

Artificial Intelligence: Its Importance, Challenges and Applications in Nigeria

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Artificial Intelligence (AI) is the ability of a digital computer, computer-controlled machine or robot to perform tasks commonly associated with intelligent beings like humans. The importance, challenges and applications of artificial intelligence in Nigeria is the focus of this paper. The paper discussed the concept and origin of artificial intelligence and presented some of its importance as related to Nigeria. Specifically, the challenges of artificial intelligence in Nigeria were given while some applications were also given as a means of showing its ability to enhance the economy of Nigeria. Finally, the paper discussed the prospect of artificial intelligence in the world of technology in

general and Nigeria specifically. Based on the importance, challenges and applications surrounding artificial intelligence in Nigeria, some recommendations that will encourage the development of artificial intelligence were given. One of such recommendations is that innovative research and policy-making are needed on the use of artificial intelligence technology in workplace management, monitoring and hiring of personnel.

Keyword: Artificial, intelligence, importance, challenges, applications, prospect and technology

INTRODUCTION

Intelligence has been considered as one of the most important quality of human beings because every human behaviour has actually been ascribed to intelligence. According to Kumar (2018), human beings are the most intelligent of all the created animals in the world. This is seen in how they exercise superiority of behavior over other animals by subjecting the animals to desired control. Human intelligence is expressed when human behaviour interacts with nature and human environment, such that random mutations for greater intelligence get selected naturally.

The idea is that humans evolved complex abstract thinking because mutations that enabled our ancestors to manipulate others' understanding of the human and natural environment. Intelligence has been defined in many ways, including: the capacity or logic, understanding, self-awareness, learning, emotional knowledge, reasoning, planning, creativity, and problem solving. More generally, it can be described as the ability

to perceive or infer information, and to retain it as knowledge to be applied towards adaptive behaviours within an environment or context. In summary, intelligence can be defined as the ability to retain, recall and apply information. This can imply that human intelligence has to do with the ability of humans to retain, recall and apply information. Through intelligence, humans possess the cognitive abilities to learn, form concepts, understand, apply logic, and reason, including the capacities to recognize patterns, comprehend ideas, plan, solve problems, make decisions, retain information, and use language to communicate. Intelligence enables humans to experience and think.

Intelligence is one of the most useful concepts used in psychology, because it correlates with lots of relevant variables, like the probability of suffering an accident, earning a higher salary, etc. Psychologists generally do not characterize human intelligence by just one trait but by the combination of many diverse abilities. Intelligence

is most often studied in humans but has also been observed in non-human animals, plants and of late studied in machines. This study of intelligence in machines is referred to as Artificial Intelligence (AI), which is commonly implemented in computer systems using programs through appropriate electronic circuits (Smith, 2006). Artificial Intelligence (AI) 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 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 (McCorduck, 2004). Some people also consider Artificial Intelligence (AI) to be a danger to humanity if it progresses unabated. Others believe that Artificial Intelligence (AI) unlike previous technological revolutions will create a risk of mass unemployment. This implies that artificial intelligence is involved in the project of developing machines endowed with the intellectual processes and characteristic of humans, such as the ability to reason, discover meaning, generalize, or learn from past experiences. Research in Artificial Intelligence (AI) focuses chiefly on the following components of intelligence: learning, reasoning, problem solving, perception, planning and using language. A deep learning of Artificial Intelligence (AI) is often made possible by the principles of Artificial Neural Networks (ANN), which imitate neurons, or brain cells. Artificial neural networks were inspired by things we find in our own biology. The neural net models use mathematics and computer science principles to mimic the processes of the human brain, allowing for more general learning. An artificial neural network tries to simulate the processes of densely interconnected brain cells, but instead of being built from biology, these neurons, or nodes, are built from code. Neural networks contain three layers: an input layer, a hidden layer and an output layer. These layers contain thousands, sometimes millions of nodes. Information is fed into the input layer. Inputs are given a certain weight, and interconnected nodes multiply the weight of the connection as they travel. Essentially, if the unit of information reaches a certain threshold, then it is able to pass to the next layer (Smith, 2006). In order to learn from experience, machines compare outputs from a neural network, and then modify connections, weights, and thresholds based on the differences among them.

