

# ARTIFICIAL INTELLIGENCE

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**ASBTRACT:** *Artificial Intelligence (A.I.) is a multidisciplinary field whose goal is to automate activities that presently require human intelligence. Recent successes in A.I. include computerized medical diagnosticians and systems that automatically customize hardware to particular user requirements. The major problem areas addressed in A.I. can be summarized as Perception, Manipulation, Reasoning, Communication, and Learning. Perception is concerned with building models of the physical world from sensory input (visual, audio, etc.). Manipulation is concerned with articulating appendages (e.g., mechanical arms, locomotion devices) in order to effect a desired state in the physical world. Reasoning is concerned with higher level cognitive functions such as planning, drawing inferential conclusions from a world model, diagnosing, designing, etc.*

**A.I. redirects here. For other uses, see AI (disambiguation) and Artificial intelligence (disambiguation).**

- Artificial intelligence (AI), sometimes called machine intelligence, is intelligence demonstrated by machines, in contrast to the natural intelligence displayed by humans and other animals. In computer science AI research is defined as the study of "intelligent agents": any device that perceives its environment and takes actions that maximize its chance of successfully achieving its goals. Colloquially, the term "artificial intelligence" is applied when a machine mimics "cognitive" functions that humans associate with other human minds, such as "learning" and "problem solving".

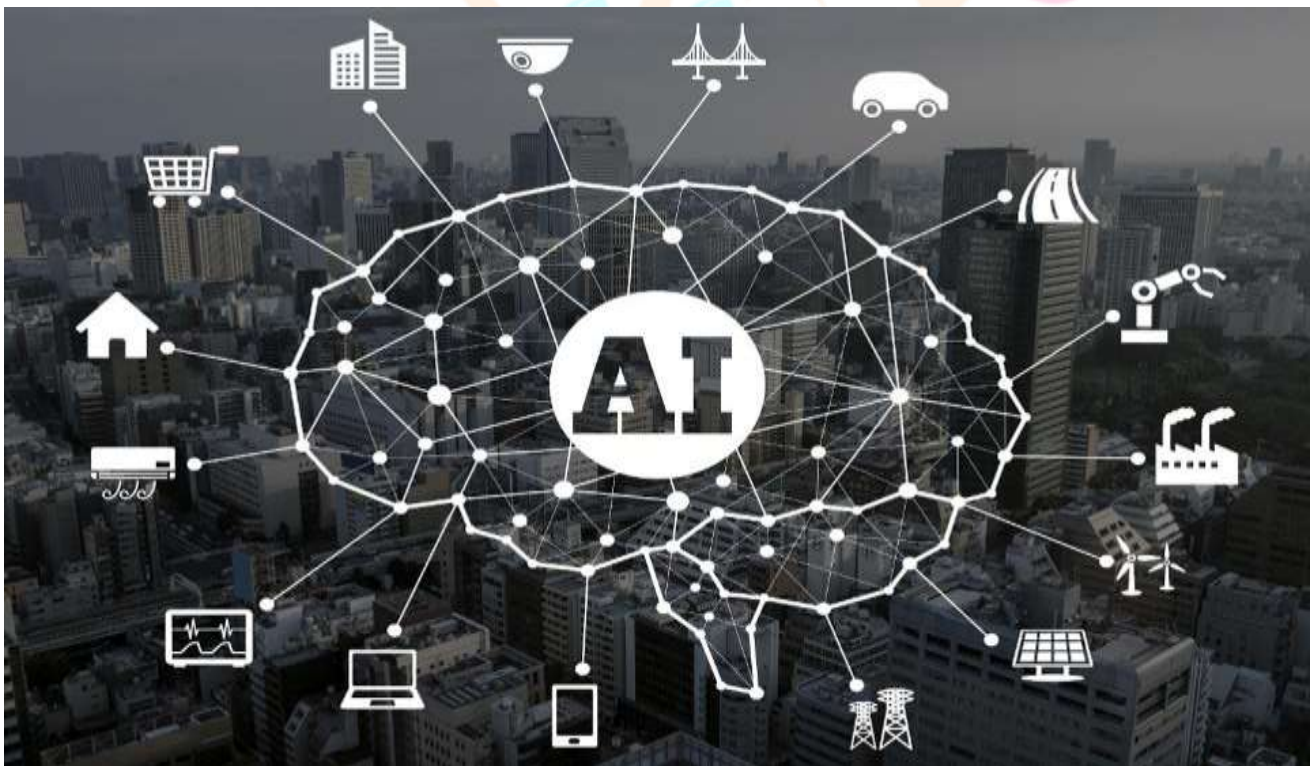


Figure 1-1: The many names of artificial intelligence.

