



Artificial Intelligence in Business

Matthew N. O. Sadiku, Omobayode I. Fagbohunge, and Sarhan M. Musa

Roy G. Perry College of Engineering

Prairie View A&M University

Prairie View, TX, USA

ABSTRACT

Artificial intelligence (AI) is a field of computer science that is dedicated to developing software dealing with intelligent decisions, reasoning, and problem solving. Artificial intelligence is already part of our lives, slowly shaping our society and business. It is everywhere, in on your smartphones, laptops, and cars. AI can increase productivity, gain competitive advantage, compliment human intelligence. and reduce cost of operations. Businesses of all types and sizes are considering artificial intelligence to solve their problems. The scope of AI in business transformation is constantly growing. This paper provides an introduction on the applications of AI in business.

Key Words: Artificial Intelligence, Artificial Intelligence in Business, Automation.

1. INTRODUCTION

Artificial Intelligence may be regarded as any software program that depicts human intelligence and consequently has the ability to engage in a humanlike activity.

AI tools can enhance decision-making abilities, allowing enterprises to perform increasingly complex tasks. They are versatile tools that enable people to rethink how we integrate information, analyze data, and use the resulting insights to improve decision making.

Artificial intelligence (AI) is becoming commonplace in our daily lives. It is now a household name. Amazon's virtual assistant Alexa may soon be in every home in America. AI is already disrupting virtually every business process in every industry.

AI has become an important technology that supports daily social life and economic activities. In recent years, AI has attracted attention as a key for economic growth in developed countries such the United States and United Kingdom and developing countries such as China and India [1].

Artificial intelligence (AI) may be regarded as the intelligence that machines exhibit by imitating human behavior. It focuses on machine learning and enabling software to solve problems in a manner similar to human intelligence. For example, computers approve American Express purchases, diagnose faults for GE, and assign rooms for Holiday Inns. Voice recognition, computer vision, and robotics all employ AI [2].

2. OVERVIEW ON ARTIFICIAL INTELLIGENCE

Artificial intelligence (AI) is one of the most important global issues of the 21st century.

The modern field of artificial intelligence came into existence in 1956 when the term "artificial intelligence" (AI) was coined by John McCarthy. AI is the branch of computer science that deals with designing intelligent computer systems that mimic human intelligence. The ability of machines to process natural language, to learn, to plan makes it possible for new tasks to be performed by intelligent systems. The main purpose of AI is to mimic the cognitive function of human beings and perform activities that would typically be performed by a human being. Without being taught by human, machines use their own experience to solve a problem. Although the original vision for artificial intelligence

was to simulate human intelligence, research effort has gradually shifted to autonomous systems that compete with people.

AI is stand-alone independent electronic entity that functions much like human expert. Today, AI is integrated into our daily lives in several forms, such as personal assistants, automated mass transportation, aviation, computer gaming, facial recognition at passport control, voice recognition on virtual assistants, driverless cars, companion robots, etc. AI technologies are performing better and better at analyzing data [3,4].

An important feature of AI technology is that it can be added to existing technologies. AI has benefited many areas such as chemistry and medicine, where routine diagnoses can be initiated by AI-aided computers. It embraces a wide range of disciplines such as computer science, engineering, chemistry, biology, physics, astronomy, neuroscience, and social sciences.

AI is not a single technology but a range of computational models and algorithms. The major disciplines in AI include expert systems, fuzzy logic, and artificial neural networks (ANNs), machine learning, deep learning, natural language processing, computer vision, and robotics. These computer-based tools or technologies that have been used to achieve AI's goals are illustrated in Figure 1 [5] and explained as follows [6,7]:

- **Expert Systems:** An expert system (ES) (or knowledge-based system) essentially embodies the knowledge and reasoning of human experts. An ES enables computers to make decisions by interpreting data and selecting between alternatives just as a human expert would do. It uses a technique known as rule-based inference in which rules are used to process data. The main business application of AI is in expert systems, which assist human experts in solving difficult problems.
- **Neural Networks:** These computer programs identify objects or recognize patterns after having been trained. Artificial neural networks (ANNs) are parallel distributed systems consisting of processing units (neurons) that calculate some mathematical functions. The ANN model represents nonlinear relationships which are directly learned from the data being modeled. Neural networks are being explored for healthcare applications in imaging and diagnoses, risk analysis, lifestyle management and monitoring, health information management, and virtual health assistance.
- **Natural Language Processors:** For AI to be useful to us humans, it needs to be able to communicate with us in our language. Computer programs that translate or interpret language as it is spoken by normal people. NLP techniques extract information from unstructured data such as clinical notes to supplement and enrich structured medical data. NLP includes applications such as speech recognition, text analysis, translation and other goals related to language. There are two basic approaches to NLP: statistical and semantic [8]. NLP allows for intelligent search engines, helpful chatbots, and accessibility for people who are visually impaired.
- **Robots:** These are computer-based programmable machines that have physical manipulators and sensors. Robots have moved from science fiction to your local hospital. Today, robots perform vital functions in homes, industries, outer space, hospitals, and on military installations. In jobs with repetitive and monotonous functions they might even completely replace humans. Robotics and autonomous systems is regarded as the fourth industrial revolution.
- **Fuzzy Logic:** Reasoning based on imprecise or incomplete information in terms of a range of values rather than point estimates. Fuzzy logic deals with uncertainty in knowledge that simulates human reasoning in incomplete or fuzzy data. The fuzzy model is robust to parameter changes and tolerant to impression.
- **Machine Learning:** Algorithms to make predictions and interpret data and “learn”, without static program instructions. ML is a statistical technique for fitting models to data and training models with data. ML extracts features from input data by constructing analytical data algorithms and examines the features to create predictive models. The most common ML algorithms are supervised learning, unsupervised learning, reinforcement learning, and deep learning. ML algorithms are a good fit for anti-malware solutions because machine learning is well suited to solve 'fuzzy' problems.
- **Deep Learning:** A subset of machine learning built on a deep hierarchy of layers, with each layer solving different pieces of a complex problem. It aims at increasing the capacity of supervised and unsupervised learning algorithms for solving complex real-world problems by adding multiple processing layers. An

illustration of deep learning with two hidden layers is in Figure 2 [9]. The relationship between artificial intelligence, machine learning, and deep learning is shown in Figure 3 [10].

- **Data Mining:** This deals with the discovery of hidden patterns and new knowledge from large databases. Data mining exhibits a variety of algorithmic tools such as statistics, regression models, neural networks, fuzzy sets, and evolutionary models.

Each AI tool has its own advantages. Using a combination of these models, rather than a single model, is recommended. AI technologies are drastically influencing the retail industry and customer experience. Some types of artificial intelligence are predominant in business, while others are not. AI systems are designed to make decisions using real-time data. They have the ability to learn and adapt as they make decisions.

3. APPLICATIONS OF AI IN BUSINESS

AI adoption must be done with IT and the entire business working together. It does not generally replace human intelligence but serves as a supporting tool. AI seems destined to profoundly impact all aspects of business. It is widely used in business applications such as marketing, finance, accounting, human resources, supply chain, automation, data analytics, and natural language processing. Some of these are explained as follows [11-14]:

- **Marketing:** Marketing is one of the most notable areas of applications of AI. It may decide the next most effective marketing strategy. AI helps to develop marketing strategies and execute them. One way AI is marketing products is through chatbots, which can help solve problems, suggest products/services, and support sales. These AI chatbots can understand natural language. Retailers will be able to use AI technology to track shoppers in their stores and prevent theft. For example, Walmart has been using HANA to process high volume of transaction records.
- **Finance:** Investments in financial AI is growing as AI is increasingly being applied in financial institutions such as banks and insurance companies. Some banks use various AI tools to detect fraudulent activity. Loan applications are now being processed by software that can take into account a variety of factors such as creditworthiness, credit score and background check. Fraud detection represents another way AI is helpful in financial systems since AI can discern fraudulent activities.
- **Accounting:** AI is redefining the job descriptions of all sectors of professions. Accounting is a discipline that deals with recording, analyzing, summarizing, and reporting every business transaction. Accounting can be divided into several parts based on the activity of the organization: financial accounting, cost accounting, and management accounting. The AI technology is revolutionizing the accounting field and altering the roles of accountants [15].
- **Automation:** The future is gravitating towards automation with AI driving the force behind eliminating the human error from business operations. AI can help improve efficiency and save money by automating many tasks. Automation alleviates repetitive or dangerous tasks. The increasing penetration of AI and autonomous devices into many aspects of life is improving efficiency and response times. For example, robotic process automation can produce amazing results in accounting department. The Aptus eSales solution is designed to automate merchandising based on a predictive understanding of consumers. AI in accounting will reduce errors and free up professionals from repetitive tasks. Business communication with customers can also be automated through online chats, email marketing, and social media.
- **Human Resources:** AI can help human resources (HR) departments by making candidate screening and recruitment process easier. Chatbots can be used to answer many commonly asked questions about company mission, policies, and benefits. Vendors in the HR sector such as Entelo, Textio, Textkernel, and HiringSolved offer AI solutions that help recruiters to sort and match potential workers and use bots to schedule candidate

interviews. There is a notable impact from using AI in their staffing and talent management operations. AI can be a powerful tool in the hiring process.

