



Editor's Point of View...

The term artificial intelligence was coined in 1956, but AI has become more popular today thanks to increased data volumes, advanced algorithms, and improvements in computing power and storage.

Early AI research in the 1950s explored topics like problem solving and symbolic methods. In the 1960s, the US Department of Defence took interest in this type of work and began training computers to mimic basic human reasoning. For example, the Defence Advanced Research Projects Agency (DARPA) completed street mapping projects in the 1970s. And DARPA produced intelligent personal assistants in 2003, long before Siri, Alexa or Cortana were household names.

This early work paved the way for the automation and formal reasoning that we see in computers today, including decision support systems and smart search systems that can be designed to complement and augment human abilities.

While Hollywood movies and science fiction novels depict AI as human-like robots that take over the world, the current evolution of AI technologies isn't that scary – or quite that smart. Instead, AI has evolved to provide many specific benefits in every industry. Keep reading for modern examples of artificial intelligence in health care, retail and more. Artificial intelligence or AI is nothing but the science of computers and machines developing intelligence

like humans. In this technology, the machines are able to do some of the simple to complex stuff that humans need to do on a regular basis. As the AI systems are used on a day to day basis in our daily life, it is not wrong to say that our lives have also become advanced with the use of this technology.

The AI systems are efficient enough to reduce human efforts in various areas. In order to perform various activities in the industry, many of them are using artificial intelligence to create machine slaves that perform various activities on a regular basis. The artificial intelligence applications help to get the work done faster and with accurate results. Error free and efficient worlds are the main motives behind artificial intelligence. In the recent years, many sectors have started using AI technology to reduce human efforts, and also to get efficient and faster results.

Regards,
Sohan Khemka

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ARTIFICIAL INTELLIGENCE

Since the invention of computers or machines, their capability to perform various tasks went on growing exponentially. Humans have developed the power of computer systems in terms of their diverse working domains, their increasing speed, and reducing size with respect to time. A branch of Computer Science named Artificial Intelligence pursues creating the computers or machines as intelligent as human beings.



HISTORY OF ARTIFICIAL INTELLIGENCE:

Artificial Intelligence was first proposed by John McCarthy in 1956 in his first academic Conference on the subject. The idea of machines operating like human beings began to be the Center of scientist's mind and whether if it is possible to make machines have the same ability to Think and learn by itself was introduced by the mathematician Alan Turing. Alan Turing was able to put his hypotheses and questions into actions by testing whether "machines can think"? After Series of testing (later was called as Turing Test) it turns out that it is possible to enable machines to think and learn just like humans. Turing Test uses the pragmatic approach to be able to identify if machines can respond as humans.

WHAT IS ARTIFICIAL INTELLIGENCE?

According to the father of Artificial Intelligence John McCarthy, it is "The science and engineering of making intelligent machines, especially intelligent computer programs". Artificial Intelligence is a way of making a computer, a computer-controlled robot, or a software think intelligently, in the similar manner the intelligent

humans think. AI is accomplished by studying how human brain thinks and how humans learn, decide, and work while trying to solve a problem, and then using the outcomes of this study as a basis of developing intelligent software and systems.

Artificial intelligence is a science and technology based on disciplines such as Computer Science, Biology, Psychology, Linguistics, Mathematics, and Engineering. A major thrust of AI is in the development of computer functions associated with human intelligence, such as reasoning, learning, and problem solving. Out of these areas, one or multiple areas can contribute to build an intelligent system.

PHILOSOPHY OF ARTIFICIAL INTELLIGENCE:

While exploiting the power of the computer systems, the curiosity of human, lead him to wonder, "Can a machine think and behave like humans do?" Thus, the development of AI started with the intention of creating similar intelligence in machines that we find and regard high in humans.

MAIN GOALS OF ARTIFICIAL INTELLIGENCE:

TO CREATE EXPERT SYSTEMS:

The systems which exhibit intelligent behaviour, learn, demonstrate, explain, and advice its users.

