

TOWARDS APPLICABILITY OF VARIOUS MACHINE LEARNING APPLICATIONS IN BUSINESS MANAGEMENT, BANKING AND FINANCE

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ABSTRACT

AI has been used in the e-commerce and finance sectors in order to establish standardised, reliable product quality control techniques; seek for new means of reaching and servicing consumers while keeping cheap costs; and search for new ways of reaching customers and maintaining low costs. Because of this, we have been able to provide a higher level of service to our customers, manage our supply chain in a more effective manner, increase our operating efficiency, and reduce the size of our staff. Machine learning and deep learning are two of the most prominent applications of artificial intelligence, however there are a number of other techniques to apply AI. People, businesses, and governments all utilise these models to acquire insight and base their forecasts on data in order to improve their decision-making. Models based on machine learning are now being developed for the large amounts of data that are present in the food business. This article investigates the ways in which artificial intelligence and machine learning have been used in the fields of business and finance. Increasing sales, optimising profits, predicting sales, controlling stock, avoiding theft, and optimising returns on investments are

some of the most prevalent uses. Other prominent applications include preventing theft and maximizing returns on investments.

Keywords: Artificial Intelligence, Machine Learning, E-commerce, Finance, Prediction, Analysis

1. INTRODUCTION

It is often accepted that "artificial intelligence" (AI) refers to the development of machine systems that replicate human cognitive skills. These abilities include the capacity to understand, plan, and carry out activities using natural language [1]. The research and development of computer systems that are capable of performing activities that are often associated with human intellect, such as the perception of visual material, speech recognition, decision making, and language translation, is what is referred to as artificial intelligence (AI). A large portion of the work in the subfield of information technology known as artificial intelligence is carried out by computers that have been programmed to simulate human intelligence. John McCarthy, who is known as the "father of AI," described artificial intelligence as "the scientific and technical ability of developing intelligent computer programmes in particular." Machine learning and deep learning are two popular subfields in artificial intelligence. These models are used by individuals, corporations, and government organisations because of their capacity to learn from data and generate predictions. Researchers are now working on developing machine learning models that are capable of coping with the diverse nature and level of complexity of the data found in the food business [2], [3].

The primary objective of artificial intelligence (AI) in the e-commerce and financial sectors is to establish standardised and reliable product quality check procedures. This requirement has necessitated the deployment of AI in order to improve the customer experience, effectively manage the supply chain, increase operating efficiency, and reduce the size of the workforce. This article explores the applications of artificial intelligence and machine learning in the business world, namely in the areas of electronic commerce, corporate administration, and financial management. There are a great many key applications, but some of the most important ones include increasing sales, increasing profitability, anticipating sales, controlling inventories, avoiding theft, and detecting fraudulent investments.

2. Introduction to Machine Learning Techniques

In the field of artificial intelligence, the technique known as machine learning is by far the most important approach. The relationship between ML and AI is shown in the following figure

(Figure 1): In this section, we're going to take a look at some of the most common techniques to machine learning.

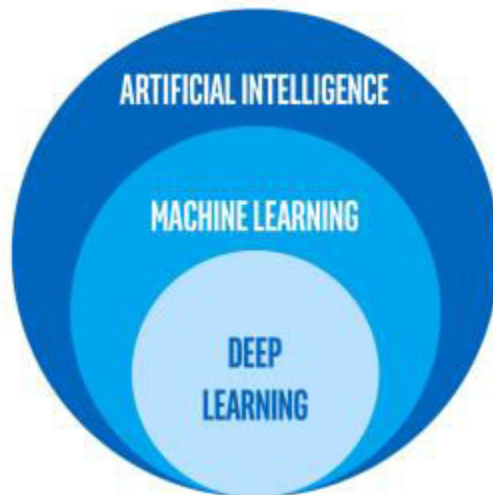


Figure 1: Relationship between Artificial Intelligence and Machine Learning

The relatively recent development of data mining known as machine learning (ML) [4] makes it possible for a computer programme to enhance the prediction accuracy it has over time without requiring any further hand-coding. Labeled training data is used by supervised learning methods for inference (classification, regression), whereas unlabeled data is used by unsupervised learning methods to uncover previously unseen patterns. Labeled data is used by supervised learning methods for inference (classification, regression) (clustering).

Classification is the process of reducing a given collection of instances (called "inputs") P to a set of unique characteristics (called "target attributes" or "labels") Q . These terms are used interchangeably throughout this article. Classification algorithms have several applications, some of which include decision trees, bayesian networks, nearest neighbour analysis, random forests, and support vector machines [5]. We are going to go fast through each of them. The learning algorithm provides the foundation upon which each strategy is built.

When it comes to addressing classification issues, it is general known that one of the simplest and most basic classifiers accessible to employ is something called a decision tree. The decision tree is a particular kind of classification graph in which occurrences are sorted according to the values of one or more characteristics. Each node in the tree represents a different instance of categorization, and each branch illustrates a different value that might be assigned to that node.

The procedure for making decisions starts at the root node, where, initially, instances are sorted according to the feature values they possess.

