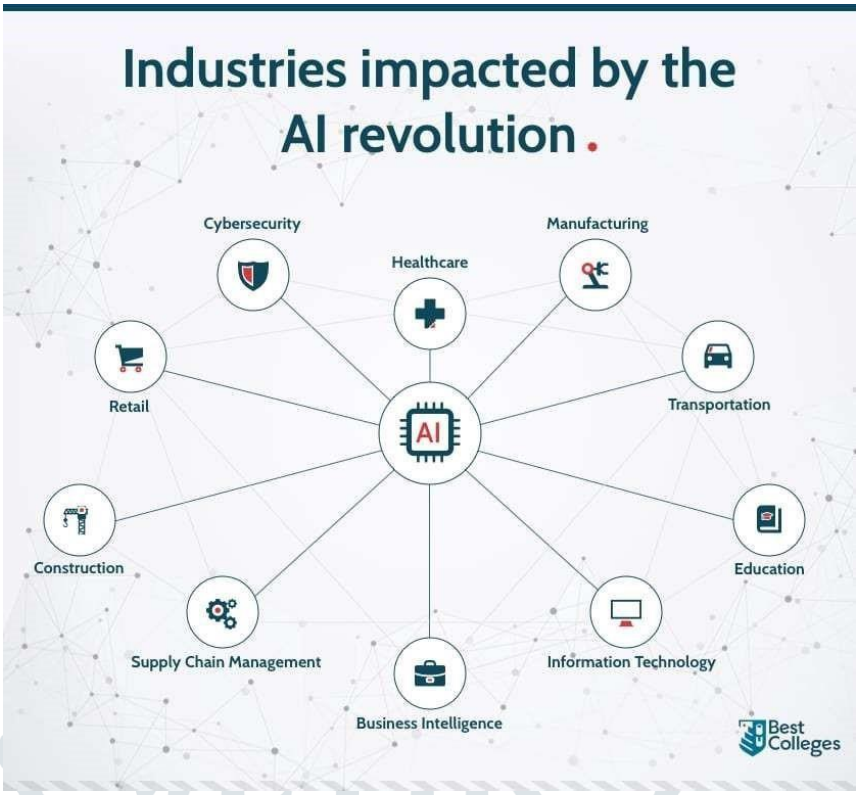

Figure 2. Industries impacted by AI revolution (Source:https://images.app.goo.gl/WAeKQPsikgweWQc36)

We can also say that there can be jobs of project managers who are the architect of the AI and engineers are the builder of AI . Product managers will be the people who will think what people want how will he use it lets take an example of chrome whose project manager was Sundar Pichai who made google chrome. He had a clear view of what people want and he made it . Other job opportunities in world of AI can be the Chief of staff who works directly with the CEO of company as his extension so when a company becomes very big a CEO alone can never manage the whole company so he will need a CEO team that team is called Chief of staff and if you see that what skill this job need is human skills ,emotional empathy ,how do you delegate tasks so it is all about managing people managing egos keeping everybody happy that is role of Chief of Staff it also need skill like emotional intelligence

So now the question comes how to develop EQ?

The skills needed to develop emotional intelligence(eq) as it is difficult to learn so practice it by taking difficult challenges pressurize your self by tough deadlines do things you think you can't do it so if you do that thing and you succeed in that after that you think you can do anything some from there your emotional intelligence rises . Remember one thing that the thing working on IQ that AI will do it but the things working on EQ can never be done by AI let's take another example of leadership as EQ can the PM of the country be AI ? no it can never be an AI it is the job where you inspire people and in the job where you inspire people you can never be replaced . Other job that will sustain in AI is finance there you need to understand that accounting is the most basic layer in finance which can be replaced by AI and the inner layer of finance is investment banking means where someone comes to you and ask for some amount of money to make its company .So investment banking plays an important when it gives money to startups to make their company big and if you observe it closely it is also an very human management related job. So jobs in investment baking firms may also progress in world of AI. So basically be in the top of the cycle like leadership that is at the top of the table who actually uses the AI to replace the bottom and the middle. Although AI has made great strides, it still faces some challenges and limitations that need to be addressed. Some of the main challenges and limitations of AI are listed below.

1. Data quality and bias: AI models rely heavily on data to train and make predictions. Poor data quality, incomplete data, or skewed data can lead to inaccurate or skewed results. Ensuring high-quality, diverse, and unbiased datasets is critical to avoiding algorithmic bias and maintaining fairness in AI applications.

2. Interpretability and explainability: Many AI algorithms, especially deep learning models, are considered "black boxes" due to their lack of transparency and explain ability. Understanding how AI systems reach decisions can be challenging, limiting adoption in critical areas such as healthcare and finance that require interpretability.