TO IMPLEMENT HUMAN INTELLIGENCE IN MACHINES:

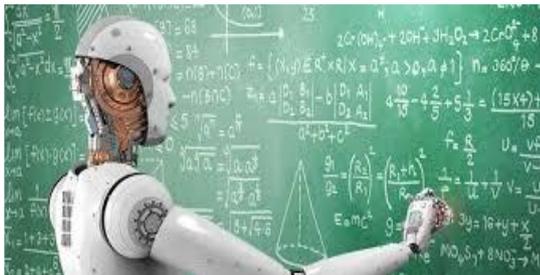
Creating systems that understand, think, learn, and behave like humans.

PROGRAMMING WITHOUT ARTIFICIAL INTELLIGENCE:

- A computer program without AI can answer the specific questions it is meant to solve.
- Modification in the program leads to change in its structure.
- Modification is not quick and easy. It may lead to affecting the program adversely.

PROGRAMMING WITH ARTIFICIAL INTELLIGENCE:

- A computer program with AI can answer the generic questions it is meant to solve.
- AI programs can absorb new modifications by putting highly independent pieces of information together. Hence you can modify even a minute piece of information of program without affecting its structure.
- Quick and Easy program modification.



SOME APPLICATIONS OF ARTIFICIAL INTELLIGENCE:

- 1. GAMING:** AI plays crucial role in strategic games such as chess, poker, tic-tac-toe, etc., where machine can think of large number of possible positions based on heuristic knowledge.
- 2. NATURAL LANGUAGE PROCESSING:** It is possible to interact with the computer that understands natural language spoken by humans.
- 3. EXPERT SYSTEMS:** There are some applications which integrate machine, software, and special information to impart reasoning and advising. They provide explanation and advice to the users.
- 4. VISION SYSTEMS:** These systems understand, interpret, and comprehend visual input on the computer. For example,

- A spying aeroplane takes photographs which are used to figure out spatial information or map of the areas.
 - Doctors use clinical expert system to diagnose the patient.
- 5. SPEECH RECOGNITION:** Some intelligent systems are capable of hearing and comprehending the language in terms of sentences and their meanings while a human talks to it. It can handle different accents, slang words, noise in the background, change in human's noise due to cold, etc.
 - 6. HANDWRITING RECOGNITION:** The handwriting recognition software reads the text written on paper by a pen or on screen by a stylus. It can recognize the shapes of the letters and convert it into editable text.



- 7. INTELLIGENT ROBOTS:** Robots are able to perform the tasks given by a human. They have sensors to detect physical data from the real world such as light, heat, temperature, movement, sound, bump, and pressure. They have efficient processors, multiple sensors and huge memory, to exhibit intelligence. In addition, they are capable of learning from their mistakes and they can adapt to the new environment.

8. VIRTUAL PERSONAL ASSISTANTS: That is collected from a variety of sources to learn about users. Also, one needs to be more effective in helping them organize and track their information. **For Example:** There are various platforms like iOS, Android, and Window mobile. We use intelligent digital personal assistants are like Siri, Google Now, and Cortana.

9. CYBERSECURITY: It's a quite big challenge to find gaps in the cyber defence. Although, it's a normal process. As attackers spend months and years to develop hacks. Moreover, the great thing about this is that it discovered a new attack in form of binary code. As it works what it was doing. Then it returns the breached and the favour the attacker's defences.

10. PREVENTING HEART ATTACKS: Nowadays we use artificial intelligence to save lives. As we use it to scan medical data. Also, help in predicting if a patient is susceptible to heart attacks and strokes.

11. CUSTOMER SERVICE: As there are so many websites are present which are providing us live chat option. Also, it's one of the ubiquitous applications of artificial intelligence. Moreover, to teach a machine is not so easy. Rapid advances in natural processing mean they are getting better all the time.

12. SMART CARS: *There are two examples:* That are featured Google's self-driving car project and Tesla's "autopilot". Also the artificial intelligence is been used since the invention of the first video game.