It is possible that, in certain circumstances, it will be challenging to anticipate the class label based on the collection of input qualities. In addition, class variables are not deterministic, even when utilising the given input attributes set values to match some of the features in the training data set. This is the case even if the input attributes set values have been provided. This is a distinct possibility due to the presence of certain noise in the data as well as some peculiar patterns that are neglected throughout the analysis process. Analysis of a person's regular daily activity might be used, for instance, to make a prognosis on the risk that they will develop heart disease.

Even if a person maintains a good diet and is active on a regular basis, they may still be at risk for having heart disease owing to other variables such as smoking, drinking, and maybe even heredity. These factors increase the likelihood of acquiring heart disease. If the model for diagnosing cardiac illness is based on well-known signs of the ailment, then the findings that it produces will not be accurate. Providing justification for duties such as these [6] is the primary focus of the Bayesian classifier, which does this by defining statistical links between the attribute collection and the class label.

An artificial neural network (ANN) is modelled after the neural networks found in animal brains in order to simulate the behaviour of a genuine neural network. The Artificial Neural Network (ANN) is also frequently referred to as a connectionist system since it is made up of linked nodes and directed linkages. The signal from one node is sent over a series of linked links, each of which has a particular amount of weight in the overall transmission. Before passing on a signal to the subsequent node in a network, a node in the network will do some type of processing on the signal.

The signal at the link between artificial neurons is simply a real number, and the output of each artificial neuron is determined by a non-linear function that is based on the sum of its inputs. This is a common implementation of an artificial neural network. The weights of the artificial neurons and the connections between them both have an effect on the intensity of the signal [7].

There are two distinct approaches to building a learning model when working with ML classification. This behaviour earns the model the nickname "eager learner" since it begins its learning process as soon as it has access to the training data. A alternative model takes into consideration all of the training examples, but it is only able to correctly categorise test cases if the attributes of the test cases are an exact match for any of the training instances. Pupils that don't put in much effort in their schoolwork are known as lazy students [8].

The NN classifier considers each individual sample to be a point located in a space that has d dimensions, where d is the total number of characteristics. It determines the distance between each data point in the training set and the given test case and quantifies that distance. If data point X is the focal point, then its k -Nearest Neighbors are the points that are immediately next to it.

The labelled classes of the data points that are immediately around the original data point are then utilised to assign it to a category. If the data point's neighbours have been labelled in more than one class, then the data point itself will be allocated to the class label that has the most labels. It is vital to arrive at an accurate determination of the values of k 's nearest neighbours. If k is set too low, it is possible that there will be misclassifications as a result of the presence of noise in the training data. However, if k is too big, the collection of data points that are considered to be the closest neighbours can contain data points that are located in a region that is physically far from the test characteristic. This raises the chance of misclassification.

To begin, in the context of supervised machine learning, the technique known as Random forest involves the construction of several decision trees via the use of random vectors in order to arrive at a conclusion. This method may be used for regression as well as classification assignments because to its adaptability. The random forest model's predictive accuracy improves as the number of trees used to generate the model rises. It is of the utmost importance to bear in mind that cultivating a forest is not the same as compiling a list of possibilities, sometimes known as "decision trees" [8].

In contrast to decision trees, random forests allow for the root node and the partitioning of the feature nodes to be determined by random chance. The many benefits that random forest categorization offers have led to its widespread use. This includes the fact that it may be used for both classification and regression analysis. If a sufficient number of trees are utilised, this strategy also has the advantage of reducing the likelihood of overfitting occurring. A random forest classifier has the additional capabilities of modelling categorical data and dealing with missing data.

In addition to its vast use in the medical and monetary fields, random forest classifiers have also found employment in e-commerce and the stock market in recent years. Random classifiers are put to use in order to differentiate between clients who are reliable and those who may attempt to scam a bank. In the field of medicine, Random Forest is used to problems such as determining the optimal mix of drugs and diagnosing illness on the basis of a patient's previous medical history. The Random Forest classifier is used to keep track of the performance of stocks and determine both losses and profits in the various financial markets. In the field of e-commerce,

Random Forest may be used to make estimates on the product recommendations of individual customers.

The Support Vector Machine is the most prevalent kind of supervised learning model, and it is used for sorting data (SVM). In the field of categorization, there is a great deal of interest and speculation around this topic. When instances from each category are plotted against one another in the vector space of the SVM, there is a distinct divide between the categories. By mapping each new sample into the vector space, we are able to classify them according to which side of the gap they fall on [9]. Accurate non-linear classification may be achieved with the help of a support vector machine when the kernel technique is used.

Clustering is the process of organising a collection of objects in such a way that the components of one group are more similar to those of another group. Clustering is sometimes referred to as cluster analysis. The occurrence of the phenomena known as clustering became more prevalent whenever there was a greater degree of resemblance between things that belonged to the same group and whenever there was a greater degree of contrast between things that belonged to different groups. Clustering is the fundamental building block of data mining, and it has numerous potential applications in a variety of domains, including but not limited to those of image processing, data compression, computer graphics, machine learning, and many more.

