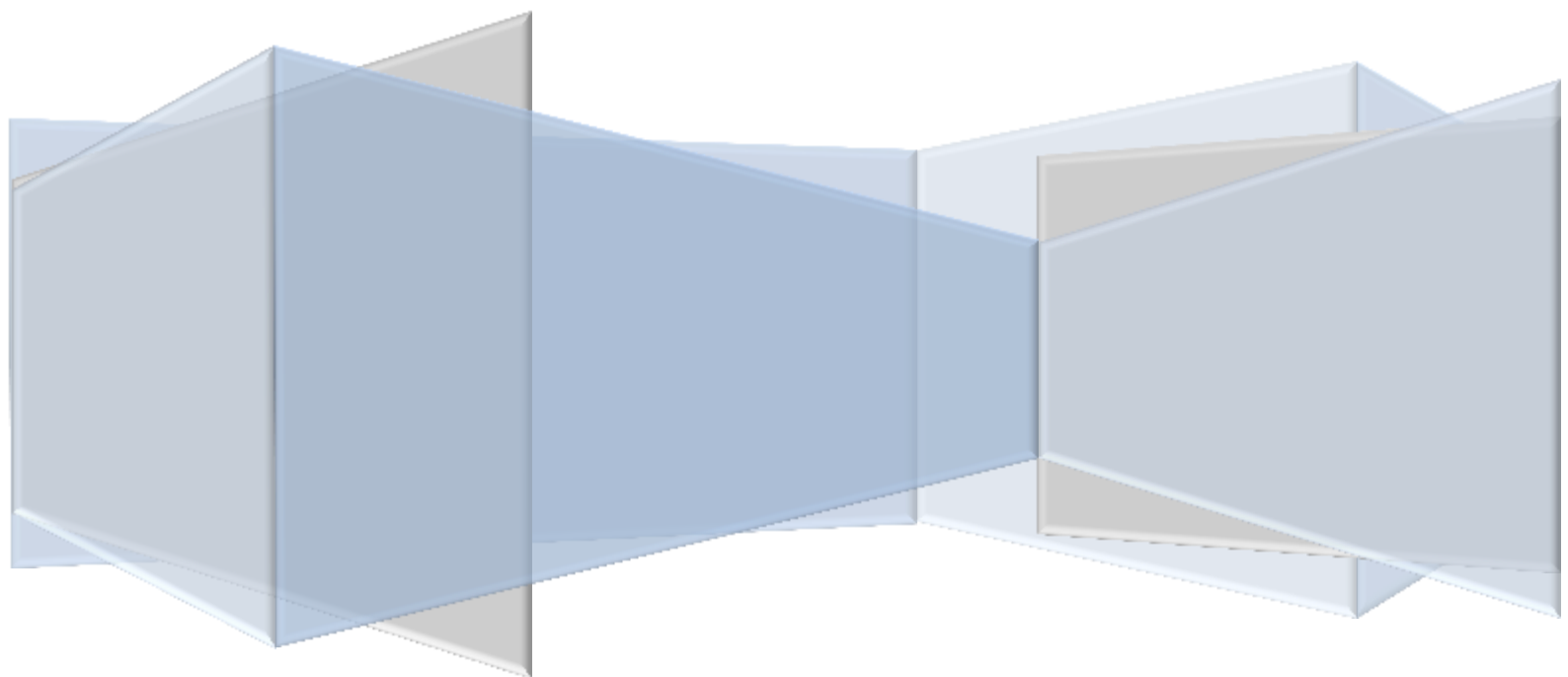


Introduction of Informatics

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Introduction and Executive Summary

Artificial intelligence has achieved the status as being a distinct technology that is a part of this digital age. AI is now the reason for several discussions, and articles, due to its potential impact on politics, economics, technology, science fiction, law, and even ethics.

