A Review on Industrial Applications of Machine Learning

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Abstract

Machine learning is the rapidly growing technology in the field of almost all recent technologies in the market. With the successful application of machine learning in almost all the recent technologies, the growth in all the areas was splendid. The growth in those areas has crossed the expectations of the scientists. Recently, the application of machine learning in the areas of medicine and pharma is growing in the recent times in a rapid fast. In the current paper, the authors represent the seven applications or the areas in the field of medicine and pharma where the applications of the machine learning were implementing and good results are obtaining.

Keywords: Machine learning, medicine, pharma, supervised learning, unsupervised learning, artificial intelligence, artificial neural networks

1. Introduction

Machine learning is the recently developing technology in the field of computer science and its related areas [1]. Even though the existing of the machine learning and its techniques, algorithms was existing form so many years, now it is in the stage of growing from time to time. The current development in the area of the machine learning and its areas are becoming more famous and more important from day to day. Now a day, the machine learning algorithms and techniques were used for various applications like voice assistants, self-driving cars and other applications. As per the current day applications were being used by all the people who can use the applications from day to day life. As these applications are using more and more, the utility of these applications becomes faster and faster and also becoming smarter and smarter [2].

Some of the recently used applications that were making a great impact on the society and its applications are discussed in detail. Some of the applications are Google Maps which can be sued for identifying the traffic routes for various locations and the identifying the various available routes from unknown places to the known locations [3]. The other applications that are using some other applications include Amazon and Walmart. These applications are useful for almost all people in the society. The other applications are the social networking applications are Facebook. By using this application, the people from various locations can interact with each other. Several other applications are discussed in the next sections and discussed in detail.
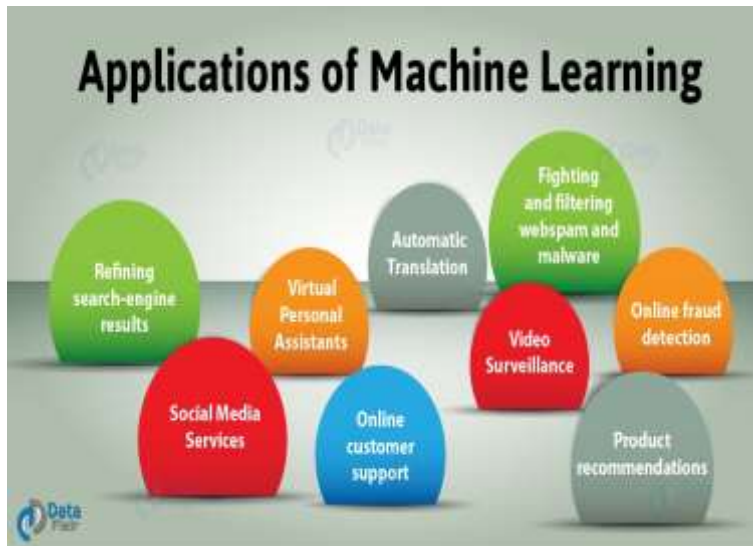
Figure 1. Applications of Machine Learning

The list of applications where the machine learning applications and other techniques are used in various areas. They are given in the following list as follows,

1. Machine Learning Applications in Healthcare

2. Machine Learning Applications in Finance

3. Machine Learning Applications in Retail

4. Machine Learning Applications in Travel

5. Machine Learning Applications in Media

2. Machine Learning Applications in Healthcare

In the recent years, the doctors and the researchers working in the area of medical research are seriously thinking about the finding of the behaviour of the drugs and its side effects. The researchers are also trying to find the number of days the people can live with the type of the disease a patient is getting. In other words, the doctors and researchers are trying to find the number of days a person can live with the type of the disease he or she was affected. Similarly, they are also trying to find the number of days that will take for a person to recover from such illness by using the available set of medicines or the available set of drugs in the research lab or in the real time scenarios. The medical systems which were developed on the basis of the previous data that was supplied from various et of patients previously, the number of tests and the type of tests required for the current disease also can be identified and suggested [4].

