

Paradigm Study: Integration of Knowledge of UIN Maulana Malik Ibrahim Malang and UIN Sunan Gunung Djati Bandung

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Received: 13-04-2025

Revised: 24-05-2025

Accepted: 21-06-2025

KEYWORDS

Deep Learning;
Artificial Intelligence (AI);
Islamic Education

ABSTRACT

Technological developments, especially artificial intelligence (AI), have encouraged innovation in various fields, including education. This research aims to explore the application of deep learning in the learning process to increase the effectiveness and efficiency of education. Using a qualitative method based on literature studies, data is collected from relevant journals, articles, and books. The results show that deep learning, as a branch of AI, is able to overcome various complex problems, such as pattern analysis, learning personalization, and adaptive evaluation. The system utilizes a layered artificial neural network that mimics the work of the human brain to generate accurate predictions and intelligent solutions. In the context of Islamic education, the application of this technology can support the development of student competencies holistically, in line with religious values. The conclusion of this study confirms that the integration of deep learning in education not only improves the quality of learning, but also prepares students to face the challenges of the digital era.

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Introduction

In the era of globalization, including an era that cannot be separated from technology, for most people, especially those in urban areas and those in villages, it is inseparable from utilizing technology. The use of technology that is so widespread and abundant can be interpreted as a sign of progress from a country. The country can be called a developed country where the population in the use of technology is increasing every year and high technology is very broad, of course, technological progress cannot be stopped and inevitably every country will definitely follow the development of technology in the history of human development (Robby Darwis Nasution, 2017). Technology will continue to develop along with the development of science that is growing rapidly, especially in terms of technology and not spared in terms of education, will continue to develop and continue to move forward to educate the next generation. The benefits of technology include facilitating human activities, especially in work, so that with human technology it is helpful in doing every heavy or light job (Nasser et al., 2021)

Technological advances are a gift from Allah Swt. given to humans with the power of their intellect to create various goods and technologies that are useful to the masses with the permission of Allah Swt. the nature of reason is a special thing entrusted by the creator to humans, besides that human intellect has a better advantage than other creatures, like animals and others. So that a human being can make the most of his intellect, namely his intelligence to be used in full use and can be useful to many people from the time of the (T. M. Nasir et al., 2024)

In the verse of the Qur'an, Surah Al-Baqarah 2:164 that Allah SWT. created the heavens and the earth and their contents (Al-Qur'an, 2019) Especially the earth that needs and must be managed by humans by using reason accompanied by fear and gratitude to Allah Swt. for the abundance of such great grace, namely the gift of reason. So that humans can with their intellect manage natural resources on earth for the benefit of the people or the country.

According to Langgul, it can be said that human beings exist because of the existence of their intellect, where the intellect has an extraordinary potential to think and decide and think in making a choice or it can be said to take one decision in solving a series of problems that continue to hit one after another (Thosin Waskita et al., 2023). Therefore, it can be called the existence of a human being due to the determining factor of his sanity which is used properly and correctly, in fact all humans have the same intellect, but some humans deepen and direct their intellect potential in a direction that they are more inclined to like or also the level of human intelligence potential that is different from each other (Supriatna et al., 2023). Meanwhile, according to Arifudin, every individual has in him a potential that is brought from birth, and a human being optimizes what is in his potential, then he has known who he is (Rosmayati & Yulianti, 2022). It means that the progress or setback of a nation, group, and even a person's individual can be greatly influenced by the activities of human intelligence who are constantly making new breakthroughs, innovating, and making choices for more benefits.

Artificial intelligence (AI) has developed very rapidly in recent years. Complex problems that were previously difficult to overcome can now be solved faster and more efficiently thanks to the help of this technology. Because its capacity to learn and adapt is often equated with the neural network of the human brain, artificial intelligence has emerged as an interesting subject for research, discussion, and application. During President Jokowi's administration, the term artificial intelligence became more well-known and widely recognized, especially among intellectuals. This happened as a result of a proposal to utilize artificial intelligence as a replacement for civil servants from Echelon 3 and Echelon 4. Deep Learning and Machine Learning are two major subfields of artificial intelligence. However, the author will concentrate more on Deep Learning in this article to keep the conversation focused and manageable (Apriani, 2024). According to MF Ak, the opinion about artificial intelligence means a sign in the change of the times to the digital age, where technology plays a very important role in covering all layers of human life (Fatira et al., 2021).

