Machine Learning Applications: An Extensive Review

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Abstract

Machine learning is the rapidly growing technology in the field of almost all recent technologies in the market. As it is growing from day to day, the utilization of these techniques and algorithms are also increasing. These algorithms can be used for various applications like mines, health, oil and gas, natural calamities and other applications. In the current paper, the representation of machine learning, evolution of machine learning models, types of machine learning techniques and its applications are done. The set of areas where the machine learning techniques and algorithms are discussed in detail.

Keywords: *Machine learning, supervised learning, unsupervised learning, artificial intelligence, artificial neural networks*

1. Introduction

1.1. Evolution of Machine Learning

The machine learning techniques, algorithms and the other equipment that was available for the users to implement these techniques and obtain the good results were not available in the past years. The infrastructure that was available today in the market for utilizing these techniques was not available in those olden days. This is due to the utilization of thee techniques in these days increased a lot. The development of these techniques and algorithms had gained importance due to the implementation of pattern recognition and face detection. Several scientists from all over the world had worked seriously on these areas such that to observe whether these systems can work accurately for identifying the detection of face and others identification systems. The problems also include the accuracy level on which these systems are detecting or identifying the image features or the features on the face images.

The logic in utilizing these techniques in these detection or identification systems was to identify the exact match by applying the accurate algorithms and techniques. The focus was given on the utilization of iterative type of learning and processing. The machine son which these logics or algorithms are being used can be pruned to utility of adapting the changes in the data that was being supplying to these systems for further processing of the data. Depending on the data patterns and the formats of the data that was created early, the decisions and the processing of the current applications with data was being done. The machines are given that data of the previously performed applications and the similar sort of data for processing and the machine processes such old data and performs the similar sort of applications and similar sort of results may be achieved. The current day

development on these systems is being used in almost all the machines and its utility is being increasing from day to day.

Now a day the other area of the applications that the ML algorithms and techniques are being used are the mathematical calculations and mathematical applications such that to process them and calculate the values of the large equations. In some cases, it is very hard to type the large equations and also to process such big equations, in such cases this sort of techniques are more helpful for both typing and creating the equations and also trying to solve the equations and tries to find some values. In general, if a human being want to prepare and tries to solve such equations, it takes nearly one or two days. But, buy using these techniques, we can solve it by very few hours and in some cases, it is in very few minutes to seconds. These mathematical applications are being used today in bigdata analytics such that to identify and solve the problems of huge datasets in very seconds to very few minutes.

Some of the best examples for utilizing and processing of such type of applications includes the Google Car, Netflix and Amazon. These are some of the applications and machines that can be useful to the human beings in their day to day life. The performance of these devices will be directly related to the lifestyle and the time of the human lives. If some problem happens in the performance of the Google car, the loss of human lives will be more and it will upset the total development of the area or the research that was being going on in the current area of machine learning with these sorts of applications. These Ml algorithms and techniques can be combined with the processing of language based applications. The applications of these models or the techniques can be used for the applications like the Twitter and Facebook.

1.2. About Machine Learning

Machine learning is the recent trending and growing technology areas in the field of applying and equipping the computers to train and understand and process the data based on theses logics. The computers in those applications can be treated as models with a target of implementing some real world applications. The models considered in these applications are made use of various sets of databases, some new databases also considered in these applications. These systems adapts the current trending technologies and other models related data applications for processing and further processing to next level of the applications. The machines in which we try to implement and utilize the machine learning techniques and its related application logics in the computations to be performed in the next future systems. These models perform with the existing data and the data collected in live from various sources from the real time scenarios. This method of adapting the new techniques and new logics for solving the real time scenarios and real time situations will includes automation of systems and analytical building of the current developing systems. Several ML algorithms are intended to perform the same level of finding the solutions.

Machine learning makes the computers to process several advanced and latest technical processing such that to get the recent technological results. These ML algorithms always in the process of identifying the various available solutions and other set of hidden insights in order to find the good solution to the existing and the real world problems. These algorithms also used for identifying and finding the new insights for identifying and programming for the searching of the matching solutions such that to process the similar process in the current scenarios or the current problems. This technology is existing from so many years but the utilization of this technology by using computer was gaining importance and momentum from the last three or four years such that to get invention of new insights of results and also to encourage the artificial intelligent based machines. As we need to increase the utility of the artificial intelligent based machines and systems, the utility of these ML algorithms and other Ml techniques are getting famous from time to time.