The type of tests required for such disease symptoms also can be decided by the medical system such that the cost of the medical tests for patients can be reduced in number. In the case of poor people, this system will be a good boon for them as they don't have enough money to perform all these tests and can spend the money for all those costly tests. The currently people facing the big problem in the area of medical research and medical tests was the cancer related tests and medicines. These items are the most costly items available for medical problems in the medical field today. In the coming days, theses radiologists can be replaced by the machine learning systems where the systems will be operated by the machine learning or the machine learning techniques in the system.

Several research organizations and research labs are working on the cancer and its related problems. McKinsey is one of the world famous research institutes which were working on the research of the cancer disease and its related issues. This institute statistics will give us an idea that the utilization of machine learning algorithms and techniques will provide lot revenue to the organization in the place using the human being for identification of the diseases. Similarly, the results that we can obtain from these machine learning based systems may give us the better decision making and better results compared with the human beings in these cases. The efficiency of the identification of cases had increase a lot by the implementation of machine learning techniques and algorithms in the cancer related research and diagnostic issues. This innovation and new technology is going help very huge people like the insurance company and insurers and the consumers.

The replacement of doctors and nurses completely may not be the correct solution because, the machines cannot replace the human beings completely. The utility of the machine learning algorithms was needed to be upgraded from time to time and increase futility was supported. The utility of these machine learning techniques can definitely enhance the health care area. The data that we were supplying to the machines might give the results more accurately and more precisely. The results we can expect from a machine learning system might give the better results as expected by the normal customers. The slogan that can be expected for working in the medical field with machine learning algorithms will be more data and more accurate results [5].

Figure 2. Health applications of Machine Learning

2.1. Drug Discovery/Manufacturing

The discovery or the preparation of drug for a particular disease was difficult to process and also difficult to implement the same process in real time environment. The cost that takes place for the discovery of a drug was very high and the testing of such drug was also very costly matter. The manufacturing of the drug is also similar lines of the cost and the performance of such drug and it side effects and other benefits of such drug was needed to be considered before it is going to be released or tested in the market. If the drug needs to be tested on human beings, its cost and side effects will be more costly and more problems to be faced by the company and also in some cases legal problems also may be faced by the organizations. The usage of machine learning and its techniques will process these things very fast and also it reduces the effects to be faced by the usage of such drugs.

Some of the Machine Learning Examples in Healthcare for Drug Discovery

- Pfizer is using IBM Watson on its immuno-oncology (a technique that uses body's immune system to help fight cancer) research. This technique and the technology was the most advanced and useful technology that can be used for the research of cancer cells or the cancer related symptoms for the presence of those cells in the patient's body. The usage of various drugs on the identified symptoms may give us various set of results for the future identification and utilization of these current drugs.

3. Machine Learning Applications in Finance

The utilization of machine learning applications and its algorithms in the field of finance was increasing from day to day. The increase of using financial services with the help of machine learning applications may increase the profits and other benefits. The utilization was increased a lot in these days and the financial services had increased a lot and help the other banks and other financial related institutions to grow their results and profits in their day to day business transactions. The utilization was increased a lot such that to provide the financial services like the loans, education loans, vehicle loans, credit cards etc. The justification of the customers to whom we can provide the customer services will decide the impact of such bank loans or the bank transactions. If the identification of the good customer was successful, then there is a guarantee of good profits to the bank and other financial organizations.

Figure 3. Machine Learning Applications Model in Finance

The utilization of machine learning algorithms will provide the services like the business transactions, share market predictions and other financial transactions. The growth and the downfall of share markets and other business applications will be considered as possible. The identification of frauds in the financial transactions was also so important and these tasks can be performed easily by using these machine learning techniques and algorithms. Some of those financial applications are as follows,

3.1. Machine Learning Examples in Finance for Fraud Detection

Now days, the fraudulent applications and transactions for the common people who are using the bank applications had grown a lot. With this act of fraud, so many innocent people are facing the financial problems and the people who faced these problems may not be aware of such problems. By the time the people came to know the transactions, the time and the details of such applications and transactions were completed with a lot of time. Hence, the people are getting so many difficulties with these fraud applications.

