

How Machine Learning Inspire Major Change in Technology In The Near Future

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Abstract: About 20 years back, internet emerged as a great change across the globe and has been ruling the planet since then by making things easier for the people. In the same role we will see machine intelligence over the coming decades. What is the unique, remarkable, self-learning and unpredictable decision making object which is capable of taking unique and apt decisions accord to the situation? It is the human brain. Though there are other brainy species as well, we as humans richly gifted with self-awareness, language, abstract thought, mathematical capability, art, technology, science and so on. The most important aspect is that it is capable of taking decisions on its own without any fixed criteria. Most of the machines which work today depend on software which is fixed with certain algorithms which states clearly what the machine need to do at a particular point and a situation. The machine just follows the instructions of the code and executes them. Till date by using this principle, the technology improved a lot. It led to many innovations which made many things possible which we thought were impossible before. But now there came a stage where things need to get improved further to a next stage for which programming things out is a lengthy and not a good option as we cannot program certain things. We need that technology which can learn things by itself and not confiding on the code for everything. In other words, we need technology which works like a human brain in taking decisions and putting them into action. The technology which the world is trying to improve for this purpose is machine learning. In this paper, it is proposed how machine learning can bring about a major change in technology which in turn helps improving many areas of the world.

Keywords- Machine Intelligence, Self-learning, Algorithm

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I. INTRODUCTION

Learning and decision making problems are at the core level of argument in many metiers of the world. So scientists initiated machine learning as the widely used concept in solving this problem. Machine learning is the science which gets computers to act without being programmed explicitly. It is the subject which teaches machines to observe and notice different patterns and to adapt to new circumstances. To understand machine learning more precisely, Samuel claimed back in 1950's that he wrote a checkers playing program. And Arthur Samuel himself wasn't a good player of checkers. He then programmed it to play 1000's of games against itself. And by observing what board positions lead to losses and what board positions lead to winning, the program learns over time what are good and bad positions. And the incredible result was that the checkers playing program learnt the game so better that it was able to play checkers better than Arthur Samuel.

The more subjective definition of machine learning given by Tom Mitchell says that, "a computer program is said to gain knowledge from the experience E, with respect to some task T, and performance measure P, if its performance on T as measured by P ameliorates with experience E". Taking this into context, in the checkers game example the experience E would be the program playing 1000's of times against itself. The task T would be playing checkers game. And the performance P would be the probability of winning the game with next opponent. Another example can be the email program which observes which emails you do or do not mark as spam which can be the experience E through which the program learns to filter mails. Accordingly it performs its task T of segregating mails into spam and non-spam and improves its performance through E.

We call these machines intelligent as learning is done by them and deep understanding of things helps in taking optimized decisions using an efficient methodology. Machine learning can bring about a really big change as it is introducing many new algorithms which assist machine to understand the virtual environment

and based on its understanding it will take particular decision instead of building big machines with so much explicit programming. It has become a real challenge for scientists and developers to design an algorithm and use it in the most appropriate manner. Many algorithms are coming into light for different types of machines and there are several types of these learning algorithms. The two major types are supervised and unsupervised learning.

II. SUPERVISED LEARNING

Let us start with an example. Let us say you want to predict the land prices. And we have the data of price of the land with respect to size and let's say you plotted the data sets as follows:

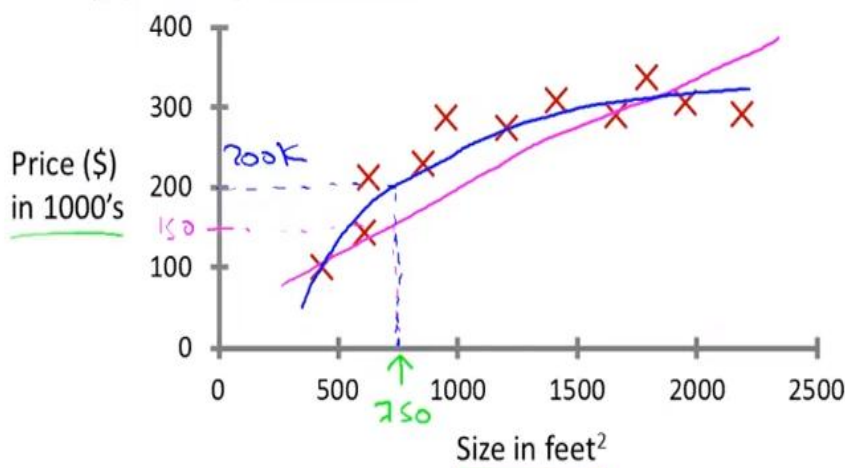


Fig.1.1.example of regression problem of price of land vs. size of land

Now, you want to sell your land of 750 feet² and want to know how much price you get by selling it. Now how can learning algorithms support us? One thing an algorithm can do is drawing a straight line through the data and based on that we can say that you can sell the land for \$150,000. Another thing it can do is to draw a curved line through the data and based on that we can say that you can sell the land for \$200,000. And this is an example of supervised learning in which we give the algorithm a data set of right answers.