FUTURE OF ARTIFICIAL INTELLIGENCE:

- Machines are predicted to be better than humans in translating languages.
- Running a truck, car, and aeroplane.
- Working in the retail sector, and can completely outperform humans by 2060.

As a result, AI researchers believed that AI will become better than humans in the next 40-year time frame.

To build AI smarter, companies have already acquired around 34 AI startups. It was acquired in the first quarter of 2017. These companies are reinforcing their leads in the world of Artificial Intelligence.

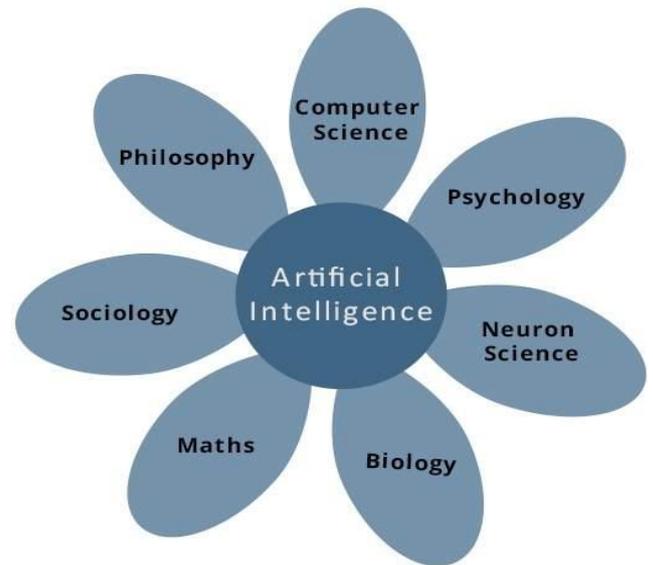


In every sphere of life, AI is present. We use AI to organize big data into different patterns and structures. Also, patterns help in a neural network, machine learning, and data analytics.

From 80's to now, Artificial intelligence is now part of our everyday lives; it's very hard to believe. Moreover, it is becoming more intelligent and accepted every day. Also, with lots of opportunities for business.



Out of the following areas, one or multiple areas can contribute to build an intelligent system.



What is AI Technique?

In the real world, the knowledge has some unwelcomed properties –

- Its volume is huge, next to unimaginable.
- It is not well-organized or well-formatted.
- It keeps changing constantly.

AI Technique is a manner to organize and use the knowledge efficiently in such a way that –

- It should be perceivable by the people who provide it.
- It should be easily modifiable to correct errors.
- It should be useful in many situations though it is incomplete or inaccurate.

AI techniques elevate the speed of execution of the complex program it is equipped with.

What Contributes to AI?

Artificial intelligence is a science and technology based on disciplines such as Computer Science, Biology, Psychology, Linguistics, Mathematics, and Engineering. A major thrust of AI is in the development of computer functions associated with human intelligence, such as reasoning, learning, and problem solving.

Algorithms used for AI:

1. Breadth-First Search
2. Depth-First Search
3. Bidirectional Search
4. Uniform Cost Search
5. Iterative Deepening Depth-First Search

1. Breadth-First Search:

It starts from the root node, explores the neighboring nodes first and moves towards the next level neighbors. It generates one tree at a time until the solution is found. It can be implemented using FIFO queue data structure. This method provides shortest path to the solution.

2. Depth-First Search:

It is implemented in recursion with LIFO stack data structure. It creates the same set of nodes as Breadth-First method, only in the different order.

As the nodes on the single path are stored in each iteration from root to leaf node, the space

requirement to store nodes is linear. With branching factor and depth as m , the storage space is B^m .

3. Bidirectional Search:

It searches forward from initial state and backward from goal state till both meet to identify a common state.

The path from initial state is concatenated with the inverse path from the goal state. Each search is done only up to half of the total path.

4. Uniform Cost Search:

Sorting is done in increasing cost of the path to a node. It always expands the least cost node. It is identical to Breadth First search if each transition has the same cost.

It explores paths in the increasing order of cost.

