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APPLICATIONS OF MACHINE LEARNING IN SOFTWARE ENGINEERING

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ABSTRACT

Machine Learning, the branch of Artificial Intelligence, is an ability for machine to learn, unlearn and relearn things from human activities as well as environment and gives more relevant result or drives towards it. It is more feasible as well as cost effective because it nullifies the manual efforts. It became a well-known topic due to its usages and therefore many people are trying to learn it. This paper mainly focuses on a brief about the different types of applications in software engineering and challenges for development.

Keywords: Applications, Challenges, Machine learning

I. INTRODUCTION

The goal of learning for anything or anyone is to solve the problem from previous records or experiences. Learning for machines is nothing but to become more familiar with the thing in such a way that can help in many ways like weather prediction, recommendation based on the taste, deciding route in traffic, diagnosing samples with most accurate output, etc. Mainly a machine learning does the statistical analysis of data and extract and use most relevant data for solving the current situation or for prediction of future events. If we consider an example of data analysis from a warehouse which produce goods, the machine will take raw data as input and manipulate them such that the data will help the owner to understand as well as predict about profit making products among them so that the overall lose can be reduced. Today, machine learning has been used in many software applications so that applications will able to learn whenever the change occur. To achieve the goal of learning, it uses different methodologies like statistics analysis, pattern recognition, neural networks, artificial intelligence, signal processing, control, and data mining. However, there are many challenges as well as complexities for developing them.

II. APPLICATIONS IN SOFTWARE DEVELOPMENT

Today, Machine learning is used in wide range of applications with different methods based on the purpose of applications. Here, some of the applications and a brief about them are given below.

- **Automatic translation:** It is used to translate text documents from one language to other. But due to difference in grammar for different languages, it hard to make proper sentences which has similar meaning. Hence, here machine will take examples of sentences so that it can learn and use for similar type of sentences.

- **Adaptive website:** An adaptive website is a website that builds a model of user activity and modifies the information and/or presentation of information to the user in order to better address the user's needs. [1] An adaptive website works as per user requirement without externally given by user. It will display main and optimized on the basis of user interaction with the website and keep updating itself. It can use techniques like collaborative filtering method and statistical hypothesis testing method.

- **Bioinformatics:** Initially, it was a study of information processes in biotic system. Today, it is used for extracting all the information like DNA[2], RNA, proteins, biomolecular system and many other things. For achieving this, it uses image and signal processing from raw data for getting useful information.

- **Credit card fraud:** It is very broad ranging term in theft and fraud using cards like credit or debit card of some other person. It is an old problem and as time goes it comes up with some solutions but the solutions are not fully effective. Therefore, it keeps changing and tries to reduce the fraud. Some of the solutions are checking card by merchants, EMV, 3-D secure, strong authentication, point to point Encryption.

- **Collaborative filtering:** It uses the information such that it attracts the customers so that they will buy extra products.[3] It shows the relevant products to the one which costumer is currently buying. For example if a customer is buying a phone then this will show the case cover, head phones or screen guard for that phone.

- **Game Playing:** Machine learning is used at strategic game where it needs to learn from its previous experiences. One of the most common and famous game is chess where computer needs to learn and update its database with new effective moves played by opponent. Some other examples are fighting games, racing games, real-time simulations, etc.

- **Information Retrieval:** It is a method of retrieving an information from collection of information based on the given inputs. It is widely used at universities for retrieving records of students or other members and also at libraries for searching a book or journal or paper or any other material.

- **Natural Language Processing:** It is a field of computer science, artificial intelligence and computational linguistics concerned with the interactions between computer and human languages.[4] It can use at Text-To-speech conversion, Text simplification, language identification and text proofing.

- **Natural Language Understanding:** It is part of Natural Language Processing where it deals with understanding on comprehensions. It is hard for machine to divide and recognize them. Some of the applications based on this are news gathering, text categorization, voice-activation and large scale context-analysis.[5]

- **Sentiment analysis:** It uses to analyze the mood of the speaker or writer for a given topic. Also, it helps to understand person's overall behavior from his history at different web pages like social media. Based on the data it can predict and help a person for finding something that is matching to his taste.

- **Speech and hand writing recognition:** It is an application by which computer can interpret a source of text data which is written in different styles. It is difficult to recognize and understand hand writing of different people by computer. Therefore, machine will divide them in small parts or segments which further processed and then finds the most suitable word from those characters.

- **Stock market, equity market or share market:** It is a vast area of data where machine needs to learn about various situation so that it can help to understand or predict the situation of market. It helps at stock trading and many other investments like short selling, investment strategies, taxation, etc.

- **Web search engine:** It is a software that helps to search on WWW and based on our inputs it represents lines of matching results. The arrangement or sorting of the results is a big problem because different user wants different results for the same search. For handling this thing machining learning required.

- **Web Page Ranking:** It is the process of submitting a query to a search engine, which then finds web pages relevant to the query and which returns them in their order of relevance. [6] It checks various factors for that query like place, search history, etc. and then provide list of solutions in an order.

III. CHALLENGES

Just like other applications, Machine learning also has challenges which are more complex than other. One of the challenge is data manipulation. Different areas have different manipulation which is not in simple form. It will be in complex, non-linear structure for which it is difficult to create an updating model then ideal model. And most of the applications have similar type of data but their outputs are in different forms based on their use. Sometime updates may also increase risk by decreasing accuracy. Therefore, what to do at that time is again a big challenge for machine if human interaction will not there.

For an example of self-driven car where accuracy is at top. And for achieve that, machine needs to learn all kind of scenario but still it faces many challenges due to many factors like time, calculation speed, observation accuracy, etc.

IV. SUMMARY

Living things like humans and animals are not only in the world who can learn but machine can too. People have proved that machine may also have brains if we guide them properly and this paper provides examples of various types applications which are available now or in near future which shows that machine can also learn to become smarter.

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