THE CONCEPT OF ARTIFICIAL INTELLIGENCE (AI)

Artificial intelligence (AI), sometimes called machine intelligence, is intelligence demonstrated by machines in contrast to natural intelligence displayed by humans and other animals (McCorduck, 2004). This implies that machines can be made to perform tasks commonly

associated with intelligent beings like humans and animals. It is an area of computer science with the help of digital electronics that emphasizes the creation of *intelligent* machines that work and react like humans. The term is frequently applied to the project of developing systems endowed with the intellectual processes and characteristic of humans, such as the ability to reason, discover meaning, generalize, or learn from past experiences. Since the development of the digital computer in the 1940s, it has been demonstrated that computers can be programmed to carry out very complex tasks like discovering proofs for mathematical theorems and playing chess with great proficiency.

Artificial Intelligence (AI) has been studied for decades and is still one of the most challenging subjects in digital computer. However, it is taking the world by storm, considering the application of its innovative uses across all industry segments. Indeed, the world is decades away from replacing every human intelligence with AI robots. AI technology ranges from machines truly capable of thinking to search algorithms used to solve societal problems. In fact, intelligent robots are slowly and gradually in demand and can be considered as an emerging technology in the field of surgery. Most AI examples that is heard about today from chess-playing computers to self-driving cars rely heavily on deep learning and natural language processing (McGuire, 2006). Using these technologies, computers can be trained to accomplish specific tasks by processing large amounts of data and recognizing patterns in the data. The overall research goal of artificial intelligence is to create technology that allows computers 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 researchers expect an intelligent system to display. The traits are learning, reasoning, problem solving, perception, planning and speech recognition. These traits have been described to have received the most attention in AI technology.

The origin of artificial intelligence (AI)

The idea of inanimate objects coming to life as intelligent beings (Artificial Intelligence) has been around for a long time. It began in antiquity with myths, stories and rumors of artificial beings endowed with intelligence or consciousness by master craftsmen. In fact, the ancient Greeks had myths about robots, and Chinese and Egyptian engineers built automatons.

The beginnings of modern Artificial Intelligence (AI) can be traced to classical philosophers' attempts to describe human thinking as a symbolic system. But the field of AI was not formally founded until 1956, when John McCarthy at an academic conference at Dartmouth College in Hanover, New Hampshire where the term

"artificial intelligence" was coined (McGuire, 2006). MIT cognitive scientist Marvin Minsky and others who attended the conference were extremely optimistic about AI's future. Many of them predicted that a machine as intelligent as a human being would exist in no more than a generation and they were given millions of dollars to make this vision come true. Eventually it became obvious that they had grossly underestimated the difficulty of the project. But achieving an artificially intelligent being was not so simple. After several reports criticizing the progress in AI, In 1973, in response to the criticism from James Lighthill and ongoing pressure from congress; the U.S. and British Governments stopped funding undirected research on artificial intelligence, and the difficult years that followed was later known as an "AI winter" – 1974 to 1980 (Huang, 2006). The field later revived in the 1980s when the British government started funding it again in part to compete with efforts by the Japanese (Yang, 2006). But by the late 80s the investors became disillusioned by the absence of the needed computer power (hardware) and withdrew funding again. The experienced brought about another major winter from 1987 to 1993. But research began to pick up again after that, and in 1997, IBM's Deep Blue became the first computer to beat a chess champion when it defeated Russian grandmaster Garry Kasparov (Lohr, 2016).

Investment and interest in AI boomed in the first decades of the 21st century, when machine learning was successfully applied to many problems in academia and industry due to the presence of powerful computer hardware. This was in the form of access to large amounts of data (known as "big data"), faster computers and advanced machine learning techniques which were successfully applied to many problems throughout the world's economy. In fact, McKinsey Global Institute estimated in their famous paper "Big data: The next frontier for innovation, competition, and productivity" that "by 2009, nearly all sectors in the US economy had at least an average of 200 terabytes of stored data". By 2016, the market for AI related products, hardware and software reached more than 8 billion dollars, which raised the interest in AI to reach a "frenzy". The applications of big data began to reach into other fields as well, such as training models in ecology and for various applications in economics (Hampton et al., 2013). Advances in deep learning (particularly deep convolutional neural networks and recurrent neural networks) drove the progress of AI to image, video processing, text analysis, and speech recognition.