Figure 1. Artificial Neural Network Model Example

Some of the important points to be noted for utilizing the Ml techniques in all day to day real time applications includes, the speed of computational process to be increased, the results should be more accurate and more efficient, recent growth of huge datasets, huge increase in the volumes of huge datasets, storage options for these huge datasets and the retrieval process of these huge databases. Now a days the, the industries are using these Ml techniques and other related logics such that to take decisions and also to implement the management of the industries also managing by them. The increment process and promotion policies in the industries are also to be implemented by these applications. All these Ml techniques and algorithms are used for developing the analytical models in the software and other related industries. The tasks include connections of the networks, trends of the datasets, patterns to be stored, processed and retrieving and also to improve or decrease the results. In all these applications, the intervention of the human beings is almost nil or very minimal in most of the cases.

2. Working of Machine Learning

In the olden days, the programmers or the people who are working on the computer machines will use the logic and supply the same logic to the machine to work on the basis of that particular logic. The performance of that particular machine will depend on the sound of that logic that particular user is supplying the machine work on that particular logic. But, in the current days of applying machine learning techniques to solve the current problems, the machines themselves are working on their own based on the previous data that we are supplying to the machine to take decisions. The machine will take the decisions based on the decisions that were taken earlier on the basis of the data available, in the same fashion, the machines will take the decision based on the current problems by previous data sets of solutions to the current problems.

The machine learning algorithms and techniques uses the hidden rules and answers for those set of questions to be raised for identifying the exact solutions to the existing problems can be considered for getting good answers. The machine tries to identify the better results from the existing data such that to provide the better results to the end users. The result always depends on the quality of the answers that were available in the database for the current problems. If the answers available in the database may not have the good answers for the current question in the existing databases, the results that we are expecting from the current system or the current application may not be sure for getting the exact answers or the correct answers.

The working of the current problems in the real time areas will try to solve the problems by using various set of applications like bigdata and other business applications. The only problem in these days for working on these machine learning applications includes the selection of right tool or the correct technique to select and apply on the problems to find the good set of results. The building of machine learning techniques such that to apply the current techniques on the problems for solving them in day to day life. Some of the famous techniques or the algorithms that can be sued for trying to solve solutions to the real time problems are as follows,

- Random forests
- Neural networks
- Discovery of sequence and associations
- Decision trees
- Mapping of nearest neighbor
- Supporting vector machines
- Boosting and bagging gradient
- Self organizing maps
- Multivariate adaptive regression
- SEO
- Analysis of principal components

As mentioned above, the secret to successfully harnessing the applications of ML lies in not just knowing the algorithms, but in pairing them accurately with the right tools and processes, which include,

- Data exploration followed by visualization of model results
- Overall data quality and management
- Easy model deployment to quickly get reliable and repeatable results
- Developing graphical user interface for creating process flows and building models
- Comparing various machine learning models and identifying the best
- Identify best performers through automated ensemble model evaluation
- Automated data-to-decision process

2.1. Supervised Learning

These algorithms are used to find the solutions, where the answer for the currently raised questions was already known to the users or the developers. This was useful in various scenarios for solving the real time scenarios. One example can be considered for better understanding of the current problem. If a problem having two options, false and true this will represent for the answers to display the users for every question or every problem that arises. The algorithm will implement the current project or the system and will give the output as either true or false. Then the output of that machine will be considered and that was compared with the actual output of the system that already existed for the purpose of training the system.

The machine will compare the current result with the existing result and the answer does not match, the machine will generate the false option and search for the better solution by the combination of other options available in the datasets. Several methods are available in our literature and our previous set of experiments and research for utilizing on these machine such that to get the good set of results. Some of these techniques are regression, classification, prediction and learning for the data to process can find the solutions. The current set of applications is used in those cases where the old data is available for finding the solutions to the current problems and to represent the good results. The events that can occur in future can also be predicted by using this technique based on the data that was available in the records of the data storage or at datasets.

Figure 2. Supervised Learning Models Example

2.2. Unsupervised Learning

The current method was the second type of learning in machine learning applications where the actual data on which we are working will not have any previous or history of data. The data available in the previous databases may not be used or may not provide the required results for the current problems. The main logic in the current mechanism was to identify the problems and analyze the data such that to identify the pattern structure and design for the datasets that was available in the market today. The data that was dependant and available in the transactions during the processing of such applications may best fit the data source or the datasets to process the current applications in unsupervised learning.