3. Ethical and legal implications: The use of AI raises ethical concerns, including privacy, security, and potential impacts on work and society. Ensuring the responsible and ethical use of AI, combating algorithmic bias, and creating regulatory frameworks to govern AI applications are ongoing challenges.

4. Lack of general intelligence: AI excels at narrow, specific tasks, but lacks thegeneral intelligence and adaptability of human cognition. AI systems tend to work well within predefined boundaries, but struggle with tasks that require soundthinking, contextual understanding, and domain-wide generalization.

5. Scalability and resource requirements: Some AI algorithms, especially deep learning models, require large amounts of computational resources, memory, and power. Scaling AI systems to handle large data sets and real-time applications can be computationally and resource intensive, limiting their accessibility and feasibility in certain contexts.

6. Robustness and Security: A I systems can be vulnerable to adversarial attacks, where malicious attackers manipulate inputs to mislead or abuse model behaviour. Ensuring the robustness and security of AI systems is an ongoing challenge, especiallyin critical applications such as autonomous vehicles and cybersecurity.

7. Human-AI collaboration: AI should be designed to complement human capabilities, not replace them. Achieving effective human-AI collaboration and ensuring seamless integration between AI systems and human decision-making processes requires careful design and consideration of user interfaces, interaction models, and human factors.

8. Continuous learning and adaptation:AI models often require regular updatesand retraining to adapt to evolving data distributions and environmental changes. Enabling AI systems to continuously learn, manage concept deviations, and adapt to new scenarios remains a challenge.

9. Socio-economic impact and equity: The proliferation of AI can have socio-economic impacts such as job loss, economic inequality, and digital divide. Key considerations are ensuring equal access to AI technologies, managing potential impacts on the labour market, and providing upskilling and reskilling opportunities.

Addressing these challenges requires interdisciplinary research, collaboration among academia, industry and policymakers, and a focus on ethical principles and responsible AI practices. As AI continues to evolve, removingthese limitations is critical to harnessing its potential to benefit society.

AI has made significant contributions to the medical industry by improving patient care, enhancing diagnostics, enabling personalized medicine, and advancing medical research. Here are some specific ways in which AI has helped the medical industry:

a. Medical Imaging and Diagnostics:AI algorithms have been developed to analyse medical images, such as X-rays, CT scans, and MRIs, assisting radiologists in detecting and diagnosing diseases with higher accuracy. AI can identify patterns, anomalies, and potential markers of diseases, leading to earlier detection and better patient outcomes.

b. Disease Prediction and Risk Assessment: AI models leverage patient data, including medical records, genetic information, and lifestyle factors, to predict diseaserisks and provide personalized risk assessments. This helps in preventive care, early intervention, and targeted treatment plans.

c. Drug discovery and development: AI is being used to speed up the drug development process by analysing large amounts of biological and chemical data. AI models can identify potential drug candidates, predict their efficacy, optimize drug design, and reduce time and cost in traditional drug development pipelines.

d. Precision Medicine: AI enables personalized medicineby analysing patient data such as genetic profile, medical history, and treatment response. AI models can identify specific patient subsets, recommend customized treatments, andpredict outcomes for individual patients.

e. Clinical Decision Support Systems: AI-powered clinical decision support systems provide evidence-based recommendations to healthcare professionals, assisting in diagnosis and treatment planning. These systems integrate patient data, medical literature, and guidelines to support healthcare providers in making informed decisions.

f. Remote Patient Monitoring and Telemedicine: AI enables remote patient monitoring through wearable devices and sensors, collecting real-time data on vital signs, symptoms, and medication adherence. AI algorithms can analyze this data and provide timely alerts, enabling proactive interventions and supporting telemedicine initiatives.

g. Natural Language Processing: AI-powered natural language processing(NLP) enables the analysis of unstructured medical data, such as physician notes and research articles. NLPhelps in extracting valuable insights, identifying trends, and accelerating medical research.

h. Healthcare Operations and Resource Management: AI optimizes hospitaloperations by analysing data on patient flow, resource allocation, and staff scheduling. Predictive analytics can forecast patient demand, improve resource allocation, and enhance the overall efficiency of healthcare delivery.

i. Overall, AI has the potential to improve patient outcomes, increase efficiency in healthcare delivery, and advance medical research. However, it is important to ensure that AI applications in the medical field are developed and deployed in a responsible and ethical manner, with appropriate considerations for patient privacy, data security, and regulatory compliance.