- **Intelligent Supply Chain:** As consumer expectations continue to change, supply chains struggle to get the right products to customers, when and where they need them, without impacting margins. AI enables a self-learning and self-optimizing supply chain model with real-time insights to deliver precision.
- **Business Intelligence:** This may also be regarded as a collection of decision support technologies for the enterprise aimed at enabling professionals make better and faster decisions. The purpose of business intelligence (BI) is to support better business decision-making [16]. The use of AI and machine learning in BI is helping business enterprises to pull out actionable insights from complex data. Machine learning tools in business intelligence like the HANA will improve operational efficiency. BI chatbots are enabling decision making by analyzing business data. AI has merged with BI applications in manufacturing and industrial sectors. Figure 4 shows a typical healthcare business intelligence [17].

These are just some of the examples of AI applications in business. Other uses of AI in business include business analytics, chatbots and virtual assistance, fraud/crime detection, sales, R&D, e-commerce, advertising, customer service, talent selection and development, manufacturing, healthcare business, national security, criminal justice, logistics, transportation, and smart cities.

4. BENEFITS

Most business leaders are excited about incorporating AI into the company's business functions in order to start realizing its extraordinary benefits. Companies of all types and sizes are finding ways to use the right artificial intelligence technology to save time and money. In order to meet evolving customer expectations, companies are leveraging intelligent technologies to transform the way they operate.

The business benefits of artificial intelligence are many. By deploying the right AI technology, a business can enjoy the following benefits [18]:

- Save time and money by automating routine or repetitive processes
- Reduce operational costs, increase efficiency, boost operational efficiency, and improve customer experience
- Increase sales, detect fraud, improve human resources, and provide predictive analysis.
- Increase productivity and operational efficiencies and drive revenue growth
- Predict customer preferences and offer them better, personalized experience
- Increase revenue by identifying and maximizing sales opportunities
- Provide competitor advantage and empowers businesses to identify new opportunities
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- Enable companies to do things differently, enable better decision making, create more intelligent processes, and generate insights
- Augment rather than replace human capabilities
- Improve personalized services and predict customer needs with remarkable accuracy
- Enable businesses to work smarter and faster, doing more with less
- Help customer service reps provide better support.
- Personalize learning and improve accuracy of knowledge worker

AI-based devices like chatbots and virtual assistants are on the rise. Amazon's Alexa, Google's Home, Apple's Siri, and Microsoft's Cortana are all using AI-based algorithms to make life better.

5. CHALLENGES

Every new technology comes with risks. As an emerging technology, AI is changing at a fast pace and may present some unexpected challenges. Some of the challenges facing business AI include the following [19,20].

- *Lack of familiarity:* Most people in business are not very familiar with artificial intelligence, what it is and what it can do for them. In spite of this, AI is a technology that is transforming every walk of life.
- *Misunderstanding:* AI is misunderstood by many, especially by the mainstream media. The media has overpraised AI for techniques that are not new, and over-criticized it for overly optimistic promises.
- *Public Fear:* Everywhere you look, it seems AI is assisting and displacing human effort. There are plenty of doom and gloom predictions around AI. AI offers both promise and peril as it revolutionizes the workplace. There is a public fear around the world particularly in the business community that AI technology such as robots will overtake us and force humans into obsolescence. This fear is considered unfounded by some. For sure, AI is nowhere near replacing humans, but it will automate repetitive tasks and free us up to do more complex tasks.
- *Ethics:* There are currently no standards concerning data access, data sharing, or data protection. How should we promote data access? How do we guard against biased or unfair use of data in algorithms? What types of ethical principles are introduced through software programming? To answer these and related questions may require an international body that will set the standards by which ethical dilemmas are resolved. The IEEE Global Initiative has ethical guidelines for AI and autonomous systems.
- *Shortage of Workforce:* Due to the fast-growing AI market, people with AI skills are in short supply. To realize the full capacity of AI, we need the right people and the right culture. Right now, there are shortages of data scientists, computer scientists, engineers, and software developers because students are not receiving instruction in AI skills. More emphasis should be put on STEM subjects (science, technology, engineering and mathematics). Not generating more people with these capabilities will limit AI development.

While AI offers valuable benefits to businesses, implementation is usually expensive and time-consuming. Overall, the pros outweigh the cons.