The primary focus of this paper is to dwell on the deep learning techniques that are determined by artificial neural networks, which have the potential of bringing about 40 percent revenue that every analytical technique may offer. AI does not find value in the models that exist, but in the ability of the organization to utilize them effectively. Business leaders should focus more on the aspects related to their deployment in an organization.

Artificial Intelligence as Machine Learning

Artificial Intelligence can essentially be referred to as a machine being capable of carrying out cognitive functions that would normally be associated with human beings, such as comprehending, problem-solving, learning, as well as reasoning (Mckinsey n.d.). The primary goal of Artificial Intelligence, as a field, is to instill the intelligence possessed by a human being in a machine.

But, it is important to consider that such an event is likely to occur only when algorithms are designed to replicate the working of the human brain. Machine Learning could be considered as being a subset of AI, having emerged from it, and aims at enabling machines to attain human-like intelligence sans the need for explicitly being programmed to do so (Das et al. 2015).

Machine learning, in recent times, has been applied to a large collection of data sets for the purpose of realizing patterns and predictions by experience, not instruction (Mckinsey n.d.).

Three Major Types of Machine Learning

Machine learning is aimed at learning from an existing dataset, and several mathematicians have worked towards developing certain strategies or approaches to enabling machines to learn by experience (Dey A. 2016). The major types of machine learning include supervised learning, unsupervised learning, and reinforcement learning (Mckinsey n.d.).

Reinforcement learning is a category of machine learning that involves systems learning on the basis of trial and error, with rewards as well as punishments being given in the virtual world. An example of Reinforcement learning would be Google DeepMind which uses this type of machine learning to build systems that play certain games like Go, better than human experts (Chui M. 2018).

The primary goal of Reinforcement learning is to take decisions so that the final result is more positive. In this diagram below, reinforcement learning has been depicted. The AI agent is input the value i , state transition r , present state s , and the input function called I . These input values determine the behavior B , and the action a that fuels an outcome.

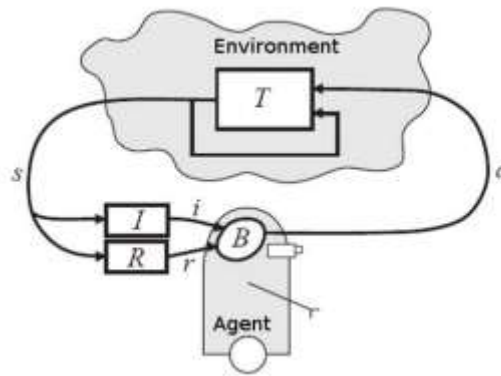


Figure 1: Sample Reinforcement Learning Model (Dey A. et al. 2016)

Supervised machine learning algorithms are those that require external assistance, where the dataset is separated into test and train dataset. The train dataset comprises the output variable that requires prediction or classification. Every algorithm learns patterns by the training dataset and applies them for the purpose of classification or prediction to the test dataset. Decision tree, Naive Bayes, and Support Vector Machine are three well-known algorithms that are used in supervised learning (Dey A., 2016).

The main goal of supervised learning is understanding how to map the input and output, when the supervisor provides the right values (Mohamed A. E. 2017). These values are provided by humans as feedback to enable learning of relationships (Mckinsey n.d.). Classification and regression are the two key types of supervised learning that exist (Mohamed A. E. 2017).

Unsupervised learning is when the algorithm is handed the task to understand the input data sans being provided an output variable. The primary goal in unsupervised learning is to determine patterns and provide a classification for the data, based on the dataset (Mckinsey n.d.).

The unsupervised learning algorithms make use of the features it learns from the dataset provided, after which it uses those learned features to classify the data it receives subsequently. It is primarily used for the purpose of feature reduction as well as clustering. The two primary algorithms that are used for unsupervised learning include K-means clustering, and principal component analysis (Dey A. 2016).

Deep Learning - Impact on The Business World

Deep learning is essentially a form of machine learning, wherein the data preprocessing required, is minimal and is utilized for handling a number of data resources. The traditional approaches to machine learning often fall short to deep learning, in terms of accuracy (Mckinsey n.d.).