Artificial Intelligence (AI) technology is becoming increasingly important in various fields, including education. Convenience and substantial curricular transformation, especially in the domains of technology, science, mathematics, and engineering, are two benefits of the presence of artificial intelligence in education. It is expected that AI will be able to transform the education industry and make it more sophisticated overall. The rapid development of AI technology is driven by the need for educators to improve the quality of education, not only in teaching methods but also in curriculum changes down to the smallest aspects (T. M. dkk Nasir, 2022). Therefore, AI is an important element in supporting the progress of the education sector. According to Ulfah, education in the era of disruption urgently needs technology to facilitate its implementation (Ulfah et al., 2022). Learning models and methods that utilize AI technology continue to evolve, from what was initially only considered fiction or imagination, to now a reality. Nowadays, advances in AI

technology have been proven to be widely applied, including in educational services that are increasingly used in daily activities, especially in the world of education. This is in line with Mayasari's opinion, which states that teachers in the modern era must be ready to keep up with technological developments, especially in the development of learning and teaching curricula. One branch of AI, Deep Learning, is the development of multi-layer neural networks, which are designed to solve complex tasks with high accuracy, such as object detection, speech recognition, language translation, and more (Raup et al., 2022).

Multilayer artificial neural networks are used in a learning process known as "deep learning" (Apriani, 2024). This artificial neural network is intended to mimic the intricate network of interconnected neurons that make up the human brain. Deep Learning, sometimes referred to as deep neural networks, deep structured learning, or hierarchical learning, processes data using multi-layered non-linear transformations. This approach that uses artificial neural networks can be seen as a blend of artificial intelligence and machine learning (Primartha, 2018).

Islamic education has a solid foundation, namely the Qur'an and Al-Hadith, which are the guidelines for life for Muslims (T. M. H. Nasir, 2023; Purnama et al., 2024; Robaeah et al., 2024). Moral In principle, these two sources encourage the ummah to stick to Islamic values. In addition, the Qur'an and Al-Hadith provide motivation for the ummah to continue to develop towards goodness, as well as to utilize natural resources and other potentials wisely. Thus, prosperity and peace are created, especially in the field of education. Due to the increasingly complicated obstacles that come with the changing times, the Prophet Muhammad (saw) also instructed Muslims to continue to pursue knowledge from birth to death. Therefore, a balance between worldly knowledge (including technology) and the hereafter is indispensable. According to Supriani, technological advances must be a spur for educators, especially in Islamic education, to be able to produce graduates who are superior, competitive, and provide great benefits to the wider community. What is deep learning? How does deep learning work? What are the types of deep learning? From the above problems, it is very interesting to discuss because education in the era of globalization is very in contact with technology, the application of technology in the world of education will make the quality of education, especially Islamic education, will be better.

Method

The study takes a qualitative approach and uses library research methods, which make use of a wide range of information and resources directly relevant to the subject being investigated or the location of the research. The main focus is on the subject that is analyzed based on its origin or source. Primary data, or information gathered directly from original or first-hand sources, is where the data used in this study comes from. Journals, books, newspapers, articles, theses, dissertations, and other materials related to the subject matter are some examples of these data sources (Kurnia et al., 2021). Once all the necessary data had been gathered, the researcher drew conclusions from a complex problem, which is often likened to a tangled thread.

Result and Discussion

In this study, the researcher will discuss Deep Learning in the context of learning and will not review in detail about Artificial Intelligence (AI) or Machine Learning (ML). The discussion related to this topic is as follows:

Definition of *Deep Learning*

Deep learning is a branch of artificial intelligence and machine learning that focuses on developing multi-layer neural networks. This technique is intended to accomplish tasks such as

object detection, speech recognition, language translation, and more with a high degree of accuracy. Deep learning, in contrast to conventional machine learning methods, can automatically represent data such as text, photos, or videos without requiring any special human knowledge or defining coding rules (Yousefi et al., 2019). *Deep Learning is a subfield of machine learning that uses Artificial Neural Networks (ANNs) to create algorithms that are modeled after the architecture of the human brain. This structure is made up of many nerve layers that work together to solve difficulties. Deep learning is basically a neural network with three or more layers of ANN. These networks can overcome a number of challenging problems for conventional machine learning algorithms to handle because they can learn and adapt from huge volumes of data.*

Chess game algorithms are one example of a Deep Learning application that is often seen. You may be questioning why even very good players find it so challenging to beat artificial intelligence (AI) in a chess game, especially when playing in a harsh setting. This happens as a result of the algorithm's ability to check for millions of moves from previous games. To help the computer choose the optimal course of action under certain circumstances, each step is carefully recorded and examined. It only takes a few seconds to complete this learning procedure. Thus, it can be claimed that Deep Learning is a model that can independently use its "brain" to learn and create its own computational techniques.