6. CONCLUSION

Artificial intelligence is the capability of a machine to imitate intelligent behavior. It has played a significant role in transforming the way business operate today. AI may well be a revolution in human affairs because AI tools will have substantial impact on the general public in the foreseeable future. Companies around the globe are utilizing AI in order to thrive, provide better solutions to their clients, and create new sources of business value.

We are in an era of AI. It is evident that AI is driving powerful transformations across a variety of industries. Business managers may not fully understand AI technology, but they need understand what it can do for their business. They should learn to integrate AI technology into multiple aspects of their business. To get the most out of AI, data scientists must engage with business users to understand their needs and problems. More information on artificial intelligence in business can be found in the books in [21-35] and several other books in Amazon.com and books.google.com. One may also consult a related journal: *Artificial Intelligence Review*.

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ABOUT THE AUTHORS

Matthew N.O. Sadiku is a professor in the Department of Electrical and Computer Engineering at Prairie View A&M University, Prairie View, Texas. He is the author of several books and papers. His areas of research interests include computational electromagnetics and computer networks. He is a fellow of IEEE.

Omobayode I. Fagbohunbe is a doctoral student at Prairie View A&M University, Prairie View Texas. He holds a masters of science degree in control engineering from the University of Manchester, UK and a bachelor degree in electrical and electronics engineering from Obafemi Awolowo University, Nigeria. He is a graduate member of the IEEE. His current research interests are in data science, machine learning, and deep learning.

Sarhan M. Musa is a professor in the Department of Electrical and Computer Engineering at Prairie View A&M University, Texas. He has been the director of Prairie View Networking Academy, Texas, since 2004. He is an LTD Sprint and Boeing Welliver Fellow. His research interests include computer networks and computational electromagnetics.

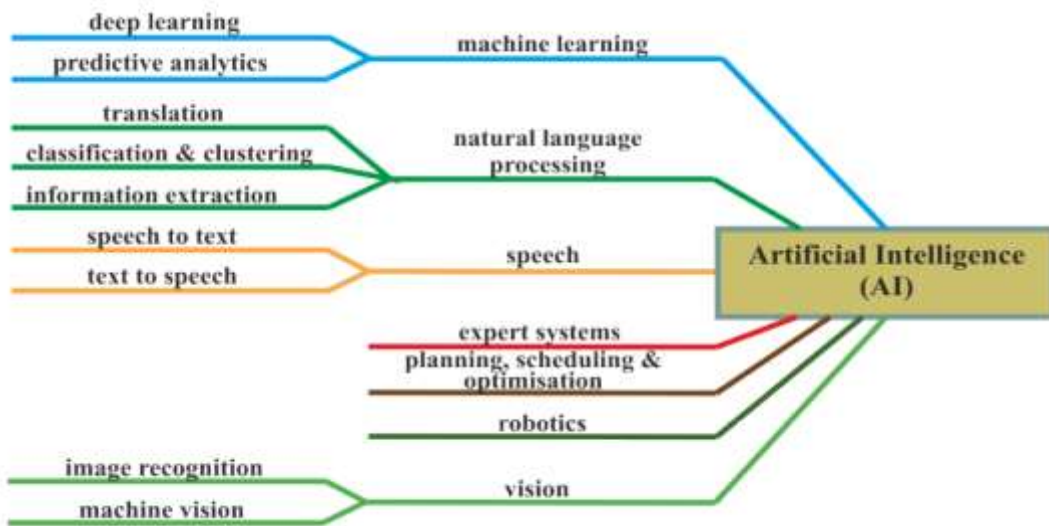


Figure 1 The relationship between AI, machine learning, and deep learning [10].

