

# An Overview of Artificial Intelligence

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## ABSTRACT

Artificial Intelligence (AI) is also Machine Intelligence (MI) is intelligence demonstrated by machine in contrast to the “Natural Intelligence” (NI) displayed by human and other animals. In computer science, all research is defined as the study of “Intelligent agent”: any device that perceives its environment and takes actions that maximize its change of successfully achieving its goal. The “Artificial Intelligence” is applied when a machine mimics “cognitive” function that human associate with other human minds such as “learning and problem solving”. AI is behavior of a machine, which, if performed by a human being, would be called intelligent. It makes machines smarter and more useful, and is less expensive than natural intelligence. Natural language processing (NLP) refers to artificial intelligence methods of communicating with a computer in a natural language like English. The main objective of a NLP program is to understand input and initiate action. Artificial intelligence involves two basic ideas. First, it involves studying the thought processes of human beings. Second, it deals with representing those processes via machines (like computers, robots, etc.).

**Keywords:** Artificial Intelligence, Machine Intelligence, Natural Language Processing

## I. INTRODUCTION

Artificial intelligence is a branch of computer science that studies the computational requirements for tasks such as perception, reasoning and learning and develop systems to perform tasks.

Intelligence is the computational part of ability to achieve goals in the world. Varying kinds and degree of intelligence occur in people, many animals and some machine. It was founded as an academic discipline in 1956, and in the year since has experienced several waves of optimism, followed by disappointment and the loss of funding called as an AI winter. AI research has been divided into subfields that often fail to communicate with each other. These sub-fields are based on technical considerations such as particular goals (eg. “robotics”

or “machine learning”), the use of particular tools (“logic” or “neural networks”), or deep philosophical differences. Subfields have also been based on social factors (particular institutions or the work of particular researchers).

The traditional problem of AI research include reasoning, knowledge, planning, learning, natural language processing, perception and the ability to move and manipulate objects. General intelligence is among the field’s long term goals. The AI draws upon computer science, mathematics, psychology, linguistics, philosophy, neuroscience, artificial psychology and many others. It uses many tools including neural networks, search and mathematical optimization, method based on statistics, probability and economics. AI become an essential part of the

technology industry, helping to solve many challenging problems in computer science

## II. HISTORY OF ARTIFICIAL INTELLIGENCE

The birth of Artificial intelligence is at Dartmouth conference 1956. The proposal for the conference included this assertion: “every aspect of learning or any other feature of intelligence can be so precisely described that a machine can be made to simulate it.

The golden years started at 1956 and ended at 1974. There were many successful programs and new directions: Natural language understanding (first AI program to use a semantic net).Micro-world, Neural networks

The first AI winter at 1974 to 1980. AI was subject to critiques and financial setbacks. AI researchers had failed to appreciate the difficulty of the problems they faced. Their tremendous optimism had raised expectations impossibly high and when the promised results failed to materialize funding for AI disappeared.

Boom: In 1980s a form of AI program called “experts systems” was adapted by corporations around the world and knowledge became the focus of mainstream AI research, In those same years, the Japanese government aggressively funded AI with its fifth generation computer project.

The second AI winter at 1987 to 1993. The business community’s fascination with AI rose and fell in the 80s in the classic pattern of an economic bubble. The collapse was in the perception of AI by government agencies and investors. The field continued to make advance despite the criticism.

According to Bloomberg’s Jack Clark,2015 was a landmark year for artificial intelligence, with the number of software projects that use AI within Google increased from a “sporadic usage” in 2012 to

more than 2,700 projects. Clark also presents factual data indicating that error rates in image processing tasks have fallen significantly since 2011. He attributes this to an increase in affordable neural networks, due to rise in cloud computing infrastructure and to an increase in research tools and datasets.