There are many different approaches to categorising things, and one of those approaches is called clustering. Clustering may be used in conjunction with other approaches, such as classification, segmentation, and partitioning. When compared to classification, cluster analysis may be thought of as an example of unsupervised learning. Cluster analysis, as opposed to classification, does not keep any of the previous information on the classes that are being analysed. Also, in classification, freshly obtained samples are organised into preexisting categories, but in cluster analysis, groups are proposed on the basis of data patterns [9]. Also, in cluster analysis, groupings are offered on the basis of the data patterns.

3. APPLICABILITY OF VARIOUS MACHINE LEARNING APPLICATIONS IN BUSINESS MANAGEMENT, BANKING AND FINANCE

Applications of Artificial Intelligence and Machine Learning in Business management, e-commerce and finance are discussed in this section. [10-15]

- **Chatbots**

The majority of online shops and financial institutions are now using chatbots in an effort to improve the overall pleasure and contentment of their customers. The makers of these chatbots

use AI and ML techniques in order to construct them. They have the ability to mimic human behaviour to some degree. These chatbots have the ability to better themselves by being exposed to fresh knowledge, and they may present customers with suggestions that are the best educated.

- **Image search**

The picture search feature on e-commerce websites is performed with the assistance of artificial intelligence. It bases its operations on several image processing methodologies. It contributes to the improvement of the quality of service provided to clients. Customers have the option to visually search for the item they need. You are free to skip the keyword search and get directly to the item you are looking for.

- **Handling Customer Data**

The field of electronic commerce has generated a vast amount of data throughout the years. Data relating to sales, human resources, marketing, and customer purchases may be analysed in the past by algorithms that have been taught using machine learning. This analytical result might be utilised to maximise profitability, sales, and resource use, among other possible outcomes. Because of this, businesses that specialise in e-commerce and financial technology may choose to tailor their products and services to a certain group of customers.

- **Recommendation Systems**

Predictions about the future may be made by machine learning algorithms if they are provided with previous data on the preferences and activities of customers. They are so skilled at reading their clients' thoughts that they are able to predict each and every purchase their customers make and direct them toward the products that are the greatest available options. Businesses in the e-commerce and banking industries have the potential to increase their income and the satisfaction of their customers with the assistance of this tool.

- **Inventory Management**

AI-powered algorithmic algorithms provide assistance to online retailers with inventory management. These algorithms analyse historical sales data in order to make forecasts about how that data will influence future sales. Managers that want to forecast demand and stock up in an appropriate manner might benefit from using this helpful tool.

- **Cybersecurity**

Machine learning algorithms may be used to discover possible weak areas in an e-commerce platform and suggest necessary remedies in order to maintain the platform's

high level of security. The identification and prevention of fraud is another area in which financial institutions may benefit from the use of machine learning algorithms.

- **CRM**

In the past, CRM depended on its employees to sift through vast amounts of data in order to better understand its customers and serve them. However, AI can now forecast which clients will buy and how to offer them in the most effective way. Applications that are powered by artificial intelligence might be utilised to assist in the identification of patterns and the organisation of future activities in light of the most current developments. Innovative customer relationship management (CRM) software may develop and improve over time with the assistance of machine learning algorithms.

- **Credit Scoring, Loan Underwriting, Portfolio management**

Machine learning may be used to teach algorithms how to classify past data and apply that knowledge to the task of making predictions about the future. The usage of these algorithms may prove to be quite beneficial in a variety of contexts, including credit scoring, loan underwriting, and portfolio management. It is of assistance to companies in lowering their risk.

- **Human Resources**

Engines based on artificial intelligence are able to select the ideal location to search for potential candidates. The adoption of NLP might also be beneficial while screening resumes in search of competent candidates. AI bots are often used these days to carry out the preliminary screening process for video interview applications. The time it takes to hire new employees might be cut down as a result of this. Unfortunately, the responsibilities of a human resources professional do not stop with the employment process. The level of devotion shown by workers is yet another essential aspect that may be improved by AI. The use of machine learning may lead to the development of innovative teaching strategies.

- **Sales**

The acquisition of new customers is always the initial stage in any sales strategy. AI is able to decide which client acquisition techniques would be the most helpful by using the goals of your organisation in conjunction with a range of data sources. Price optimization with the assistance of AI and ML is another method that may be used to maximise profits. The combination of artificial intelligence and machine learning has the potential to increase sales via improved product suggestions and market basket analysis.

4. CONCLUSION

In the e-commerce and financial sectors, artificial intelligence (AI) has been used to improve customer experience, efficient supply chain management, operational efficiency, and mate size, with the primary objectives of developing standardised, reliable product quality control methods and the pursuit of new channels of reaching and serving customers at low cost. AI has also been used to improve operational efficiency and mate size. Deep learning and machine learning are two popular subfields in artificial intelligence. These models are used by individuals, organisations, and government agencies alike to derive insights from data and make predictions based on that data. At this time, models based on machine learning are being created in order to handle the huge diversity and complexity of data pertaining to the food business. This article explores the potential applications of artificial intelligence (AI) and machine learning in the areas of internet commerce, corporate administration, and financial affairs. The most common applications are sales growth, maximisation of profits, accurate sales forecasting, control of inventories, protection against fraud and theft, and administration of investment portfolios.

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