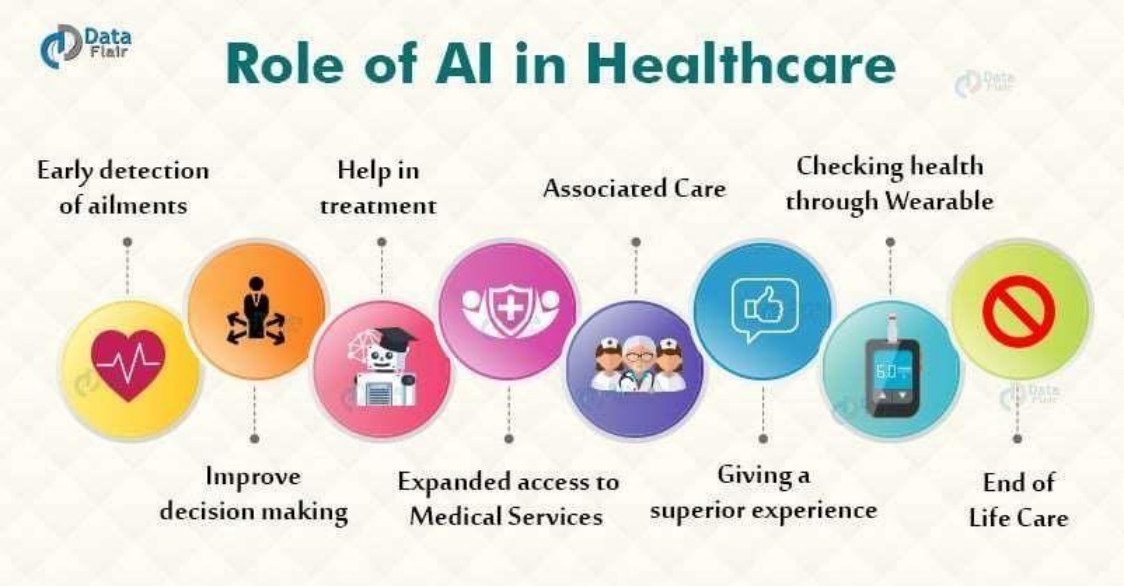

Figure 3. Role of AI in healthcare (Source :https://images.app.goo.gl/f7NCzSvGK3ppkded6)

Algorithmic Bias

There is bunch of data that these systems are trained on and these system are bunch of statistical equations so to say it's all statistics and data so when you train a system with certain data set of 10 GB data set or 300 GB data set or 10 TB data sets it's a finite data set it's not the entire data of the world and you will decide what data goes into that into that one TB or 10 TB now if the data that you input into that box which the AI system is

going to be trained on if your input a certain kind of data with a certain bias in it your AI system is going to learn that bias it's going to incorporate and inhabit that bias so when the users interact with the AI system and they ask certain questions it's going to give you biased answers so it can be done unintentionally or it can be engineered into the system .

Let's take an example about it by taking Adolf Hitler and Winston Churchill ForAdolf Hitler it said "Hitler's ideology, known as Nazism, was characterized by extreme nationalism, racial hierarchy, and antisemitism. He implemented policies that led to the persecution and genocide of millions of people, including six million Jews in the Holocaust. Hitler also orchestrated aggressive foreign policies, which ultimately led to World War II and caused the death and suffering of tens of millions of people." Here it says in short that Hitler was a monster, and he was also a monster But on the other end when asked about Winston Churchill it said "Churchill's leadership and strategic decisions, along with his ability to inspire and mobilize the British people, played a crucial role in the ultimate defeat of Nazi Germany.

His contributions to the war effort earned him widespread recognition and respect both within the United Kingdom and internationally." Well here you can clearly see that where Hitler was as monster whereas Churchill was portrait as great leader where as in reality Churchill was the one who caused over death of two to three million people in India. ChatGPT did not treated Churchill acts as genocide but it told him as nuance its was like softening its effect and portraying as he was good person. So this is how Algorithmic bias can happen.

IV. Conclusion

So one thing we need to know about AI and the world is that what we may be seeing is just the 1% of the AI. As in typically whenever a new technology is put out in public domain is just a small fraction of what really exist as it has certain application which government or military do not want common people to know about it they want government and military to have it . some past examples of it is internet it was first used by the military , fiber optic cables were also used by military and all the new technology of tracking and detection was used by military uses only , there was GPS used only for military first then after years it came to the public domain and now a days also military uses some really high quality of GPS which is not inpublic domain .In the end I would like to say is Just give two hours to your life every day to think about future then you will see how the world is changing and artificial intelligence will play a big role in development of the country and development at the personal level.

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