## III. TOOLS USED IN ARTIFICIAL INTELLIGENCE

Artificial intelligence has developed a large number of tools to solve the most difficult problems in computer science. A few of the most general of these methods are:

- ✓ Search and optimization
- ✓ Logic
- ✓ Probabilistic methods for uncertain reasoning

### A. Search and Optimization

Many problems in AI can be solved in theory by intelligently searching through many possible solutions: Reasoning can be reduced to performing a search. Planning algorithm search through trees of goals and sub goals, attempting to find a path to a target goal, a process called means end analysis. Heuristics supply the program with a best guess for the path on which the solution lies. Heuristics limit the search for solutions into a smaller sample size.

A very different kind of search came to prominence in the 1990s, based on the mathematical theory of optimization. For many problems, it is possible to begin the search with some form of a guess and then refine the guess incrementally until no more refinements can be made. Evolutionary computation uses a form of optimization search. Example that may begin with a population of organisms and then allow them to mutate and recombine, selecting only the fittest to survive each generation. Forms of evolutionary computation include swarm intelligence algorithms such as ant colony or particle swarm optimization) and evolutionary algorithms

such as genetic algorithms, gene expression programming and genetic programming.

## B. Logic

Logic is used for knowledge representation and problems solving, but it can be applied to other problems as well. Example, the satplan algorithm uses logic for planning and inductive logic programming is a method for learning.

Several different forms of logic are used in AI research. Propositional or Sentential logic of statements, which can be true or false. First logic also allows the use of quantifiers and predicates and can express facts about objects, their properties and their relations with each other. Default logics, non-monotonic logics and circumscription are forms of logic designed to help with default reasoning and the qualification problem. Several extensions of logic have been designed to handle specific domains of knowledge, such as description logics; situation calculus, event calculus and fluent calculus (for representing events and time); casual calculus; brief calculus; and modal logics.

## C. Probabilistic Methods For Uncertain Reasoning

AI researchers have devised a number of powerful tools to solve these problems using methods from probability theory and economics. Bayesian networks are a very general tools that can be used for a large number of problems. The key concept from the science of economics is “utility” a measure of how valuable something is to an intelligent agent. Precise mathematical tools have been developed that analyze how an agent can make choices and plan, using decision theory, decision analysis, and information value theory.

## IV. APPROACHES

AI research into three approaches, which he calls computational psychology, computational philosophy, and computer science. Computational psychology is used to make computer programs that

mimic human behaviour. Computational philosophy is used to develop an adaptive, free flowing computer mind. Implementing computer science serves the goal of creating computers that can perform tasks that only accomplish. Some of the approaches are,

- ✓ Cybernetics and brain simulation
- ✓ Cognitive simulation
- ✓ Knowledge based

## A. Cybernetics And Brain Simulations

In the 1940s and 1950s, a number of researchers explored the connection between neurobiology, information theory, and cybernetics. Some of them built machines that are used electronic networks to exhibit rudimentary intelligence. Many of these researchers gathered for meetings of the teleological society at Princeton University and the ratio club in England. By 1960, this approach was largely abandoned, although elements of it would be revived in the 1980s

## B. Cognitive Simulation

Economist Herbert Simon and Allen newell studied human problem solving skills, and attempted to formalize them, and their work laid the foundation of the field of artificial intelligence as well as cognitive science, operation research and management science. Their research team used the results of psychological experiments to develop program the simulated the techniques that people used to solve problems. This tradition, centered at Carnegie Mellon University would eventually culminate in the development of the soar architecture in the middle 1980s.

## C. Knowledge Based

When computers with large memories became available around 1970, researchers from all three traditions began to build knowledge into AI applications. The “knowledge revolution” led to the development and deployment of expert systems. The first truly successful form of AI software. The knowledge revolution was also driven by the

realization that enormous amounts of knowledge would be required by many simple AI applications.

## V. APPLICATION USED FOR ARTIFICIAL INTELLIGENCE

AI is relevant to any intellectual task. Modern artificial intelligence techniques are pervasive and are too numerous to list here. Frequently, when a technique reaches mainstream use, it is no longer considered artificial intelligence; this phenomenon is described as the AI effect.