What is Deep Learning

The part of machine learning that incorporates deeper learning is called deep learning (Sharma & Chaudhary, 2021). The deep learning process is carried out in a network using classification through several layers on the network. This technology uses features such as mobile feature extraction plus to extract information better. However, the impact is a very high computing need. One of the advantages of deep learning is its ability to perform advanced feature extraction, which can be considered mature. Unlike traditional machine learning, deep learning consists of many layers of neural networks, which, while not yet fully equivalent to the human brain, have come close to the way humans think about processing data (Iglesias et al., 2021).

How Deep Learning Works

Meanwhile, Artificial Intelligence (AI) is a branch of science that seeks to imitate human intelligence through a logical approach using formal language (Prayogi & Nasrullah, 2024). One of the drawbacks of AI is its limited focus on formal language derived from specific dictionaries (Babys, 2024). From this AI emerged machine learning, which focuses more on data-driven learning. Unlike AI, which requires formal rule-based programming, machine learning is able to analyze patterns from more complex data. But as the problem becomes more complicated, machine learning still requires human involvement to process data and prepare certain procedures. This shortcoming is then enhanced by deep learning, which is able to process data through deeper and more sophisticated layers of computing.

Simply put, deep learning is a branch of machine learning that is specifically created to operate with highly complex layers of artificial neural networks. This process allows machines to learn autonomously without much human intervention. For example, in tasks such as image classification, deep learning can automatically determine objects in an image based on the data it learns, while machine learning still requires human intervention to determine certain parameters. Therefore, deep learning is a more advanced development of machine learning.

Deep Learning System

Deep Learning System (DLS) in the neural network model in training the model by utilizing distributed resources from a cluster (Yudistira, 2021). Developers have to make a lot of DLS decisions to efficiently process custom workloads in their environment. Graphics Processing Unit (GPU)-based deep learning will increase, data size will also increase, and DL neural network models combined with the bandwidth limitations that exist in cluster environments require DLS developers to be innovative in training high-quality models quickly. It is difficult to compare DLS virtually due to the extensive and distorted list of architectural features. This article aims to oversee the basic principles in the workplace when training neural networks in independent machine clusters by analyzing the common properties associated with deep training models and how these workloads can be developed in clusters to achieve collaborative training models. This study provides an overview of the various techniques used by contemporary DLS and discusses their application to training.

In forming a taxonomy (a branch of science that studies the classification of living things) of Deep Learning systems, DLS needs to be grouped into various technical categories (Langer et al., 2020). A different contribution to this research is to provide insight into the motivations and concepts behind design choices, thoroughly analyze the various depths of distributed learning approaches, and how they affect the model. These design choices form the taxonomy (a branch of science that studies the classification of living things) of the existing literature, with a special emphasis on various scales using a set of machines.

Some DLS differ significantly. This article discusses how to categorize, connect and use taxonomy (a branch of science that studies the classification of living things). This article provides a systematic overview of the various principles and techniques used in DLS. This will be achieved by creating taxonomy (a branch of science that studies the classification of living things) and sorting out the fundamental characteristics that have a major impact on the way DLS operates. Understanding the intuition and principles that underpin these characteristics allows the actual DLS to adapt as a specialization of more general concepts. The taxonomy of the study is divided into 4 parts: 1) communication patterns used to exchange parameters; 2) synchronous vs asynchronous; 3) optimization vs decentralized scheduling; and 4) model vs data parallelis (Shohibah et al., 2023).

Basic Concepts of Deep Learning (DL)

DL is a part of AI and is at the core of AI. DL is used to support computers in data usage. Deep Learning (DL) in machine learning allows computers to learn from experience and understand various concepts without the need for human operator intervention. Computers independently accumulate knowledge through experience and learn complex concepts gradually. This process is done by building complex concepts from simpler elements. The hierarchical structure formed in this process is made up of many layers, which are interconnected to support deeper learning (Dehghani & Yazdanparast, 2023).

