

# Artificial intelligence and its applications for the betterment of society



**ASSIGN  
BUSTER**

## **Abstract**

This paper explains five articles highlighting the potential of Artificial Intelligence (AI) in, and throughout, an ever-evolving world that is becoming ever more reliant on the rapid innovation of technology. As technology advances, more processing power is needed to analyze data in an effective manner, and as shown by both Naser (2019) and Jiang F, Jiang Y, Zhi H (2017), there are multiple practical applications for AI in engineering, mathematical, and medical fields to achieve the level of processing power needed to solve modern problems. Many of these problems require the use of a system capable of processing data in a way similar to the human brain, however, requiring significantly more processing speed, requiring the use of an AI. To understand the applications of AI, one must first understand what AI is, why it is important, and what the advantages of AI are over traditional programming methods. This paper will examine the works of Naser (2019) and Jiang (2017) along with other articles published in relation to the subject of AI and their practical applications, through research and development, for the betterment of society.

Keywords: Artificial Intelligence

Artificial Intelligence and its Applications for the Betterment of Society

Artificial Intelligence (AI) is the pursuit of the creation of a computational, silicon-based, logical brain that can process data in ways that the normal human brain could not. This is what makes the brain of an AI so much more appealing to researchers that doing the calculations manually - speed. While this is the main goal of AI, there are many research teams with differing <https://assignbuster.com/artificial-intelligence-and-its-applications-for-the-betterment-of-society/>

views on the best way to approach the development and training of modern AI. The methods of developing AI have changed over the years including methods such as symbolic AI, connectionist AI, and most recently, evolutionary AI (Boden, 2006). Each of these methods has its advantages and disadvantages; however, the current most effective method that researchers are using is evolutionary AI which incorporates the use of genetic algorithms (GAs). This Paper will examine the works of Naser and Jiang et al. regarding their studies of how AI can be applied in effective manners.

## **Literature Review**

In various articles written by Jiang et al. (2017), Boden (2006), and Larry (2009), AI is defined as something that aims to mimic human cognitive functions. This description would lead to the assumption the AI is designed to be like a human, while in most cases, this is not true. AI systems are designed so that they can complete tasks in a similar process to that of the human brain, with logical outcomes based on a set of data (Larry, 2009). In current AI fields, there are many approaches that attempt to replicate the processes of the human mind, symbolic AI, connectionism, situated robotics, and evolutionary programming as mentioned by Boden (2006). As to how the AI gets the data that it needs to analyze, currently, Yale is using sensor-based AI to observe the outside world and make the logical decisions that a human would make to get to an intended outcome based on the known data (Yale University).

## **Types of Artificial Intelligences**

In Boden's paper, he outlines the forms of AI over the years and what each one of them does. The oldest form of AI was called Connectionist AI, a name given to it because it relied on a database of data points that had some sort of connection to the solution. This meant that the data had to be relevant; otherwise, the AI would not be able to make sense of the connections. This type of AI is suited for pattern recognizing tasks since each data point is connected to each other in a particular, predictable way. A similar yet different type of AI is symbolic AI, a method of using a computer to do the logical steps and calculations that the human mind does. This method of logical progression relies on a series of if-then statements to decide what the most logical next step is. This process is good for applications that have set rules to them such as "manipulate objects, identify the content of sounds or images, steer vehicles, aim weapons, etc" (Larry, 2009). Anywhere that there are concrete rules that must be followed it is more applicable for a symbolic AI whereas Connectionist AI is more suited for pattern recognition, especially when the data set is partially incomplete. A practical application for connectionist AI is in situated robotics. Normally a robot would follow a set of specific commands to perform a task, however, when adding connectionist AI, the system allows for truly autonomous robotic function. In situated robotics, the robot is able to become "sensor-controlled" (Yale University), use the connections between data to recognize patterns in the environment, and finally decide on what the next logical step would be. The most recent form of AI is Evolutionary Programming, a method that employs the use of Genetic Algorithms to make the system ever evolving. The purpose of evolutionary programming is to allow the AI to determine if it was

<https://assignbuster.com/artificial-intelligence-and-its-applications-for-the-betterment-of-society/>

successful in its task and if it was how efficient was it. Once it has these values, it makes small changes to its rule sets to attempt to either complete the task or complete it more efficiently than before. This method is the basis of higher level Symbolic and Connectionist AI – a way for each method to evolve its base rules so that the system may be better the next time the task is performed.