Importance of artificial intelligence (AI) in Nigeria

In Nigeria, almost everything is done manually, despite the fact that we now live in the time where a lot of works are taken over by machines (Artificial Intelligence). Therefore, artificial intelligence has a key role to play in

the world of technology of developing nations like Nigeria. For artificial intelligence to be enhanced in Nigeria there is need to consider some importance of artificial intelligence.

A greater assistance to humans

In Nigeria, almost all the works are done manually by humans, hence causing several economic dangers due to poor production and poor technology inclination. However, AI technology is efficient enough to reduce human efforts in various areas hence improving production and technology. In developed nations, in order to improve production in various activities in the economy, many of them are using artificial intelligence to create machine slaves that perform various activities on a regular basis. The use of artificial intelligence will assist humans to get the work done faster and with accurate results. Error free and efficient worlds are the main motives behind artificial intelligence. In the recent years, many nations have started using AI technology to reduce human efforts, and also to get efficient and faster results, but Nigeria is yet to give the required attention in AI.

A greater advance in technology

In the developed world, scientists are riding on the back of AI, hoping that machine intelligence will surpass the human intelligence. Scientists believe that once the AI system starts working in its full capacity, it will reinvent the world of technology that we know today and Nigeria will not be an exception if it places greater importance on the development of AI. AI will develop to a point where humans will be served or their responsibilities completely taken over by robots. In this way, humans can focus their strengths on higher levels of work in order to accomplish more and take technology to new heights.

Development of better human safety and peace

Though there are quite a lot of benefits in the technology of AI, but with every great invention, there are certain amounts of risk. One of such risks is the use of this technology for foolish and selfish activities, especially in the destruction of human lives. Unfortunately, Nigeria could be a clear victim considering her volatile ethno-religion differences. To control this, there are already a great push for national and international control of its development in order to ensure human safety and peace in the world.

Challenges of artificial intelligence (AI) in Nigeria

Despite the innovative importance and growth of artificial intelligence technology, it is indeed been faced with some

significant challenges especially in developing nation like Nigeria. Nigeria as a nation must endeavour to overcome these challenges in order to improve artificial intelligence. Some of the challenges are seen below.

Complex algorithms

The technical side of AI involves some huge data and complex algorithm; sometimes making users not to grasp AI concepts. A lot of researchers in Nigeria are completely unaware of these algorithms and technology, hence finds it difficult to understand the functioning of AI technology. Besides, many Nigerians tend to stay away from some complicated learning.

AI human interface

The challenge here is the shortage of data science skills within humans to get maximum output from artificial intelligence. There is a clear shortage of advanced skills that will interface between Nigerians and AI technology.

Decline of investment

Another challenge of artificial intelligence in Nigeria is that not all business owners or managers are willing to invest in it. The funds required to set up and implement Artificial Intelligence is very high, thus not every business owner or organization in Nigeria can invest in it.

Software malfunction

No technology of human is perfect. A case of software or hardware crash could be highly frustrating to researchers especially in Nigeria where storage and retrieval systems are poor. Hence, software tasks performed by humans can be difficult to trace. This kind of problem can be frustrating and discouraging.

Cultural and religious barriers

Cultural affiliation and religion bigotry are the two most common barriers to development in Nigeria; hence AI technology is not spared. Language might not be a much challenge to artificial intelligence progress in Nigeria, but persons of the same tribal affiliation are usually biased in working cooperatively with other tribes especially in knowledge acquisition. Similarly, there is so much religious intolerance that can seriously militate against AI technology in Nigeria.

Applications of artificial intelligence (AI) in Nigeria

It has been acknowledged of late that machines are performing many smarter activities using cognitive intelligence in contrast to natural intelligence (NI) displayed by humans and other animals. Most of the

developed nations have used artificial intelligence to grow every facet of their economy to become world power. Similarly, Artificial Intelligence can be used to play a major role in shaping the growth of core sectors in Nigerian economy. What is paramount is for Nigeria to quickly adopt the AI technology and commence experiments in many new things for a positive outcome and applications. Indeed, the applications of AI technology will be the finest technology to give a boost to core sectors and help Nigeria for a fastest digitization. Meanwhile, below are some of the applications of Artificial Intelligence.