In the same way, the current unsupervised learning will always tries to identify the attributes and other related objects and rules such that to identify the exact and other related matching attributes. The structure may identify whether the similar or in some cases the matching attributes may be identified. Some of the important and highly used unsupervised learning techniques that were using today in the market and other applications are as follows,

- value decomposition
- self-organizing maps
- mapping of nearest neighbor
- k-means clustering

The users or the researchers who ever is using the unsupervised learning techniques for trying to find the solutions to the existing problems, the researchers can use the above set of techniques. Most of the researchers are using the k-nearest neighbour technique and k-means clustering algorithms.

2.3. Reinforcement Learning

The other set of new technique or the other learning method was the reinforcement algorithm. This algorithm or this technique is mainly used for other set of applications like robotic applications, gaming applications and other location and navigation applications. The major set of applications that were used in the current set of applications was the trial and error methods. The major type of parts that were used in the current reinforcement learning mechanism was consists of three major components. The three components were consists of the agent, the actions for that agent and the third component was the environment that was related with the current applications. The agent in the current systems can be considered as the decision taker or the decision maker where the

decisions can be finalized. The actions can be considered as the agents that with whom they will interact and the environment with which agent the actions can be taken.

3. Machine Learning Importance in Business and Applications

Some of the applications or the software's developed for the utilization of ML techniques include,

1. Mobile Development

Machine learning techniques and algorithms are using in the recent days for the development of mobile phones and smart mobile devices. The utilization of machine learning techniques in mobile phones is used for face recognition, thumb recognition, screen lock and further applications. These techniques are used for other set of applications like face recognition in lock screens, photo changes during the capturing photos through camera on the mobile phones etc. Several other applications also used in the mobile and smart phones such that to acquire the best and good performance of the systems. The auto processing of the data and the applications with which we are using today in the mobiles are being used in these mobile phones.

Figure 3. Machine Learning in Mobile Development

2. IT Staff

The Ml techniques are using widely in the software and other information technology related industries in the market today. The industries are using these ML techniques for processing the leave data of the employees, salary calculations and increment processing and promotion policies too implemented by these algorithms. The works also performed by various set of new techniques that were developed and placed in the machines that were being used in the organizations. As a result of these applications, the reduction of employees is going to be reduced in number in the coming future in almost all software and information technology related industries.

3. Testing

The other set of applications where these ML algorithms and techniques will be used in such a way to test the various set of applications. The testing of applications includes the testing of the performance of machine, the performance of a drug, the performance of an algorithm also to verify the performance of the developed both hardware and software systems. In some cases, it is not possible to implement or check the set of drugs on the

human beings as the laws may not allow performing such tests, in those cases these ML algorithms can give us an opportunity to verify and test the importance of the drug performance. In some other cases, the working behaviour of the hardware system or a machine performance cannot be tested as the loss of human lives may be there. Hence, it is not advisable to check the performance of the system with these set of ML techniques and algorithms.

4. Data Analysis

Most of the industries dealing with huge amounts of data have now recognized the value of machine learning. By gleaning hidden insights from this data, businesses can work more efficiently and can also gain a competitive edge. Besides, affordable and easy computational processing and cost-effective data storage options have made it feasible to develop models that quickly and accurately analyze huge chunks of complex data. Apart from enabling enterprises to identify trends and patters from diverse data sets, ML also enables businesses to automate analysis, which was traditionally done by humans. Using ML organizations can deliver personalized services and differentiated products that precisely cater to varying needs of the customers. Additionally, ML also helps companies to identify opportunities that can be profitable in the long run.
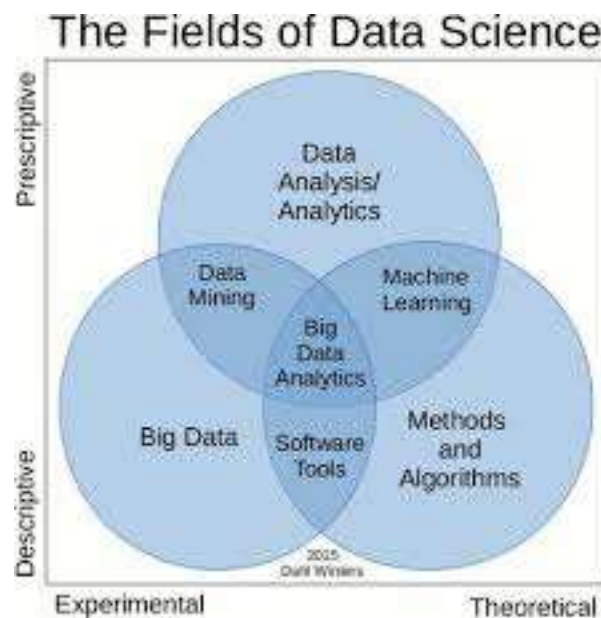