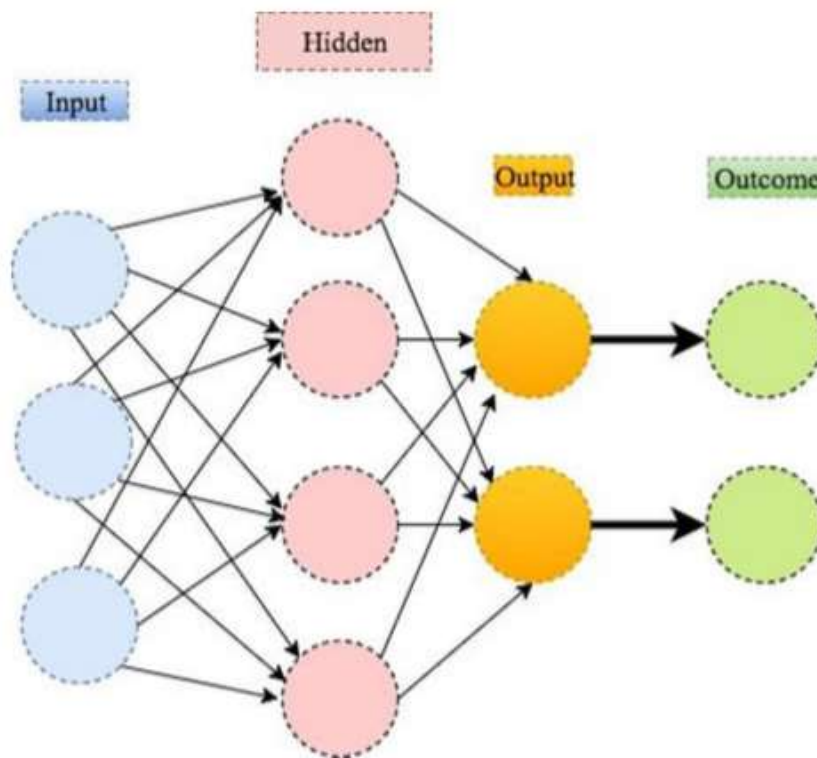


Figure 2 An illustration of deep learning with two hidden layers [9].

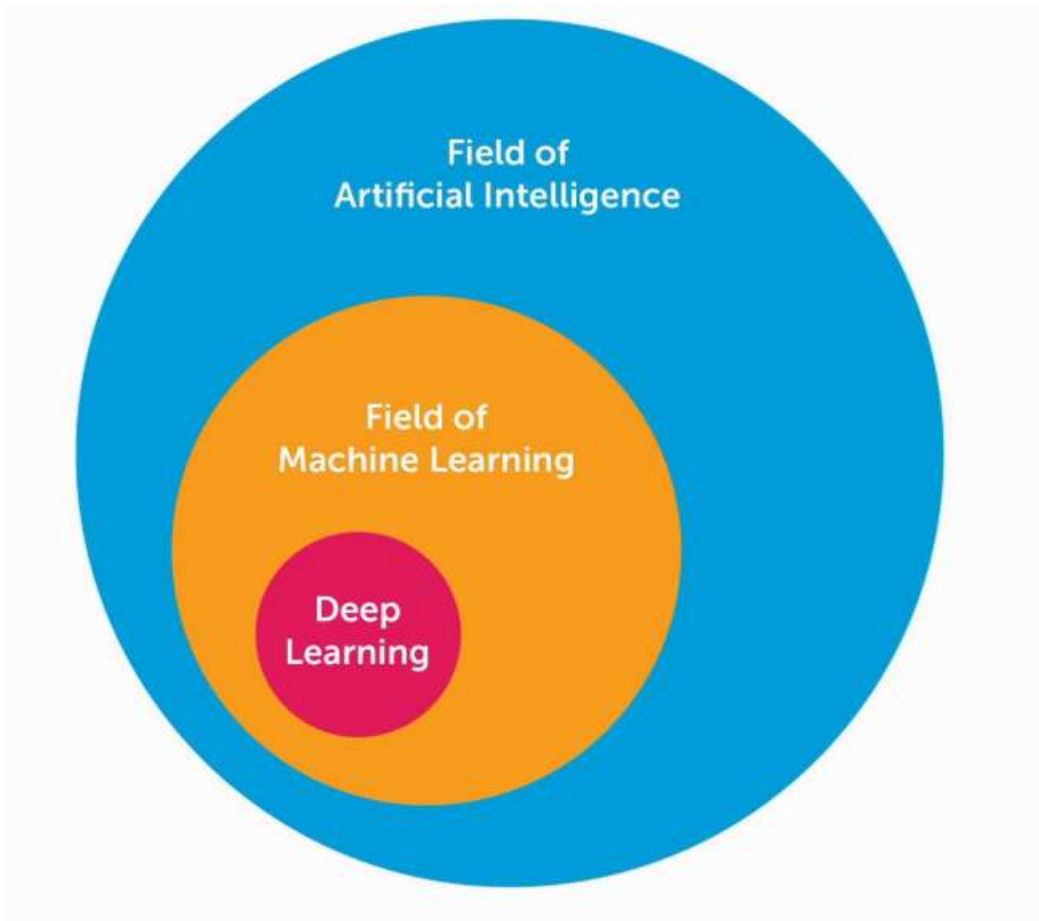


Figure 3 The relationship between AI, machine learning, and deep learning [10].



Figure 4 Healthcare business intelligence [17].