Astronomy

It has been ascertained that the accuracy of artificial intelligence is immeasurable. Researchers have shown that calculations carried out by artificial intelligence can make more accurate predictions than humans concerning the long term stability of circumlunar planets. Hence, this technology can be used in understanding our entire universe and how it works. This implementation could give Nigeria the ability to make an attempt into space.

Construction

AI based applications can widely be used in the construction sectors of the Nigerian economy. AI could give the ideal design for buildings and recommend best safety features to make lives more secure. It understands complex languages and the ability to fixing them. This invariably means that AI technology can make engineers more productive and capable of delivering high quality work in the stipulated time frame. Besides, the technology can be useful in analyzing the work and process of the construction industry.

Agriculture

Agriculture is one of the core sectors of the Nigerian economy and efforts are been made to modify the cultivation process in order to yield more production. AI technology could be of immense help. It can understand a timely planting, getting predictions, using fertilizers, harvesting and climate conditions. Automation of farming activities is possible with the implementation of the AI technology and maximum output from agriculture can be achieved.

Sports

There has been a huge demand for AI technology in the sports industry as it possesses significant capabilities.

This technology can make sports more interesting and help sports men and women to go beyond the capacity to practice and deliver the best out of them. The implementation of this technology is certainly going to solve many major changes in the sports world of Nigeria by bringing true capacity and competition among sports men and women in the country.

Education

This is the most important sector in Nigeria that touches every life regardless of the age and location. AI technology can make education system smarter in Nigeria. This can be done by introducing self teaching classrooms at every level of the education institution. In this classroom, machines can be used to properly teach and answer on the spot questions in a universally accepted manner. Indeed, the 21st-century classrooms can be equipped with emerging technological solutions to deliver the best learning environment to students. It can also collaborate with virtual networks in order to make a perfect learning environment for students as well as teachers.

Healthcare

The AI technology can certainly cater for greater services in the healthcare sector of the Nigerian economy. The implementation of the AI technology in the healthcare sector can be used to understand medical data and reach the right conclusion without direct human input. It can be applied in diagnosis processes, treatment protocol development, drug development, personalized medicine, and patient monitoring and care.

Banking

Banks and other financial institutions all over the world have begun adopting the AI technology into their systems and Nigeria cannot be an exception. It can create a huge impact on the business and commerce of the banking industry in Nigeria. The implementation of the AI technology in the banking industries can be used in the payment efforts and reduced complex process through simple chatbots conversation to continue the operations without any hassles. The banking industries in Nigeria can also use the AI technology in the field of intelligent virtual assistant to improve their customer services.

Prospect of AI in the world of technology

Artificial intelligence (AI) has been a fascinating concept of science fiction for decades. This is a type of “deep

learning” that allows machines to process information for themselves on a very sophisticated level, allowing them to perform complex functions like facial recognition. Scientists have made breakthroughs in “machine learning,” using neural networks, which mimic the processes of real neurons. Many researchers thought the world has finally stabilized on the development of AI technology. However, “Big data” is speeding up the AI development process and hence creating more opportunities for future prospect. The followings are some prospect of AI technology.

Automated transportation

Self-driving cars already exist, though the vehicles are currently required to have a driver present at the wheel for safety. Despite these interesting developments, it will take a while for a public acceptance to bring automated cars into widespread use. But when Google began the testing of a self-driving car in 2012, the U.S. Department of Transportation was forced to release policies to control different levels of automation. It is been believed that other self driving transportation means like buses and train will soon emerge.

Cyborg technology

One of the main limitations of being human is simply our own bodies and brains. Researchers have thought that in the future, humans will be able to augment themselves with computers and enhance many of their own natural abilities. Though many of these possible cyborg enhancements would be added for convenience, others might serve for a more practical purpose. For instance, AI will soon be used for people with amputated limbs, as the brain will be able to communicate with a robotic limb in order to give patients more control. This kind of cyborg technology would significantly reduce the limitations that amputees deal with on a daily basis.

