

Machine Learning and Its Applications: A Survey

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Abstract— Machine learning is a broad concept derived from artificial intelligence. Machine learning techniques are used in many fields of application. Thus, every human being uses countless intelligent systems developed using machine learning techniques countless times in a single day. When you use a mobile phone, surf the Internet, buy something on the Internet, we are faced with many intelligent systems. The companies that develop technologies have spent considerable sums to develop smarter systems. Almost all machines will be smart in the future because smart systems make life easier. And of course, people love applications that simplify life. The use of Machine Learning alters the way people live and helps in many technical ways. Machine learning also helps in the situation that cannot be manipulated by humans.

Keywords-machine learning, supervised learning, Deep learning.

I. INTRODUCTION

Machine learning is a type of artificial intelligence (AI) that gives computers the ability to learn without being explicitly programmed. Machine learning focuses on the development of such computer programs that can change when new data is applied. Although it has gained considerable momentum in recent years, machine learning is almost as old as the history of the computer. Data generated from computers or sensors is processed and makes sense of this data from the use of the first computers. So, why is machine learning so popular in recent years? We have as much data as ever before and we need to make sense of it. Therefore, it's called BIG DATA. The researchers have been trying to develop artificial intelligence applications that cannot be detected as a computer by real users. Thus, the first artificial intelligence applications generated tried to pass the Turing test. The Turing test is a test of the ability of a machine to display intelligent behavior equivalent or identical to that of a human. After that, the researchers discovered that it was not so easy to create an artificial intelligence that functions in the same way as the human brain. As a result, AI has begun to use more specific application areas, such as face recognition, object recognition, and so on. Machine Learning is the most common technique for predicting the future or classifying information to help people make the right decisions. Machine learning algorithms are formed on instances or examples through which they draw from past experiences and also analyze historical data. As a result, as he trains on the examples, he is able to identify models to predict the future. Using Machine Learning, we can develop intelligent systems that can make decisions autonomously. These algorithms draw lessons from past instances of data through statistical analysis and filtering. Then, based on the acquired data, it provides us with the expected results. Data is the heart of the machine learning algorithm. Using historical data, we are able to create more data by forming these machine learning algorithms. For

example, generative adversary networks are an advanced machine learning concept that learns from the historical images by which they are able to generate more images. This also applies to the synthesis of speech and text. Machine learning has opened up a huge potential for IT applications. Machine learning combines computing, mathematics and statistics. Statistics are essential for drawing inferences from the data. Mathematics is useful for developing machine learning models, and finally, computing is used to implement an algorithm.

II. TYPE OF MACHINE LEARNING

Machine Learning Algorithms can be classified into 3 types as follows –

1. Supervised learning:- In Supervised Learning, the dataset on which we form our model is labeled. There is a clear and distinct mapping of inputs and outputs. Based on the input examples, the model is able to form in the instances. Spam filtering is an example of supervised learning. Based on the tagged data, the model is able to determine if the data is spam or not. It's a form of training easier. Spam filtering is an example of this type of machine learning. The supervised learning algorithms are formed using tagged examples, such as an entry in which the desired output is known. He then modifies the model accordingly. Using methods such as classification, regression, prediction and gradient enhancement, supervised learning uses models to predict label values on other unlabeled data. Supervised learning is used in applications where historical data can predict likely future events. For example, it can predict when credit card transactions may be fraudulent or the insurance customer may file a claim.
2. Unsupervised Learning:- In unsupervised learning, there are no labeled data. The algorithm identifies the models within the dataset and learns them. The algorithm groups the data in

different groups according to their density. By using it, one can visualize large data. Principal Component Analysis is an example of this type of machine learning algorithm. In addition, K-Means groups another type of unsupervised learning in which data is grouped into groups of the same order. Unsupervised learning is used against data without historical labels. The system is not told the "right answer". The algorithm must understand what is shown. The goal is to explore the data and find a structure inside. Unsupervised learning works well on transactional data. For example, it can identify customer segments with similar attributes that can then be treated in the same way in marketing campaigns. You can also search for the key attributes that separate customer segments from each other. Popular techniques include self-organizing maps, nearest neighbor mapping, grouping of k-means, and singular value decomposition. These algorithms are also used in applications like segment text topics, recommend elements, and identify outliers.

3. Semi supervised learning:-

Semi-supervised learning has same applications as supervised learning. But it uses both labeled and unlabeled data for training. It uses a small amount of labeled data with a large amount of unlabeled data (because unlabeled data is less expensive and requires less effort to acquire it) . classification, regression and prediction etc. use semi supervised learning algorithm. Semi-supervised learning is useful when the cost associated with labeling is too high to allow a fully labeled training process. Some early examples include identifying a person's face on a webcam.