Some of the fraud people will call a customer and tell about the persons had got some prize money and they will provide their personal data to those fraud people for the prize money. By using this data, the fraud people will perform the financial transactions easily as regular customers and the data will not be reached to the actual customer within the span of time. By the time the actual customer will come to know about the transactions, the fraud details will be abolished. Hence, the identification of such fraud transactions and fraud call or the fraud messages should be identified and resolved. By using the machine learning techniques and algorithms, we can identify the fraud people or the fraud transactions without any delay or without any hassle.

Figure 4. Fraud Detection Model in Machine Learning Applications

In order to reduce the fraudulent transactions from the banks, all banks in the society are using the special techniques and special measures to protect and provide the best and more secured operations to its customers. The increase of online banking and other applications, the fraudulent transactions number had increased a lot. In order to reduce such transactions, several banks had tied up with various security organizations such that to provide security and safety to the financial transactions that were being performed by the customer's trough the website of the banks. One of the best example was the Citibank has tied up with the Portugal based security company Feedzai such that to provide the security to the customers data and other customer related transactions. This organization works on real time cases and alerts the customers and banks both at same time such that to alert for the fraudulent operations and other fraudulent transactions. The other organization which uses the services of machine learning and its related techniques such that to provide security for the customers and their other financial transactions and operations. PayPal is the other organization using the machine learning techniques such that to provide better service and security to the customers whoever is using this application and its related operations.

3.2. Bank Account Holder Targeting

The other important task where the machine learning techniques and algorithms can be used mostly was identifying the good customers for the banks to provide some benefits and other services to the customers. The banks are facing so many problems with the customers who are taking the loans and other facilities from the bank and they are not paying back or not admitting to the bank notices. With such type of customers, the banks are losing so much money of other customers and the banks are going to the stage of not

proving money back to other customers and also to maintain the enough money with the banks in liquid cash model. Hence, the identification of the good customers with good feedback of paying the loans back and the refund of the other loans provided to such customers was very important. The utilization of machine learning algorithms will easily find the customers with good feedback, good documentation and good bank paying habit. By using such filtering, the banks are somehow reduced the sanctioning of loans and other financial services to the people whose background due to financial transactions was not good.

4. Machine Learning Applications in Retail

The utilization of machine learning techniques in retail market is growing day by day. This process of utilization in retail market was so important to increase the number of customers. In general, most of the customers will go for purchasing products which were already used once and also with good feedback from others. In most of the cases, people try to go for the feedback from their friends and their relatives and colleagues. Hence, collecting the feedback from the customers and analyze their data and suggest for the other related people is always a good trend in business for developing the business related issues. By using the feedback from the customers, the company people will send the details regarding the business updates, new products released by the same company. The company people and the showrooms people will send the offers on the similar products from which the customers purchased earlier at various stores and similar type of articles from various locations.

Figure 5. Machine Learning Applications in Retail Market

Whenever people are purchasing some set of items from various stores, based on the data provided by the customers, machine learning algorithms will give the details of the customers who were interested in which items and the list of customers can be contacted at a time. This sort of process and technology will be utilized by almost all giant marketing organizations in the market today are Amazon, Walmart, Alibaba and Flip kart etc. Whenever some new product was launched or added in the same websites for the users to purchase, the same message and the product details will be recommended for the customers whoever interested earlier and who purchased such items earlier. Whenever the prices of such items were reduced due to any festivals or for any further reasons, the product details will be given or recommended to the same set of customers who were interested. By following these set of machine learning techniques, the business of these organizations are growing in large scale from time to time.

5. Machine Learning Applications in Travel

The utilization of machine learning applications and other set of machine learning algorithms in the area of travel and other travel related websites and other issues will help for better results and better business. The booking of tickets and booking of movie ticket and other services offered for travel related issues are the fast growing areas in the field of service sector. In service sector, occupying more number of customers for the vehicles to hire and also to offer better services for the tickets booking was latest trends in marketing. In most of the cases, the dynamic pricing was the major application where the companies or the organization which were using these set of applications will have the better utilization. When some festival or some other occasion is arriving, the companies will contact the customers who are planning to travel and based on the search of the customers, the price of such routes will be adjusted dynamically. Based on the routes traffic and the number of customers utilizing and searching the same route s will have the high demand and this demand will be identified and the prices will be increase accordingly. In the same way, the routes where the customers number is very less and number is very small, in such routes the special offers and price rates were reduced such that to increase the business and increase the number o customers in the same routes.

