Artificial Intelligence Empowering the Digital World

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Abstract: The present time have seen a significant impact of AI in vivid fields such as industry, healthcare, industry, software development, cybernetics, arts, law, etc. however, the main idea behind integrating AI among all remained the same, one was to remove individual bias and the other is automation. In the pandemic times of Coronavirus Disease (COVID-19), the digitalization has taken a new turn not only in detection and diagnosis of the virus, but also towards economy management via several employment channels. Moving forward AI has improved the capabilities of cloud computing for handling enormously evolving data owing to vivid cloud services. This not only empowers the urban smart designs such as smart homes, intelligent transport system, healthcare wearables, but also remote health diagnosis. Despite of the fact that more than a decade has been celebrated by AI, it still lacks a single platform that provides all this information at one go. To address this research gap, the author has presented a concise review of current applications and futuristic possibilities offered and empowered by AI in revolutionizing the digital world.

Keywords: Artificial Intelligence, Digital World, Machine Learning, Deep Learning, Big Data, Machine Learning Models.

1. Introduction

The article deals with the advancements in the wide field of Artificial Intelligence (AI) that has revolutionized each and every aspect of human life [1, 2]. It is to be understood that the necessity for management of enormously generation data is the motivation behind advent of AI. AI offers numerous means and endless opportunities to explore and deal with the vivid types, volume and size of data [3]. In all this, never don't forget the cloud computing which is also one the major player to support and generate large data, also referred as Big Data in literature [4]. It servers to present online support for data access anywhere and anytime over the globe [5]. In present times, there is no machine that could challenge human intelligence, phenomenon's and principles bestowed in the laps of nature. This lead to the attraction of research community towards the nature to draw inspiration from the all-time, most powerful decision making and selection behavior. Thus, when trying to develop various autonomous machines, designs or system, the scientists move towards to mimic the intelligence behavior of humans or nature in the form of inspired algorithms.

2. Artificial Intelligence

AI is simply used to improve the capabilities of the existing technologies. This section provides valuable information for those who are interested in understanding AI, Machine Learning (ML), Deep Learning (DL), etc. Now, the question arise here is what comes under what, how to classify these techniques. To ease the reader understanding figure 1 is drawn to clear the picture in the minds of the professionals who are new in this field [6]. The deep learning is the concept that is highly specific and have achieved high performance accuracies in vivid fields such as face recognition [7], sentiment

analysis , text classification [8], Image classification [9], speech recognition [10], etc. When it comes to analyzing non-linear or complex data structures, the deep learning has proved to be very successful models. In medical technology, they have been used as explainable AI models to support visualization, interpretation, decision making, diagnosis with a very high level of accuracy [11–13]. As such, they offer applications in domains such as cyber security, biomedical signal classification aided with wearable technology [14], cancer detection, etc. that need nothing less than perfection.

In addition to machine learning, there is another sub-field of AI know as Swarm Intelligence (SI) which is based on the collective behavior of multiple objects to reach a near optimal solution [15]. Now, these objects may be humans, insects, animals, birds, natural phenomenon, etc. and are also terms as optimization techniques in the literature [16, 17] .

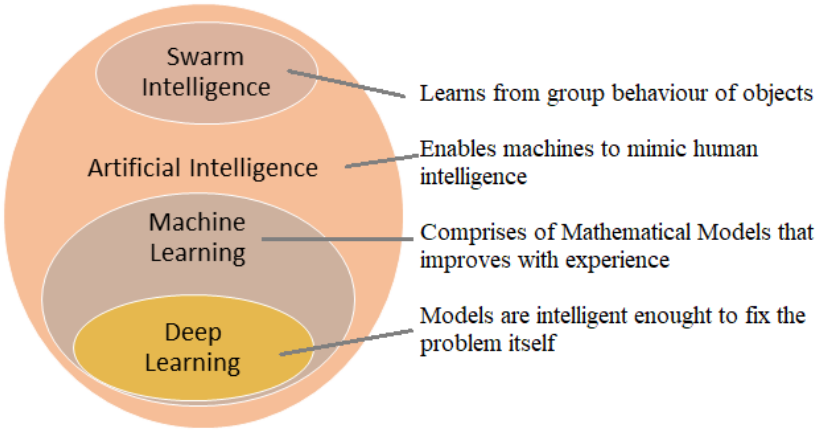

Figure 1. Sub-fields of AI

3. Prediction Models based on AI

The machine learning which comprises of a little broader area covering various learning models mainly used for the prediction, forecast and estimation based analysis. It is a subset that covers various mathematical models. What happens in the ML is that the designed models are made to learn from the historical data so that they could make intelligent decisions for the novel situations. This has been reflected by the articles published in the last two decades. The various ML modes that have been popularity used the research community are support vector machine (SVM), random forest (RF), gradient boosting machine (GBM), Decision Tree (DT), relevance vector machine (RVM), multi-variant adaptive regression spline (MARS), K-nearest neighbour (KNN), genetic programming (GP), regression model (RM), Gaussian process regression (GPR), extreme learning machine (ELM), artificial neural network (ANN), adaptive neuro fuzzy inference system (ANFIS), etc [18]. The highly specific DL models comprises of convolutional neural network (CNN), recurrent neural network (RNN), Long Short Term Memory (LSTM), Multilayer Perceptron (MLP), feed forward neural network (FFNN), feed forward back propagation neural network (FFBPNN), etc [19, 20]. Thus, there is endless list of such models that have been used in combination to other techniques to bring the existing capacities and performance to a next level. To show the popularity of various AI prediction models a graphical summary has been presented in figure 2. The percent value in the graph depicts the instances that the particular technique has been discussed in the present citation list.