Deep learning including google with Natural Language Processing, instant recommendations and personal systems are DL apps in the context of AI (Saxton & Guo, 2020). In the DL Pendidikan application: (1) Adaptive Assessment, (2) Prediction of learning achievement, (3) Student retention. To assess tasks and see the risk of failure can use pattern recognition with the DL app (Adriana, 2021). To meet the goals of Deep Learning (DL)-based learning, learning will use adaptive pathways, which allow students to adapt to the norms or standards that apply in their environment, as well as provide constant feedback for students and teachers. Students' strengths and weaknesses can be determined by predicting and analyzing their abilities with DL technology, which can also offer recommendations on how to perform better tests or activities.

Retention-related student enrollment (the amount of outstanding payments) will affect important metrics such as the school's reputation, progress, and financial performance. DL can detect at-risk students, especially if they face retention issues in payment management. Significant shifts in educational paradigms and trends have resulted from the use of Deep Learning techniques in the teaching and learning process. There is a decrease in student expectations for traditional learning techniques and conventional technology-based learning models. Personalized learning through adaptive learning systems has emerged as a rapidly evolving educational technology. Deep Learning and Big Data, deep learning combined with enormous computing power have paved the way for significant technological advancements. Technology evolves to anticipate, understand, and meet our unmet needs (Yousefi et al., 2019).

Types of Deep Learning

a. Feedforward Neural Network

The input layer of this kind of neural network controls the flow of information to the output layer. This type of neural network has only one layer of output, making it the most basic (I Putu Sutawinaya, 2017). Feedforward neural networks have one hidden layer or even no hidden layer at all. The input layer receives the weight assigned to the entire input, and this type of network is widely used in facial recognition applications using computer algorithms.

b. Convolutional Neural Network

One component of artificial neural networks (ANNs) with a more complex architectural structure is the convolutional neural network (CNN). CNN has many variants, including the famous VGG architecture. CNNs use a convolution layer and are known for their deep networks and have a smaller number of parameters. These networks can consist of multiple layers of convolution and are very effective in recognizing patterns and detecting different types of images.

c. Multilayer Perceptron

The purpose of this multilayer network is to categorize nonlinear data. Since each node in this network is completely connected, all components can communicate with each other. Speech recognition and machine learning systems make extensive use of these networks.

d. Sequence to Sequence Model

Typically, this model is created by combining two Recurrent Neural Networks (RNNs) (Zurayyah et al., 2023). The network uses encoding and decoding to process the data, with the encoder's handling inputs and decoders producing the outputs. Typically, the length of the text generated during the text processing process differs from the length of the text fed into this model.

Examples of Deep Learning

a. Robot

Recent developments in deep learning and artificial intelligence (AI) have been key drivers of robotics technology advancements (Hussain & Pangilinan, 2023; Mardikawati et al., 2023; Soori et al., 2023). For example, AI has allowed robots to "see" and react to their environment. This expands the range of activities that robots can perform, allowing them to travel in areas such as warehouse floors and handle uneven, brittle, or jumbled materials. Strawberry picking is a difficult activity for robots, but it is a simple task for people. As AI advances, robots' ability to adapt and perform these tasks will continue to evolve. With the advancement of this technology, in the future

we will see more robots that function as human assistants, with a primary focus on understanding and responding to their environment.

b. Agriculture

Deep learning has made many tasks in agriculture easier (Setiyono et al., 2023; Suparman et al., 2023). Farmers can now quickly identify weed crops from agricultural crops thanks to this technology. Because of these benefits, weeding machines can only apply herbicides to weeds, protecting other plants in the process. Computer vision and deep learning-powered agricultural machinery can even optimize individual crop yields in the field by using targeted applications such as herbicides, fertilizers, fungicides, insects, and other biological products. Additionally, deep learning can be used for a number of other agricultural tasks, including harvesting, irrigation, and fertilizing, which lowers the need for herbicides while increasing agricultural yields.

c. Healthcare

Due to the availability of high-quality data and the ability of convolutional neural networks to classify images, deep learning has shown impressive effectiveness in the field of medical imaging (Nugroho et al., 2022). Deep learning, for example, may be able to diagnose skin malignancies as accurately as a dermatologist. Deep learning techniques are used in other diagnostic applications, such as image analysis for retinal disorders and cancer. In addition, by predicting medical events using data from electronic medical records, deep learning makes a major contribution to improving the quality of health services.

Conclusion

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