4. Reinforcement Learning:-

Reinforcement learning is the most popular type of machine learning algorithm. It is used in various autonomous systems such as cars and industrial robotics. The goal of this algorithm is to achieve an objective in a dynamic environment. It can achieve this goal depending on several benefits provided by the system. It is mostly used in programming robots to perform autonomous actions. It is also used in the manufacture of autonomous smart cars. Consider the case of robotic navigation. In addition, the efficiency can be improved by a new experiment of the agent in its environment. This is the basic principle of reinforcement learning. There are similar action sequences in a reinforcement learning model. Reinforcement learning is commonly used for robotics, games and navigation. With reinforcement learning, the algorithm discovers by trial and error the actions that generate the greatest rewards. This type of learning has three main components: the agent (the learner or the decision maker), the environment (all interactions with the agent) and the actions (what the agent can do). The goal is for the agent to choose stocks that maximize the expected reward over a period of time. The agent will achieve his goal much faster by following a good policy. Reinforcement learning is therefore about learning the best policy.

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III. APPLICATIONS OF MACHINE LEARNING

1. Deep blue

Deep Blue is one of the most important milestones in the history of AI. Deep Blue was a chess computer developed by IBM. We know that the first system of chess on computer wins a match against a world champion in title. Deep Blue won their first match against world champion Garry Kasparov on February 10, 1996. However, Kasparov won three and drew five of the next five, beating Deep Blue 4-2. Deep Blue was then significantly improved and again played against Kasparov in May 1997. Deep Blue won the sixth game, winning the rematch of six games against 3½ to 2½, becoming the first computer system to defeat a world champion. title in a world match under standard chess tournament time checks. (Deep Blue was right.) Chess was thought to be a game of intelligence. Playing chess well is a very difficult task, even for humans. As a result, the first chess match won by a computer against a world champion was too much talked about in those years. AI applications focus on human support instead of defeating them. These types of applications use a machine learning technique to learn specific problems and help users. Every person in the world uses many applications that have been developed using machine learning in their daily lives, consciously or unconsciously.

2. Medical Diagnosis:-

ML provides methods, techniques and tools that can help solve diagnostic and prognostic problems in various medical fields. It is used to analyze the importance of clinical parameters and their combinations for prognosis, for example. prediction of disease progression, extraction of medical knowledge for results research, planning and support of therapy, and overall patient management. ML is also used for data analysis, such as detecting patterns in data by correctly processing imperfect data, interpreting continuous data used in the intensive care unit, and for smart alarms that enable monitoring. effective. It is argued that the successful implementation of money laundering methods can contribute to the integration of computer systems into the health environment, providing opportunities to facilitate and improve the work of medical experts and ultimately , improve the efficiency and quality of medical care. neural network algorithms. In medical diagnosis, the main interest is to establish the existence of a disease, followed by its precise identification. There is a separate category for each disease considered and a category for cases where no disease is present. Here, machine learning improves the accuracy of medical diagnosis by analyzing patient data. Measurements in these machine learning applications are usually the results of certain medical tests (eg, blood pressure, temperature and various blood tests) or medical diagnoses (eg, medical images), presence / absence / intensity of various symptoms and basic physical information on the subject. patient (age, sex, weight, etc.). On the basis of the results of these measurements, the doctors specify the disease from which the patient suffers.

3. Image Recognition:-

One of the most significant Machine Learning and artificial intelligence example is Image Recognition. Basically, it is an approach for identifying and detecting a feature or an object in the digital image. Moreover, this technique can be used for further analysis, such as pattern recognition, face detection, face recognition, optical character recognition, and many

more. Though several techniques are available, using a machine learning approach for image recognition is preferable. In a machine learning approach for image-recognition is involved extracting the key features from the image and therefore input these features to a machine learning mode.



Fig. 1: Image-Recognition

4. Sentiment Analysis:-

Sentiment analysis is another real-time machine learning application. It also refers to opinion mining, sentiment classification, etc. It's a process of determining the attitude or opinion of the speaker or the writer. In other words, it's the process of finding out the emotion from the text.

The main concern of sentiment analysis is "what other people think?" Assume that someone writes 'the movie is not so good.' To find out the actual thought or opinion from the text (is it good or bad) is the task of sentiment analysis. This sentiment analysis application can also apply to the further application such as in review based website, decision-making application.



Fig 2 : Sentiment-Analysis

5. Services of Social Media:

Social media is using the machine learning approach to create attractive and splendid features, i.e. people you may know, suggestion, react options for their users. These features are just an outcome of the machine learning technique. Do you ever think of how they use the machine learning approach to engage you in your social account? For example, Facebook continuously notices your activities like with whom you chat, your likes, workplace, study place. And machine learning always acts based on experience. So, Facebook gives you a suggestion based on your activities.



Fig3: Social-Media-Services

6. Age/Gender Identification:-

The recently forensic related task has become a hot research issue in the world of research. Many researchers are working for bringing an effective and efficient system to develop an enriched system. In this context, age or gender identification is an important task for many cases. Age or gender identification can be done using a machine learning and AI algorithm, i.e. using SVM classifier.