The supervised learning algorithms are classified into regression and classification problem. The regression problem consists of data which is in continuous form. The above given graph is an example of regression problem. The classification problem on the other hand consists of data which is in discrete form i.e. either one or zero. The example for this is as follows:

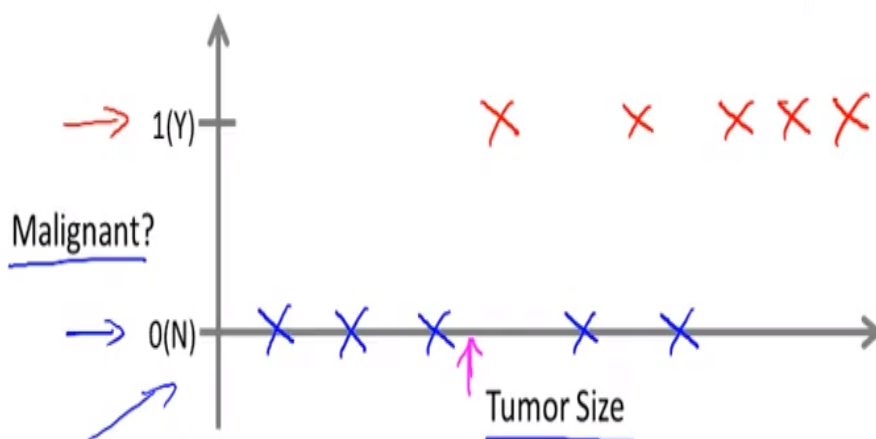


Fig.1.2.example of classification problem of cancer (malignant or benign)

The above example of classification problem is tumor size of the cancer whether it is malignant or benign. There are only two options either yes or no.

III. UNSUPERVISED LEARNING

Algorithms in machine learning are either supervised or unsupervised. The difference between them is based upon how the learner classifies data. The data given in supervised learning as seen before was labelled either as positive or negative, malignant or benign etc. and we were told what the right answer is. In unsupervised learning we will be given data that contains no labels or same labels. The type of data given in supervised learning and unsupervised learning looks like:

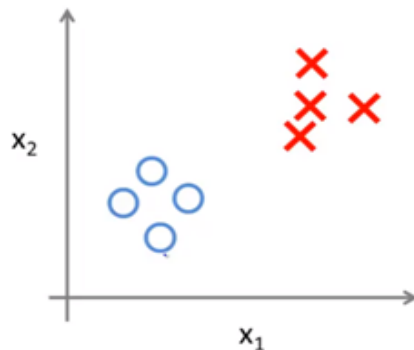


Fig.1.3.data in supervised learning

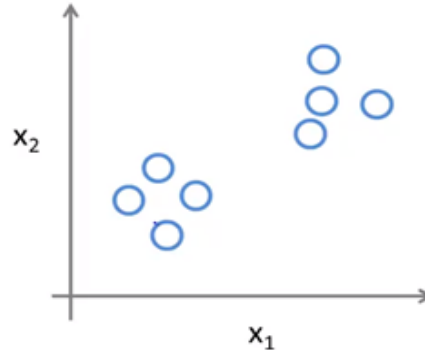


Fig.1.4.data in unsupervised learning

As shown above, the data given in supervised learning has some label (O, X) and in case of data given in unsupervised learning all are of same label. So in unsupervised learning we're given data and we're not informed what each data point is and what we need to do it. The unsupervised learning algorithm thus takes the data set given and finds some structure in it and here in the above case it finds two clusters. And so this algorithm is also called as clustering algorithm.

There are many places where this clustering algorithm is used. For instance, clustering is used in Google news where it looks into various thousands of new stories on the web and then it groups them into different categories.

IV. IMPACT OF ML ON SOME OF THE MAJOR SECTORS

Machine learning perhaps is becoming the most popular, trendy and in demand topic in silicon valley right now. Its demand is for the reason that it takes over many boring, repetitive, monotonous, dull and uninteresting tasks and it helps in making the lawyers better lawyers, cars better cars which can drive themselves, doctors better doctors and so on. Many companies are looking forward showing interest in doing machine learning on a bigger scale. Because machine learning is faster, bigger, cheaper and more accurate with fewer amounts of data, there will be many applications which continue to increase across all sectors. Some of the major sectors which are getting ameliorated using machine learning and how ML is showing impact on their enhancement are as follows:

V. MARKETING:

Most of the companies should start using machine learning marketing strategies as it brings real time to life which most of the marketers were looking forward from many years and it wasn't possible before machine learning came into picture. Visit any website these days; we get to see many ads on the screen. Recently, Facebook also started implementing marketing strategies with the help of machine learning by presenting ads on the timeline of everyone, making an extra income. Customers can see changes in offers by the minute based. It helps in analysing the huge amounts of data in real time.