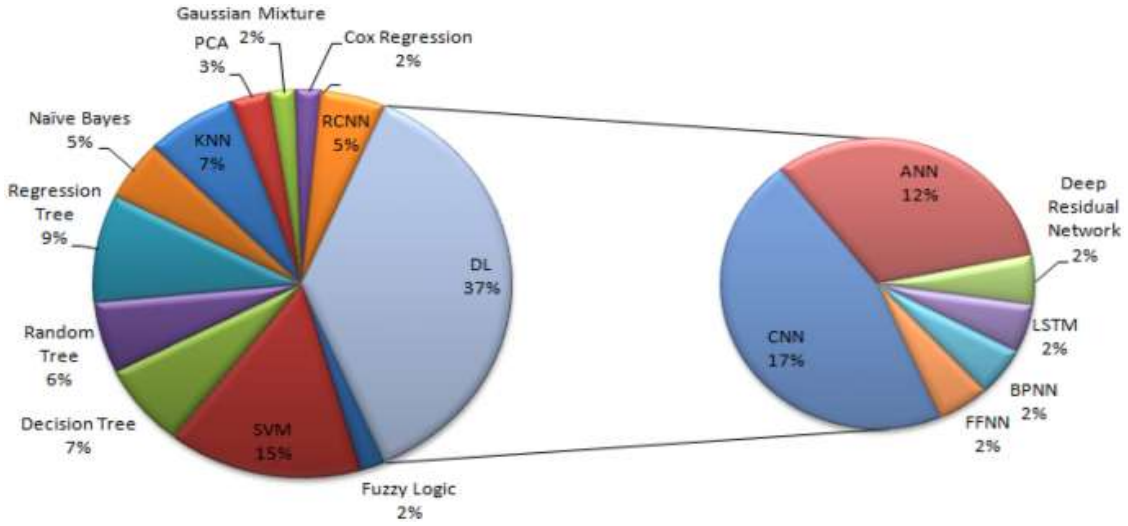

Figure 2 Artificial intelligence-based prediction models

4. Concise Discussion: How AI empowers Life

The digital life is expanding its dimensions far and wide, and AI is a great option for having a low risk decision making. Taking humans into the loop, it is important to understand that the main purpose of AI is to empower humans, let it be a customer support bot [21], or sophisticated surgery planning [22] in emergency situations. The main goal of AI is to help humans to perform an unbiased decision making to assure a personalized experience [23]. For example, some of applications and case studies where AI has empowered humans are discussed below.

1. Miniature and embedded sensor technology empowered by AI has allowed machines to communicate seamlessly even in highly complex environment. This is exemplified by the intelligent projects focusing on various natural disaster [24], forest fire, underwater, robotic based applications [25] used to ease life in remote areas.

2. An endless support of AI has been observed in healthcare informatics starting from initial diagnosis to complex surgery operations [26] even in COVID-19 times that calls for contact less communication [27]. This has been supported by numerous articles referring disease diagnosis such as diabetes [28, 29], cardiovascular disease, cancer, tuberculosis, liver disorder, muscular dystrophy, Alzheimer, hypertension, skin lesions, stroke, renal and kidney disease etc [30, 31].

3. The visualization powers and enriches any observation or the outcome. In this context, there are several image processing ideas that have been influenced by soft-computing applications based on AI. AI has empowered the image processing and led to informed prediction, diagnosis and detection of anomaly or abnormal behavior. This has been used not only in analyzing medical imaging (CT, ultra sounds, xray, MRI) [32, 33]but also forensics [34], military surveillance [35], motion detection, object tracking [36], etc.

4. In the past decade authentication, security, privacy has been linked with the biological measureable features based on iris, fingerprint, face, voice, palm, signature, gait etc [37]. However, at some point these unimodal biometric get challenged and therefore AI has been integrated to combine these unimodal biometrics to design a much secured authentication system as evident from various publications [38, 39].

5. As with every technology, when AI is used in negative sense against the society it has a very dark future. Despite of endless pros of AI in dealing with cybercrime, privacy and security via block chain technology, a recent trend of fake generation has been observed based on AI technology to breach the security, authentication.

6. Owing to its wonderful decision making and learning capabilities, it has shown implication in recommendation system, scientific writing [40], medical transcription, metaverse [41], etc. For instance, one might have come across numerous plagiarism removal tools and ChatGPT [40].

7. Among all these, the refinement of education system can never be neglected. The integration of latest technological advancements enables personalized pedagogy, illustrations, virtual hands on training, providing a low cost smart learning and training option [42].

In futuristic AI based applications, while developing autonomous disease detection, autonomous vehicle designs, autonomous security design, autonomous surveillance application, autonomous robotic designs, etc, one should understand that the machine will be able to govern their own actions and decisions. The concept of AI would make the machine to perceive, learn, decide and response according to its learning skills and as such humans will be highly depended on the system behaviour with no option left to consider it an anomaly.

5. Summary

In this article, author tried to draw the attention of the research community towards the important aspects of big data and AI in developing an impactful future in automation designs. The endless fields that have been influenced by AI have also been listed to widen the understanding of the readers. There is no doubt in the fact that big data has proved to be a raw material for the rise of AI. The flushing of large volumes of data of enormous size has led to the necessity to mimic human intelligence via computers. AI has significantly revolutions the current capabilities of information technology. However, it makes humans being highly dependent on the machines even to carry day to day task.

Contributions

M.P. and Dr. M.S. conceived the idea, manuscript was prepared by M.P. and refined by Dr. M.S. Both authors contributed equally towards the development of the article and such should be considered as first authors in future reference.

Conflict of Interests

Authors declare that they have no conflict of interests.

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