7. Language Identification:-

Language identification (Language Guessing) is the process of identifying the type of language. Apache Open NLP, Apache Tika is the language identifying software. There are several approaches to identify the language. Among these, the machine learning and artificial intelligence approach is efficient.

8. Robot Control:-

A machine learning algorithm is used in a variety of robot control system. For instance, recently, several types of research have been working to gain control over stable helicopter flight and helicopter aerobatics. In Darpa-sponsored competition, a robot driving for over one hundred miles within the desert was won by a robot that used machine learning to refine its ability to notice distant objects.

9. Virtual Personal Assistant:-

A virtual personal assistant is the advanced application of machine learning and artificial intelligence. In the machine learning technique, this system acts as follows: a machine-learning based system takes input, and processes the input and gives the resultant output. The machine learning approach is important as they act based on the experience. Different virtual personal assistants are smart speakers of Amazon Echo and Google Home, Mobile Apps of Google Allo.

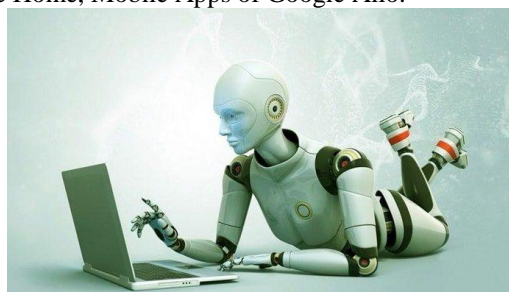


Fig. 4: Virtual-Personal-Assistant

10. ML in Army:-

AI and ML will benefit the military industry, both on the ground and on the battlefield. "AI / ML will have an impact on the defense industry in terms of capabilities because it

combines autonomy with computer vision, for example. The benefits in terms of efficiency will come from predictive analytics that can reduce costs in the long run, "said Jim Fitzgerald, Director of Aerospace and Manufacturing at Spark Cognition. Jim is a former Navy fighter pilot and graduate of Top Gun. "AI / ML codifies tribal knowledge; Instead of looking for a supervisor or a junior maintainer, the AI system can determine the best practice for solving a problem. "Military customers have the same requirements for predictive analytics as they do for other applications, the difference being that the stakes are higher in the military, with the focus on the fighter. On the battlefield, the AI will facilitate the absorption of all the data that the fighter faces during each mission.

As far as the battlefield is concerned, AI and ML allow more sensor fusion and data filtering, reducing the workload of operators, such as those monitoring UAV sensor data eight or ten hours per day. day, says Fitzgerald. AI will do the same for the fighter pilots who, with each new generation of fighter jets, have more and more information to assimilate in their cockpit. "Artificial intelligence will alleviate this burden by acting as a filter and providing the most relevant information to the pilot.

11. ML in Google maps and navigation:-

Google Maps is relaying information from bicycle sharing stations to global markets as of today, more than a year after the launch of the feature in New York. Last April, Google introduced the integration to City Bike in the Big Apple, showing travelers the nearest bike sharing station and indicating the number of bikes currently available. Now, the internet giant is extending integration to dozens of markets in the Americas, Asia and Europe, thanks to a new stream of real-time bike sharing data gleaned through a partnership with ITO World.

Starting this week, on Android and iOS, runners will be able to locate their nearest bike sharing station in 23 new cities. Others, however, will soon be added: Barcelona, Berlin, Budapest, Chicago, Dublin, Hamburg, Helsinki, Kaohsiung, London, Los Angeles, Lyon, Madrid, Mexico City, Montreal, New Taipei, Rio de Janeiro, San Bay Francisco, São Paulo, Toronto, Vienna, Warsaw and Zurich



Fig. 5: Extractions_MusomaTanzania

How it works? Riders search for a specific bike-share service in their city, for example "Santander cycle hire" in London, and Google Maps will show where the nearest stations are and whether there are any bikes available. Alternatively, it is also a useful tool to establish whether there are empty spaces available to drop off a bike.

Google introduces a new forecasting feature in Google Maps, which tells travelers how likely their bus, train, or subway ride will be. According to this screenshot, the data is based on crowd sourced ratings from other Google Map users.

In the past, Google has introduced similar predictive features that passively exploit data from Android devices with "location history" enabled on their phones. For example, Google Maps can predict the number of parking spaces at your destination, while Google Search can help you avoid queues by displaying the busiest times in millions of places. But this crowd forecasting feature is based entirely on active comments solicited by users during peak hours.

In another Google Maps update, Google is also introducing real-time traffic delays for buses, so those who use public transport always have up-to-date information about their bus's location and probable arrival depending on the traffic conditions.

IV. CONCLUSION

This developing technology introduces various new concepts that bring an evolution in human life. This can be very useful but sometimes also can be harmful for human life. Machine learning is a very useful concept because it is used to treat many diseases and allows humans to use a wide range of technologies. Human use to produce the machine with brain to ensure that work has been done with perfection and reduces the risk of errors

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