Taking over dangerous jobs

Some machines are already taking over some of the most hazardous jobs like bomb defusing. These machines aren't quite robots yet, but are technically drones, being used as the physical counterpart for defusing bombs, but requiring a human to control them, rather than using AI. Whatever their classification, they have been saving thousands of lives by taking over one of the most dangerous jobs in the world. As technology improves, we will likely see more AI integration to help these machines function. Other jobs are also being reconsidered for AI integration. Welding which is well known for producing toxic substances, intense heat, and

earsplitting noise will also be replaced by robots soon in the future.

Robot as friends

Presently most robots are still emotionless and it is difficult to picture a robot you could relate to emotionally. However, a company in Japan has made the first big steps toward a robot companion; one that can understand and feel emotions of human. Developed in 2014 and was called Pepper. About 1000 pieces of Pepper the companion robot were produced and all were sold in the year 2015. The robot was programmed to read human emotions, develop its own emotions, and help its human friends stay happy. More sophisticated friendly robots are sure to be developed soon.

Robot as medical doctors

Presently in the medical field, robots are assisted by humans to carry out surgeries or treat patients. However, it is been believed that autonomous surgical robots can be used in the future to perform surgeries on their own without the help of surgeons and medical doctors in the future can be a fully autonomous robots that can make their own decisions.

Improved house servants

For many persons, everyday life is a struggle, hence the high demand for house servants all over the world. As a result, hiring house servants to manage their care is becoming scarce and expensive. AI is at a stage where replacing this need isn't too far off. Home robots could soon replace house servants who will persons of needs with everyday tasks and allow them to stay comfortably in their homes for as long as possible. It will also be replicated to house guards robots who will perform the services of a gate man or security personnel at homes.

Conclusion

The ability to reason logically is an important aspect of intelligence and has always been a major focus of Artificial intelligence (AI) research. This focus has revolutionized Artificial intelligence in virtually every field it has touched. This revolutionizing ability of AI can be of immense benefits to the Nigerian economy and society if AI is deliberately given a priority to strive in the nation. Artificial intelligence (AI) makes it possible for machines to learn from experience, adjust to new inputs and perform human-like tasks. Most AI examples that is heard about today from chess-playing computers to self-driving

cars rely heavily on deep learning and natural language processing. Using this technology in Nigeria, computers can be trained to accomplish specific tasks by processing large amounts of data and recognizing patterns in the data.

Recommendations

Considering the importance, challenges and applications surrounding artificial intelligence in Nigeria, the following recommendations are given to enhance its development.

- (i) Innovative research and policy making are needed on the use of AI technology in workplace management, monitoring and hiring of personnel.
- (ii) There should be the development of standards to track the provenance of different AI development, and use of training data sets throughout its life cycle.
- (iii) There should be proper processes to AI mitigation and unbiased strategies beyond a narrowly technical approach.
- (iv) Companies, universities, conferences and other stakeholders in AI technology should ensure the participation of women and minority groups in AI research and development.
- (v) The AI industry should hire experts from disciplines beyond computer science and engineering and ensure they have good managers to AI development and usage.

REFERENCES

- Hampton SE, Strasser CA, Tewksbury JJ, Gram WK, Budden AE, Batcheller AL, Duke CS, Porter JH (2013). Big data and the future of ecology. *Frontiers in Ecology and the Environment*. 11 (3): 156–162. Retrieved at doi:10.1890/120103. ISSN 1540-9309.
- Huang T (2006). *AI Winter and its lessons*. Washington: History of Computing CSEP 590A.
- Kumar M (2018). Is human being the most intelligent and wise among living beings. *Research Gate*. Retrived from www.researchgate.net/post.
- Lohr S (2016). IBM is counting on its bet on watson, and paying big money for it. *New York: New York Times*.
- McCorduck P (2004). *Machines who think*. Artificial intelligence. Pp.340–400.
- McGuire B (2006). *History of AI applied to Chess*. Washington: History of Computing CSEP 590A.
- Smith C (2006). *The Turing Test*. Washington: History of Computing CSEP 590A.
- Yang G (2006). *Japan's fifth generation computer system project*. Washington: History of Computing CSEP 590A.