Figure 3. Example of Data Analytics

5. Financial Services

The machine learning algorithms and other techniques are used in various sectors of finance related sectors. The usage of these techniques and algorithms can suggest the users who were in business applications and also in the business applications. The applications in financial sector are always needs to be in analyzing the data and also to take the good decisions at right time. It is also required to analyze the data at right time such that to take the decisions for investing the money in various business sectors in the stock markets. It is very much helpful for the people to invest their money in good companies which will give them the good yields of money in return. It is also required for the usage of these techniques and algorithms such that to identify the fraud things in the markets. By analyzing the data and the applications that were related to the business applications, it is always required for us to analyze the data and to identify the frauds that were happening in the business markets today. It is also required to analyze the data for

predicting the frauds and data analysis of the financial transactions of the markets today. It is also required to identify the institutions and the industries which were prone to be attacked soon are also required.

6. Marketing and Sales

The other important area in the utilization of machine learning techniques and algorithms was to use in the area of marketing and sales analysis. The analysis of marketing data and sales was important to analyze such that to contact the customers based on their interest and can make the increase in their business related applications. For growing the business, it is always required to analyze the opinions of the people their interests. Based on the interests of the people, one company can analyze the data of the customers and can contact them with their data whenever there is an offer in the current market. Based on the data of the current purchases and previous purchases, the company people can contact the customers at the times of offers and recommend the customers for their next purchase. The current trend in the market is going on with the analyzing of the customers data based on their previous purchases and other interests. This method of increasing the customers based on the analysis of the data of customers based on their interests is the current trend of the business using today in the society today.

7. Government

The utilization of ML algorithms and techniques was needed mostly in government agencies. The government agencies will have the various type's large datasets and to process such large datasets, these algorithms are required. The beneficiaries from various group of people in the society are needed to be identified and the prevention steps needs to be taken to identify the actual customers rather than the misuse of the schemes that were being implementing by the government agencies. The governments always tries to identify the misuses and make the beneficiaries will get more advantage. In such cases, these techniques are more useful.

8. Healthcare

It is always better to identify the disease their related issues before going for the suffering from the diseases. As the diseases are identified earlier with the symptoms, the proper prevention steps and measures can be followed to avoid the damage that was going to be happening for these severe diseases. Some of the serious diseases may be related to brain diseases, kidney related issues, heart related issues and other serious issues. If we were successful in identifying these diseases in earlier times, the prevention of these diseases can be stopped and the cure for these diseases might be helpful and the life of the patients can be saved. By using the machine learning algorithms and other techniques, it is possible to avoid the diseases to go for serious situations.

9. Oil and Gas

This is the important area of research applications that were going on continuously till today for better results and for more materials like oil and gas. The utility of machine learning algorithms and techniques need to be used in this area was more important and it is needed. The ML techniques can be used for identifying the materials that were lying in the ground and also to identify the severity of these minerals from the ground. It is also required to find these data about minerals exactly such that the operational cost for identifying such systems may be reduced in most of the cases. The company's money cannot be wasted for unnecessarily going for digging the hole and drilling for identifying the presence of these oil and natural gas minerals in the underground layers of the earth.

4. Conclusions

In the current paper, we had discussed the details about the machine learning and its techniques, evolution of the machine learning and its other related areas. The various list of applications where the machine learning concepts and other algorithms can be used such that to get the good results and good yields from the markets and also good minerals from the earth. This machine learning techniques can be used for identifying the various diseases before they can be attacked or before to the occurring of the diseases. Hence, the detailed analysis of these applications was discussed in detail in the current paper.

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