- The scope of AI is disputed: as machines become increasingly capable, tasks considered as requiring "intelligence" are often removed from the definition, a phenomenon known as the AI effect, leading to the quip, "AI is whatever hasn't been done yet." For instance, optical character recognition is frequently excluded from "artificial intelligence", having become a routine technology. Capabilities generally classified as AI as of 2017 include successfully understanding human speech, competing at the highest level in strategic game systems (such as chess and Go), autonomous cars, intelligent routing in content delivery network and military simulations.

- Artificial intelligence was founded as an academic discipline in 1956, and in the years since has experienced several waves of optimism, followed by disappointment and the loss of funding (known as an "AI winter"), followed by new approaches, success and renewed funding. For most of its history, AI research has been divided into subfields that often fail to communicate with each other. These
- The traditional problems (or goals) of AI research include reasoning, knowledge representation, planning, learning, natural language processing, perception and the ability to move and manipulate objects. General intelligence is among the field's long-term goals. Approaches include statistical methods, computational intelligence, and traditional symbolic AI. Many tools are used in AI, including versions of search and mathematical optimization, artificial neural networks, and methods based on statistics, probability and economics. The AI field draws upon computer science, mathematics, psychology, linguistics, philosophy and many others.
- The field was founded on the claim that human intelligence "can be so precisely described that a machine can be made to simulate it". This raises philosophical arguments about

sub-fields are based on technical considerations, such as particular goals (e.g. "robotics" or "machine learning"), the use of particular tools ("logic" or artificial neural networks), or deep philosophical differences. Subfields have also been based on social factors (particular institutions or the work of particular researchers).

the nature of the mind and the ethics of creating artificial beings endowed with human-like intelligence which are issues that have been explored by myth, fiction and philosophy since antiquity. Some people also consider AI to be a danger to humanity if it progresses unabatedly. Others believe that AI, unlike previous technological revolutions, will create a risk of mass unemployment.

- In the twenty-first century, AI techniques have experienced a resurgence following concurrent advances in computer power, large amounts of data, and theoretical understanding; and AI techniques have become an essential part of the technology industry, helping to solve many challenging problems in computer science.

### Application of Artificial Intelligence

## Example applications

#### Infrastructure:

- Resource management
- Maintenance planning
- Aerial analysis
- Traffic monitoring

#### Logistics:

- Address correction
- Geo optimisation
- Package tracking
- Dynamic route planning

#### E-commerce:

- Data validation & enrichment
- Product classification
- Recommendations
- Dynamic pricing

#### Manufacturing:

- Visual quality monitoring
- Process optimisation
- Anomaly detection
- Planning & control

#### Media:

- Sentiment analysis
- Object recognition
- Semantics
- Content classification

#### BRAINCREATORS

- Brain-inspired
- Blue Brain Project, an attempt to create a synthetic brain by reverse-engineering the mammalian brain down to the molecular level.
- Human Brain Project
- NuPIC, an open source implementation by Numenta of its cortical learning algorithm.
- Cognitive architectures
- 4CAPS, developed at Carnegie Mellon University under Marcel A. Just
- ACT-R, developed at Carnegie Mellon University under John R. Anderson.
- AIXI, Universal Artificial Intelligence developed by
- Google Brain A deep learning project part of Google X attempting to have intelligence similar or equal to human-level.
- Marcus Hutter at IDSIA and ANU.
- CALO, a DARPA-funded, 25-institution effort to integrate many artificial intelligence approaches (natural language processing, speech recognition, machine vision, probabilistic logic, planning, reasoning, many forms of machine learning) into an AI assistant that learns to help manage your office environment.
- CHREST, developed under Fernand Gobet at Brunel University and Peter C. Lane at the University of

Hertfordshire.