5. Iterative Deepening Depth-First Search:

It performs depth-first search to level 1, starts over, executes a complete depth-first search to level 2, and continues in such way till the solution is found.

It never creates a node until all lower nodes are generated. It only saves a stack of nodes. The algorithm ends when it finds a solution at depth d . The number of nodes created at depth d is b^d and at depth $d-1$ is b^{d-1} .

Difference between Human and Machine Intelligence:

Humans perceive by patterns whereas the machines perceive by set of rules and data.

Humans store and recall information by patterns; machines do it by searching algorithms. For example, the number 40404040 is easy to

remember, store, and recall as its pattern is simple.

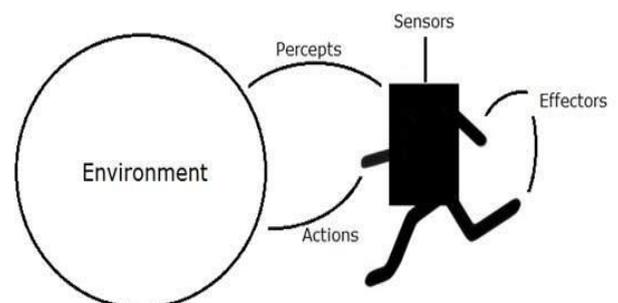
Humans can figure out the complete object even if some part of it is missing or distorted; whereas the machines cannot do it correctly.



What are Agent and Environment?

An **Agent** is anything that can perceive its environment through **sensors** and acts upon that environment through **effectors**.

- A **Human Agent** has sensory organs such as eyes, ears, nose, tongue and skin parallel to the sensors, and other organs such as hands, legs, mouth, for effectors.
- A **Robotic Agent** replaces cameras and infrared range finders for the sensors, and various motors and actuators for effectors.
- A **Software Agent** has encoded bit strings as its programs and actions.



CONCLUSION AND RECOMMENDATIONS:

There are many lessons that can be learnt from the past successes and failures of AI. To sustain the progress of AI, a rational and harmonic interaction is required between application specific projects and visionary research ideas. Along with the unprecedented enthusiasm of AI, there are also fears about the impact of the technology on our society.

A clear strategy is required to consider the associated ethical and legal challenges to ensure that the society as a whole will benefit from the evolution of AI and its potential adverse effects are mitigated from early on. Such fears should not hinder the progress of AI but motivate the development of a systematic framework on which future AI will flourish.

Most critical of all, it is important to understand science fiction from practical reality. With sustained funding and responsible investment, AI is set to transform the future of our society - our life, our living environment and our economy.

The following recommendations are relevant to the UK research community, industry, government agencies and policy makers:

Robotics and AI are playing an increasingly important role in the UK's economy and its future growth. We need to be open and fully prepared for the changes that they bring to our society and their impact on the workforce structure and a shift in the skills base. Stronger national level engagement is essential to ensure the general public has a clear and factual view of the current and future development of robotics and AI.

A strong research and development base for robotics and AI is fundamental to the UK, particularly in areas in which we already have a critical mass and international lead. Sustained

investment in robotics and AI would ensure the future growth of the UK research base and funding needs to support key Clusters/Centres of Excellence that are internationally leading and weighted towards projects with greater social-economic benefit.

It is important to address legal, regulatory and ethical issues for practical deployment and responsible innovation of robotics and AI; greater effort needs to be invested on assessing the economic impact and understanding how to maximize the benefits of these technologies while mitigating adverse effects.



The government needs to tangibly support the workforce by adjusting their skills and business in creating opportunities based on new technologies. Training in digital skills and re-educating the existing workforce is essential to maintain the competitiveness of the UK.

The UK has a strong track record in many areas of RAS and AI. Sustained investment in robotics and AI is critical to ensure the future growth of the UK research base and its international lead. It is also critical to invest in and develop the younger generation to be robotics and AI savvy with a strong STEM foundation by making effective use of new technical skills.

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Work flow flexibility will increase by **40%**

90% of business leaders feel that cloud-based collaboration can improve business processes

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