High profile examples of AI include autonomous vehicles such as drones and self-driving cars, medical diagnosis, creating art such as poetry, proving mathematical theorems, playing games such as chess or Go, search engines such as Google search, online assistants such as siri, image recognition in photographs, spam filtering, prediction of judicial decisions and targeting online advertisements.

- ✓ Competitions and prizes
- ✓ Healthcare
- ✓ Finance and economics
- ✓ Automotive
- ✓ Music

### Finance and Economics

Bank use artificial intelligence to:

- ✓ Organize operations
- ✓ Invest in stocks
- ✓ Manage properties

Financial institutions have used AI to detect charges or claims.

### Music

Composition, performance, music theory, sound processing are some of the major areas on which research in music and AI are focusing.

## VI. PLATFORMS

A platform or computing platform is defined as “some sort of hardware architecture or software framework that allows software to run”. As Rodney Brooks pointed out many years ago, it is not just the artificial intelligence software that defines the AI features of the platform, but rather the actual platform itself that affects the AI that results, i.e., there needs to be work in AI problems on real world platforms rather than in isolation.

A wide variety of platform has allowed different aspects of AI to develop, ranging from expert systems such as Cyc to deep learning frameworks to robot platforms such as the Roomba with the open interface. Recent advances in deep artificial neural networks are distributed computing have led to a proliferation of software libraries, including deep learning, TensorFlow, theano and torch.

## VII. CONCLUSION

Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions. Authors are strongly encouraged not to call out multiple figures or tables in the conclusion these should be referenced in the body of the paper.

## VIII. ADVANTAGES

With AI, the changes of error are almost nil and greater precision and accuracy is achieved. AI finds application in space explorations. Intelligent robots can be used to explore space. They are machines and hence have the ability to endure the hostile environment of the interplanetary space.

AI has made daily life a lot easier like by use of applications or phones or computers that predict user actions and also make recommendations that suit user's choice e.g. application such as GPS, and maps

application etc. Intelligent machines can replace human beings in many areas of work. Robots can do certain laborious tasks. Painstaking activities, which have long been carried out by human can be taken over by the robots.

## IX. PROBLEMS OF ARTIFICIAL INTELLIGENCE

The overall research goal of artificial intelligence is to create technology that allows computer and machines to function in an intelligent manner. The general problem of simulating or creating intelligence has been broken down into sub problems. These consist of particular traits or capabilities that researcher expect an intelligent system to display. The traits described below have received the most attention.

- ✓ Reasoning and problem solving
- ✓ Knowledge representation

### A. Reasoning And Problem Solving

Human beings ordinarily use fast, intuitive judgements rather than step by step deduction that early AI research was able to model. AI progressed using “sub-symbolic” problem solving; embodied agent approaches emphasize the importance of sensorimotor skills to higher reasoning; neural net research attempts to stimulate the structure inside the brain rise to this skill; statistical approaches of AI mimic the human ability to guess

### B. Knowledge Representation

Knowledge representation are central to AI research. Many of the problems machines are expected to solve will require extensive knowledge about the world. Among the things that AI needs to represent the object, properties, categories, and relations between objects, states, events and time, causes and effects , knowledge about knowledge and the domain. Knowledge representation is suitable for content based indexing and retrieval scene interpretation,

clinical decision support, knowledge discovery via automated reasoning.

## X. CONCLUSION

AI and the technology are one side of the life that always interest and surprise us with the new ideas, topics, innovations, products etc. AI is still not implemented as the films representing it; however, there are many important tries to reach the level and to compete in market, like sometimes the robots that they show in TV. AI is at the center of a new enterprise to build computational models of intelligence. The main assumption is that intelligence can be represented in terms of symbol structures and symbolic operations which can be programmed in a digital computer. Conventional digital computers may be capable of running such programs, or we may need to develop new machines that can support the complexity of human thought.

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