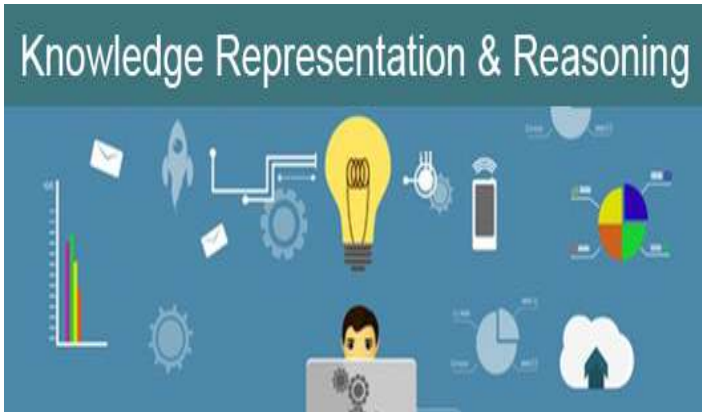
- CLARION, developed under Ron Sun at Rensselaer Polytechnic Institute and University of Missouri.
- CoJACK, an ACT-R inspired extension to the JACK multi-agent system that adds a cognitive architecture to the agents for eliciting more realistic (human-like) behaviors in virtual environments.
- Copycat, by Douglas Hofstadter and Melanie Mitchell at the Indiana University.
- DUAL, developed at the New Bulgarian University under Boicho Kokinov.
- EPIC, developed under David E. Kieras and David E. Meyer (both University of Michigan Ph.D. graduates) at the University of Michigan.
- FORR developed by Susan L. Epstein at The City University of New York.
- IDA and LIDA, implementing Global Workspace Theory, developed under Stan Franklin at the University of Memphis.
- OpenCog Prime, developed using the OpenCog Framework.
- Procedural Reasoning System (PRS), developed by Michael Georgeff and Amy L. Lansky at SRI International.
- Psi-Theory developed under Dietrich Dörner at the Otto-Friedrich University in Bamberg, Germany.
- R-CAST, developed at the Pennsylvania State University.
- Soar, developed under Allen Newell and John Laird at Carnegie Mellon University and the University of Michigan.
- Society of mind and its successor the Emotion machine proposed by Marvin Minsky.
- Subsumption architectures, developed e.g. by Rodney Brooks (though it could be argued whether they are cognitive).
- Games
- AlphaGo, software developed by Google that plays the Chinese board game Go.
- Chinook, a computer program that plays English draughts; the first to win the world champion title in the competition against humans.
- Deep Blue, a chess-playing computer developed by IBM which beat Garry Kasparov in 1997.
- FreeHAL, a self-learning conversation simulator (chatterbot) which uses semantic nets to organize its knowledge to imitate a very close human behavior within conversations.
- Libratus, a poker AI that beat world-class poker players in 2017, intended to be generalisable to other applications.
- Stockfish AI, an open source chess engine currently ranked the highest in many computer chess rankings.
- TD-Gammon, a program that learned to play world-class backgammon partly by playing against itself (temporal difference learning with neural networks).
- Internet activism
- Operation\_Serenata\_de\_Amor, project for the analysis of public expenditures and detect discrepancies.
- Knowledge and reasoning
- Braina, an intelligent personal assistant application with a voice interface for Windows OS.
- Cyc, an attempt to assemble an ontology and database of everyday knowledge, enabling human-like reasoning.
- Eurisko, a language by Douglas Lenat for solving problems which consists of heuristics, including some for how to use and change its heuristics.
- Google Now, an intelligent personal assistant with a voice interface in Google's Android and Apple Inc.'s iOS, as well as Google Chrome web browser on personal computers.
- Holmes a new AI created by Wipro.
- James, an intelligent personal assistant that understands questions in several languages, including questions mixing languages.
- Microsoft Cortana, an intelligent personal assistant with a voice interface in Microsoft's various Windows 10 editions.
- Mycin, an early medical expert system.
- Open Assistant, an evolving open source artificial intelligence agent able to interact in basic conversation and automate an increasing number of tasks.
- Open Mind Common Sense, a project based at the MIT Media Lab to build a large common sense knowledge base from online contributions.
- P.A.N., a publicly available text analyzer.
- Siri, an intelligent personal assistant and knowledge navigator with a voice-interface in Apple Inc.'s iOS and macOS.
- SNePS, simultaneously a logic-based, frame-based, and network-based knowledge representation, reasoning, and acting system.
- Viv (software), a new AI by the creators of Siri.
- Wolfram Alpha, an online service that answers queries by computing the answer from structured data.
- BrainR, an RPA solution that use artificial intelligence for learning how people are resolving task using their computers.
- Motion and manipulation
- AIBO, the robot pet for the home, grew out of Sony's Computer Science Laboratory (CSL).
- Cog, a robot developed by MIT to study theories of cognitive science and artificial intelligence, now discontinued.
- Music
- Melomics, a bioinspired technology for music composition and synthesization of music, where computers develop their own style, rather than mimic musicians.
- Natural language processing
- AIML, an XML dialect for creating natural language software agents.
- Apache Lucene, a high-performance, full-featured text search engine library written entirely in Java.
- Apache OpenNLP, a machine learning based toolkit for the processing of natural language text. It supports the most common NLP tasks, such as tokenization, sentence segmentation, part-of-speech tagging, named entity extraction, chunking and parsing.
- Artificial Linguistic Internet Computer Entity (A.L.I.C.E.), an award-winning natural language processing chatterbot.
- Cleverbot, successor to Jabberwacky, now with 170m lines of conversation, Deep Context, fuzziness and parallel processing. Cleverbot learns from around 2 million user interactions per month.
- ELIZA, a famous 1966 computer program by Joseph Weizenbaum, which parodied person-centered therapy.
- InfoTame, a text analysis search engine originally

