
1 - Introduction (1.1 and 1.2) and AI index report 2024

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1 The History of AI

Turing award is considered as the highest award in AI. Marvin Minsky(1969) and John McCarthy(1971) in foundations of the field based on representation and reasoning. Allen Newell and Herbert Simon(1975) for problem solving and human cognition. Ed Feigenbaum and Raj Reddy(1994) for developing expert systems that encode human knowledge to solve real-world problems. Judea Pearl(2011) in probabilistic reasoning techniques. Yoshua Bengio, Geoffrey Hinton and Yann LeCun(2019) in the field of deep learning.

The first work in AI was done by Warren McCulloch and Walter Pitts. They showed that any computable function could be computed by some network of connected neurons and the logical connectives. Newell and Simon created the General Problem Solver(GPS) which was designed to imitate human problem solving protocols. After this Newell and Simon formulated the famous physical symbol system. In 1958, John McCarthy developed a high level language called Lisp, which was to become the dominant AI programming language for the next 30 years.

There are 2 reasons for the failure of AI on earlier times. The first reason is AI concentrated on how humans perform a task, rather than on a careful analysis of the task. The second reason is the lack of appreciation. The return of neural networks in 1980s and 2010s had changed the world of AI in many aspects. The brittleness of expert systems led to the development of probability and machine learning. Judea Pearl's **Probabilistic Reasoning in Intelligent Systems** led to a new acceptance of probability and decision theory in AI.

Big data includes words of text, images, videos, vehicle tracking data, etc. The availability of big data and machine learning helped AI recover commercial attractiveness. Deep learning refers to machine learning using multiple layers of simple, adjustable computing elements. This deep learning is first used in speech recognition and then in visual object recognition.

2 Risks and Benefits of AI

Misuse of AI can result in very hazardous situations. Risks with AI include making autonomous weapons, biased decisions, impact on employment, cyberattacks, etc. There were also concerns among AI researchers about artificial superintelligence(ASI). Because 7 million years ago gorillas were overtaken by humans and now gorilla's are unhappy about it. Similar problem can occur even to the human if ASI is developed.

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AI surpasses humans in some tasks but not able to do it in all tasks. The United States leads the rest of the world in AI research. The investments in generative AI increases enormously in the recent years. AI enables workers to be more productive. The number of AI regulations in the United States increase sharply. AI accelerates in scientific researches like AlphaDev.

Inspite of development of AI in recent years it is unable to dominate industry. The number of AI related projects on GitHub has increased consistently. Multimodal AI has seen a prominent development in recent times. Robots have become more flexible due to LLMs. LLMs can generate copyrighted material. Risks involved in AI are difficult to analyze. Use of AI in economy is it decreases costs and increases revenue.

The usage of AI increases a lot in medical field. AI is increasingly being utilized to propel medical advancements. The PhDs done in AI has seen a tremendous rise. AI-related degree programs are on the rise internationally. The number of patents in AI has doubled in 2023 in the US compared to 2022. The public are curious about the development of AI. They is pessimistic about AI's economic impact.