### **Real-world Applications for Artificial Intelligence.**

AI has found its way into many different areas of research and development for a multitude of different tasks. One example of this is Jiang et al.'s (2017) paper concerning the issue of AI in the medical field. He explains how an AI can take data from a large medical database to be trained in pattern recognition and help assist medical technicians in interpreting and verifying discoveries throughout the medical process. One such example provided is the ability for an AI to be trained to analyze Computed tomography (CT) scans, X-ray's, and Magnetic resonance imaging (MRI) scans. This would allow doctors discoveries to be verified by a program trained to detect any abnormalities in said scans within a low margin of error. In his paper, he also wrote that such a system will help medical professionals ensure that they did not overlook a key piece of information that would affect treatment options. What is helpful is that this medical information is easily available; this availability means that the training of the AI would be simple and would require very little extra data to be added to ensure a high degree of accuracy when assisting medical professionals. In contrast to the paper written by Jiang et al. (2017), Naser (2019) explains that for his research there was very little data to use to train the AI. This meant that in order to

<https://assignbuster.com/artificial-intelligence-and-its-applications-for-the-betterment-of-society/>

accurately make decisions, the research team had to conduct multiple studies to gather the adequate data needed to achieve the 0.5% error rate after only a mere 1500 iterations of the GA using a version of a connectionist AI, also known as an Artificial Neural Network (ANN). Naser used the data collected from the experiments to attempt to predict the structural integrity of buildings exposed to severe fires and temperatures “exceeding 1200° C”, constructed of either of Reinforced Concrete (RC) or High Strength Concrete (HSC). Naser used AI in an attempt to perform the logistical calculations needed to predict the complex, however not random ways in which fire and extreme temperature affect the stability of many load-bearing components. Naser explained one of the reasons why such predictions are difficult even for an AI is that the data used to train the AI is highly qualitative rather than quantitative. One of the major variables that the AI is fed is the degree of concrete spalling which is given a qualitative value since the level of spalling can span such a large range. One of the advantages of using AI-based computing is that it is easy to reverse the direction of prediction. Rather than predict the structural integrity of a pillar after the fact, the ANN could instead predict the time the concrete would take to fail. Both Jiang and Naser used evolutionary programming and GAs in an effort to create an AI that can evolve to the incoming data and process it in a logical manner. The difference is that Naser applies GAs using connectionist AI which is better at recognizing patterns in data sets, which is highly applicable to something that is predictable and also requires the AI to see data values that can, at times be vague. While Naser uses connectionist AI, Jiang uses a symbolic AI which is better suited for an if-then approach helping to analyze a particular medical file rather than finding the patterns between multiple data points <https://assignbuster.com/artificial-intelligence-and-its-applications-for-the-betterment-of-society/>

spread across many medical files. While each type of AI is suited for its own particular niche data set, both rely on evolutionary programming and GAs to effectively analyze data and modify their rule sets to decrease the margin of error while also increasing efficiency.

### **Analysis of Credibility: Strengths and Weaknesses**

The issues noted in the study written by Naser (2019) come out of the issue with modern classification of spalling and other qualitative variable that are mentioned in his research. His research does however suggest that once this problem of using qualitative data rather than quantitative data is rectified, the system would become even more accurate and would require little to no modification to perform in such a manner. Any discrepancies between sources are most likely due to the ever-changing nature of the field as more modern approaches to a problem are developed. In light of this, there are no differences between sources in any description of the history, purpose, and various applications of modern AI.

### **Conclusions**

In order to understand the applications of AI, it is necessary to first understand what AI is, what types of AI there are, and what each one's advantages and disadvantages are. Many of these methods are dated, however with the integration of more modern approaches such as evolutionary programming and the use of GAs each method proves quite useful in its own application. In today's growing reliance on technology, it is only logical to assume that AI will become an ever more present and integral part of society. With the introduction of other technologies such as fully self-driving cars and more advanced machine learning in addition to what we

<https://assignbuster.com/artificial-intelligence-and-its-applications-for-the-betterment-of-society/>

already use today, it is not hard to imagine a world where everything incorporates some type of AI processing.

## References

- Larry, G. (2009). Computer Science: Artificial Intelligence. In K. L. Lerner & B. W. Lerner (Eds.), In Context Series. Scientific Thought: In Context (Vol. 2, pp. 620-624). Detroit, MI: Gale. Retrieved from [https://link.galegroup.com/apps/doc/CX3058900084/GVRL?u=fl\\_sarhs&sid=GVRL&d=37cf9f52](https://link.galegroup.com/apps/doc/CX3058900084/GVRL?u=fl_sarhs&sid=GVRL&d=37cf9f52)
- Boden, M. A. (2006). Artificial Intelligence. In D. M. Borchert (Ed.), Encyclopedia of Philosophy (2nd ed., Vol. 1, pp. 345-350). Detroit, MI: Macmillan Reference USA. Retrieved from [https://link.galegroup.com/apps/doc/CX3446800125/GVRL?u=fl\\_sarhs&sid=GVRL&d=39a6a1ec](https://link.galegroup.com/apps/doc/CX3446800125/GVRL?u=fl_sarhs&sid=GVRL&d=39a6a1ec)
- Jiang F, Jiang Y, Zhi H, et al Artificial intelligence in healthcare: past, present and future Stroke and Vascular Neurology 2017; 2: doi: 10.1136/svn-2017-000101
- Artificial Intelligence. (Yale University). Retrieved from <https://cpsc.yale.edu/research/artificial-intelligence>
- Naser M. Z. (2019). “ AI-based cognitive framework for evaluating response of concrete structures in extreme conditions.” Engineering Applications of Artificial Intelligence. Vol. 81, pp. 437-449. (<https://doi.org/10.1016/j.engappai.2019.03.004>).