MACROJOURNALS

The Journal of **Macro**Trends in Applied Science

Artificial Intelligence: Research and Management Trends

Kirk Plum, Christopher Haney, Omar Cavazos, Nourredine Boubekri
College of Engineering; University of North Texas; U.S.A

Abstract

Artificial intelligence (A.I) is a term used to define several innovative concepts that culminate to form what is now known as A.I. The two primary research topics are Machine Learning (ML) and Deep Learning (DL). This paper outlines the research trends in theses technologies; including Reinforced Learning(RL),Computer vision (CV), and Natural Language Processing (NLP).It also discusses applications and management issues of A.I in several fields including Medical ,Manufacturing and law enforcement applications.

Keywords: *Artificial Intelligence*

1. Introduction

Artificial Intelligence (AI) where learning and decision making is done by machines alone or in collaboration with people is a growing technology. A factory in Little Rock, Arkansas, is using sewing robots developed by Georgia-based startup SoftWear Automation to manufacture apparel. By 2025, more than 80% of elderly care would be done by robots, not caregivers according to Chaturvedi (2018).

China has now surpassed the United States in global AI funding. China makes up 48% of the global equity share, while the United States makes up 38%. The United States' equity has decreased as China has continued to fund AI developments and in a number of areas including face recognition and Edge AI. Applications of AI in manufacturing, navigation, transportation, medical, support systems, security, communication are gaining momentum with more funding and global competition. Global funding for AI startups increased from $1.7 billion in 2013 to $15.2 billion in 2017.Pannu (2015)

2. Research Trends

Artificial intelligence is a blanket term. It is used to define several innovative technologies. Machine Learning (ML) and Deep Learning (DL) are the two primary areas of research in this field. As subtopics within these areas are :Reinforcement Learning (RL), Computer vision (CV), and Natural Language Processing (NLP). Chu (2018).

Machine Learning (ML) is composed of two types of "learning" . One is supervised learning where data sets are labeled, essentially as right or wrong. This type of learning is used to create technology which can predict outcomes. An example application of this type of learning would be autonomous cars. The other type is unsupervised learning where data sets are unlabeled and the machine is left to create connections. This type does not predict outcomes but rather clusters of similar and/or related data. An example of this would be Google's search engine.

Deep learning (DL) is creating simple or complex artificial neural networks to mimic the human brain. Deep Learning technologies are used to recognize or cluster certain images, words, phrases, or patterns. Both ML and DL are composed of Reinforcement Learning (RL), Computer Vision (CV), and Natural Language Processing (NLP) in some way or another.

Reinforcement learning is creating a smart agent that essentially learns as a human would as they progressed through life. The machine learns from mistakes, previous attempts, and successes. It then attempts to interact with the environment to maximize and reap long-term rewards. An example of this would be the AlphaGo computer program that beat the world Go board game champions.

The director of the Stanford AI lab, Dr Fei-Fei Li said, "If we want machines to think, we need to teach them to see". Computer Vision is the basis in allowing machines to be able to recognize, differentiate, and group data or images in order to reach a conclusion. CV is a key component in creating technology to navigate through an environment autonomously. Additional applications of this specific field are automatic inspection, assisting humans in identification tasks, controlling processes, visual surveillance, computer-human interactions, modeling objects or environments, navigation, and organization.

Natural Language Processing (NLP) are techniques and algorithms that permit a machine to perceive and understand a given spoken language. NLP also comes with several subtasks such as speech recognition, natural language understanding, language generation, and translation. The most prominent example of NLP would be Siri for iOS, or Cortana for Microsoft. All of these research areas are driven by data. Consider Big Data to be crude oil, databases and warehouses to be the drilling rigs, and A.I. to be the refinery to use the raw data and turn it into useful information.

3. Applications Areas

While AI has been applied in a large number of domains, including information processing, law enforcement, logistics, transportation; other areas including medical, manufacturing, defense, and cybersecurity are worth mentioning.

AI has been successfully used in clinical diagnosis. An example is in the computer-aided detection of tumors based on medical images. Distinguishing between two medical conditions is frustrating and difficult. Medical doctors rely on their knowledge and data available to make a credible decision. An experienced cardiologist may make an accurate diagnosis three out of four times. AI assisted technology was developed to help in this regard. In a recent study, the Intel Saffron AI spotted the difference between pericarditis and cardiomyopathy with 90 percent success rate. The researchers used associative memory AI, which mimics the human brain and works by noticing similarity patterns which allows the AI to respond in real time. The results of this experiment show that AI is a feasible diagnostic tool that keeps patients healthier.Parbhakar(2018)

Another application of AI is in video games. Nowadays video games can be very complex with 3D interactive capabilities. It produces a mutual challenge so that users can fully appreciate the nature and context of the environment. Features of AI, being applied include simulated perception, spatial reasoning, target selection, learning, etc. The applications of this technology in other fields including medical, defense, space, design and manufacturing are significant.

One of the most notable applications of AI today is in manufacturing . According to Intel, “smarter” factories manufacturing output is 40 percent higher than it was 20 years ago. The term “smarter” refers to the use of sensors and robots to react in real time and achieve their respective tasks. Overall, it is estimated that by 2025 AI driven factories will generate about 3.7 trillion in new value. Overall, managing AI itself is a challenge on its own. A fully developed AI robot will basically be able to perform tasks similar to a human being. Therefore, it will be able to make decisions based on feedback from all modes of cognitive ability. Ironically, pop culture sci-fi ideas are becoming a reality with the developments of innovation and technology that occur on a daily basis.

4. Conclusions

The developments of artificial intelligence is a significant undertaking involving the integration the fields of science, engineering, and humanities. The positive impact of this technology is already significant in a number of areas and will continue to grow perhaps at an exponential rate. The potential negative disruptions are still not understood or net even yet identified. One thing is for certain.AI will continue to disrupt our lives

References

1. Chaturvedi, Aditya. “13 Major Artificial Intelligence Trends to Watch for in 2018.” *Geospatial World*, 11 July 2018, www.geospatialworld.net/blogs/13-artificial-intelligence-trends-2018/.

2. Chu, Joanne. "Understanding AI, Machine Learning, and Deep Learning." *Oracle + DataScience.com*, 2 Feb. 2018, www.datascience.com/blog/understanding-ai-machine-learning-deep-learning.

3. Parbhakar, Abhishek. "Hot Topics in AI Research – Towards Data Science." *Towards Data Science*, Towards Data Science, 19 May 2018, towardsdatascience.com/hot-topics-in-ai-research-4367bdd93564.

4. Pannu, Avneet. "Artificial Intelligence and its Application in Different Areas." DAV Institute of Engineering and Technology. 10 April 2015

5. Intel. "*Applications of Artificial Intelligence: Finding opportunity hidden in data.*"https://www.intel.com/content/www/us/en/analytics/artificial-intelligence/ai-reveals-answers.html