Deep learning make use of artificial neural networks to deal with a number of problems in the real world, which is considered as being able to generate even 40 percent likely value that all analytics techniques are able to offer. Deep learning revolves around neurons, although artificial, which are used to develop a loose model of how neurons work in the brain together.

The word “deep” has been coined owing to the neural networks having a number of deep layers of simulated interconnected neurons. It is important to consider that prior to deep learning, only three or five layers existed, and possessed few neurons (Mckinsey 2017).

Deep learning is designed to offer much better results, in comparison to traditional techniques, such as voice recognition, facial recognition, and image classification (Mckinsey n.d.).

Convolutional Neural Networks (CNNs)

Convolutional neural networks are among the three types of neural networks, wherein the connections that exist among the neural layers are those that are derived by the way the animal visual cortex exists. The animal visual cortex is essentially the part of the brain that is responsible for processing images, and is appropriate for tasks that relate to visual perception (Mckinsey 2017).

This class of artificial neural networks is multi-layered, and possesses a distinct architecture that offers the ability to derive highly intricate aspects of the data at different layers to unravel the output. These artificial neural networks are mostly used when there exists a set of unstructured data, from which meaningful information needs to be derived (Mckinsey n.d.). The kind of data that convolutional neural networks deal with, is two-dimensional in nature. The design of such networks is a result of the Time-Delay Neural Networks that were designed for processing of speech as well as time sequence signals to decrease the computational complexity associated with the learning process (Han X. and Li Y. 2015).

Convolutional neural networks are considered the first method for deep learning that has proven effective in utilizing multi-layer hierarchical structure networks. In the context of data mining, convolutional neural networks may help in decreasing the trainable parameters associated with the networks, to enhance the issue with back propagation algorithms for forward propagation networks (Han X. and Li Y. 2015).

Business Models For Convolutional Neural Networks

Convolutional neural networks have proven to be highly useful in the diagnosis of medical conditions by examining reports, which includes imagery (Mckinsey n.d.). Studies have shown the effectiveness of these neural networks for diagnosing the H. pylori infection. A study has been conducted to draw a comparison on the diagnostic capability for H. pylori gastritis of these neural networks and endoscopists. The study showed that the diagnostic accuracy of convolutional neural networks was higher than that of endoscopists, and was almost at par with the accuracy level of experienced endoscopists (Shichijo S. et al. 2017).

Convolutional neural networks may also be used in determining ventures that facilitate joint marketing, such as by detecting a company logo on social media (Mckinsey n.d.). Deep CNNs have been successfully employed for deriving and filtering user content, such as images on social media, for the purpose of digital marketing. The CNNs have been used in such a way that they recognize the content of the images, and contribute to the metadata.

This further helps in determining the visual identity of the image, which can be used further for digital marketing (Tous R. et al. 2016).

Conclusions and Recommendations

Artificial intelligence is indeed one of the buzz technology terms in the market, and for a reason that is well-justified. The AI tools, such as convolutional neural networks and feed forward neural networks, have the ability to generate considerable high wealth, to the tune of 3.5 to 5.8 trillion dollars, spanning several business functions in 19 industries (Mckinsey 2017).

Also, it is necessary to consider that despite the potential benefit of AI on the economy, the usage of data needs to be regulated. Aspects such as privacy, and data security need to be kept in mind (Mckinsey 2017). Through the course of this paper, the primary focus has been on machine learning, and its role in Artificial Intelligence, as well as its impact on the real-world. Machine learning has enabled social network analysis, medical diagnosis, astronomical analysis, face recognition, handwriting recognition, and spam filtering, to mention a few (Das S. et al. 2015).

Keeping in mind the effects that AI has on multiple business domains, it is indeed a field of Computer Science that needs to be researched into further, so that society can reap the benefits to the fullest.

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