developed by the KGB for sorting communications intercepts.

- Jabberwacky, a chatterbot by Rollo Carpenter, aiming to simulate natural human chat.
- LEVERTON, software based on deep learning that extracts and structures data from scanned documents.
- Mycroft, a free and open-source intelligent personal assistant that uses a natural language user interface.

- PARRY, another early chatterbot, written in 1972 by Kenneth Colby, attempting to simulate a paranoid schizophrenic.
- SHRDLU, an early natural language processing computer program developed by Terry Winograd at MIT from 1968 to 1970.

### **Knowledge representation and reasoning**



- Knowledge representation and reasoning (KR, KR<sup>2</sup>, KR&R) is the field of Artificial intelligence (AI) dedicated to representing information about the world in a form that a computer system can utilize to solve complex tasks such as diagnosing a medical condition or having a dialog in a natural language. Knowledge representation incorporates findings from psychology[1] about how humans solve problems and represent knowledge in order to design formalisms that will make complex systems easier to design and build. Knowledge representation and reasoning also incorporates findings from logic to automate various kinds of reasoning, such as the application of rules or the relations of sets and subsets.

- Examples of knowledge representation formalisms include semantic nets, systems architecture, frames, rules, and ontologies. Examples of automated reasoning engines include inference engines, theorem provers, and

classifiers.

- The KR conference series was established to share ideas and progress on this challenging field.

### **Conclusion**

Artificial Intelligence 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 (i.e. intelligent robots), however there are many important tries to reach the level and to compete in market, like sometimes the robots that they show in TV. Nevertheless, the hidden projects and the development in industrial companies. At the end, we've been in this research through the AI definitions, brief history, applications of AI in public, applications of AI in military, ethics of AI, and the three rules of robotics. This is not the end of AI, there is more to come from it, who knows what the AI can do for us in the future, maybe it will be a whole society of robots.

### **Reference:**

- [1] [https://en.wikipedia.org/wiki/Artificial\\_intelligence](https://en.wikipedia.org/wiki/Artificial_intelligence)
- [2] <https://ieeexplore.ieee.org/document/1152096/>
- [3] <https://sites.google.com/a/cas.edu.om/ai/conclusion>