The utilization of such techniques in the travel operators like Uber will give more profits to the company. The best example is that on the busy routes, the price of the routes will be increased dynamically based on the traffic. In the same way in the off times or the much number of customers are not available, in such cases the prices will be slashed by the machines itself. No intervention of the persons is required for the processing of such applications. If no occupancy is there in some specific routes, in order to increase the business in such routes, the free travel for the customers will also be provided during some festivals or some other occasions such that to increase the number of customers in the same route and also to increase the business. The Uber Company is having more patent rights and more research work was being done on this area of travel and utilizing the best resources available for the end customers. Some of the other companies or the industries where the machine learning techniques and algorithms are being used for the travel support includes lyft, expedia and tripadvisor. In India some other industries like the Ola is utilizing this sort of techniques and algorithms for increasing their business in terms of increasing the number of seats to be occupied and more income to be generated.
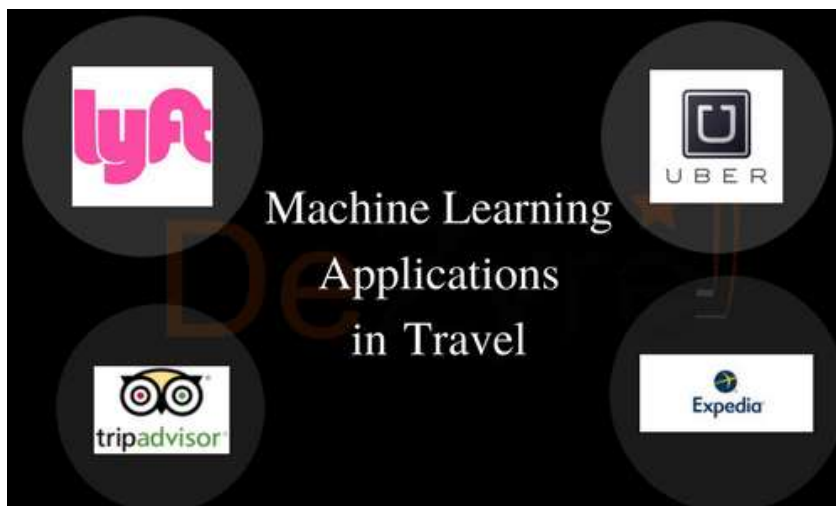

Figure 6. Machine Learning Application in Travel

6. Machine Learning Applications in Social Media

The usage of machine learning algorithms and techniques in the areas of social media had increased a lot. This area of work was growing from day to day to next level of operations. Some of the famous social networking websites using the machine learning techniques and algorithms are Facebook, Twitter and linkedin *etc*. The major work in the area of social media was suggesting the friends in the websites by knowing the common friends and other related points. Reminding the users with their birthdays, friends birthdays and how many times you had logged in and what sort of data you had searched *etc.*, will be possible. The utility of these techniques will give the friends who have their own occasions and other related points and issues.

The other set of applications are suggesting the customers with their interest in searching. Some research websites are becoming famous by day to day such that to provide the recent research related issued day by day. Displaying them for each author wise was more specific and more useful for researchers and scientists who were working on the same set of applications and other related areas. The number of citations that were taken place for each article also was being displayed in such websites and applications. Suggesting the friends with same interests, same research interest, same food habits and other set of applications can also be viewed in these applications.

Figure 7. Machine Learning Applications in Social Media Example

By observing the friends with similar tastes and ideas on various issues, the machine learning algorithms and techniques will suggest the users for making good decisions for purchasing, suggesting friends and sharing of their locations where some interested events are being taken place.

7. Conclusions

In the current paper, the importance machine learning and its techniques and algorithms were discussed in detail. The usage of machine learning in various applications and their behaviour was discussed in detail. The various applications machine learning in medicine, healthcare, drugs manufacturing and their testing was discussed in detail. The utility of these techniques in travel, social media and other applications were discussed and given in detail.

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