Most of the marketing people think about reducing the marketing waste. This can be in terms of reducing the advertisements in the areas where there would be no customers. Machine learning actually does this for them by analysing the behavioural data of shoppers through its experience and their audiences are targeted in an efficient manner which enhances greatly the probability of transforming shoppers into customers. Machine learning also reduces marketing costs as it involves less number of people. It also reduces communication expenses as most of the consumers can be updated through scheduled posts online, online ads, automatic mails and notifications.

It can help in structuring the marketing content. Marketers need to frame their advertisements and campaigns of marketing which reaches the target audience at the right time and place. For this the marketers and writers need to be smart enough by making some intelligent guesses. Machine learning narrows the effort of making guesses through its behavioural analysis by processing huge data in a faster way. It provides with the

concept of sentimental analysis to marketers so that they get to know what they need to say and how the audience is prone to react.

b. Transport Industry:

Machine learning is bringing about some fascinating results in transportation industry. Intelligent transport systems help in decreasing stress, improve customer experiences and promote safety and much more. Here are some projects under development that are going to bring a great change in transportation industry.

- **Self-driving cars**

These cars can bring about a huge change in society in terms of safety, ease, reducing pollution, noise and many other things. They are the cars which need no driver to drive them. How interesting that could be? People can

actually go anywhere they want without any minimal effort or without the help of anyone. These cars will be very smart enough displaying all the maps of the roads and the traffic in each road. They are very alert enough every second unlike human and there will be no chances of any accidents anymore in the city promoting safety. All this is possible because of machine learning which makes the system learn driving and other required things. The project called Waymo has already showing huge results and by 2020, it is expected that there will be 10 million self-driving cars on the road and more than 250 million smart cars. There are already certain self-driving features available on several vehicles of Mercedes, BMW and Tesla.

- **Autonomous trucks**

Trucking industry is also working on this to make trucks driverless so that they can deliver the loads. Flights and cargo ships are also trying this out.

And whatever the vehicle is we can use lots of data available to improve safety and efficiency throughout the transportation system by the help of machine learning.

c. Manufacturing:

Most of the manufacturers around the world are now integrating machine learning concepts into their operational activities to gain predictive insights of production. Core technologies of machine learning are well focusing on the manufacturer's complex problems daily. In every phase of production, machine learning algorithms have the tendency to bring about great predictive accuracy. Most of the algorithms produce optimised outputs by being repetitive which are designed to continuously learn. Machine learning algorithms enabling manufactures in getting optimised results in minutes instead of months which can be considered as a great change. Some of the ways in which machine learning is drastically changing the manufacturing industry are as follows:

- By using this, the production capacity is getting raised by 20% and at the same time the material consumption rates are getting decreased by 4% as manufacturing is done based on predictive analysis and machine learning which have the potential to increase profit rates at the levels of machine, production cell and even plant.
- In most of the manufacturing companies, the amalgamation of the IT systems are not being done properly which is making the cross-functional teams face difficulties in accomplishing shared goals. Machine learning has the ability to remove these difficulties by bringing new intelligence and insight in these teams.
- Unifying machine learning algorithms, apps and databases into cloud platforms is becoming pervasive as announced by Google, Amazon and Microsoft. In this way it improves the repair, maintenance and overhaul performance in the more preventive way using higher predictive analysis.
- The manufacturers were provided the scale to manage overall effectiveness of the equipment at the plant level and the performance has increased from 65% to 85% by enabling conditioning monitoring processes.
- Product quality is considered as the major part of any company. The machine learning algorithms determine factors which are causing the most and least impact on the quality of a product based on the company.
- Most of the high-tech manufacturers including aerospace and defence, industrial and discrete manufacturers are already making a huge difference using machine learning. They are increasing their productions by manufacturing only customised products where machine learning is helping them in selecting the best products, suppliers, machines and staff.
- It is enabling the manufacturers to know how to get the apt margin by making them know the right price to be charged to the particular customer at the right time.

d. Pharmaceutical and Medicine

It is estimated that a sum of \$100 billion can be produced in pharmaceutical and medicine sector using the concepts of machine learning. It is based on taking better and apt decisions, news tools for consumers, physicians, regulators, insurers and innovation which is optimised and enhanced clinical trials. Its capability to

discover the patterns in huge amounts of data provides a range of applications of machine learning in pharmaceutical industry. The ways in which it could help are as follows:

- It helps in reducing the time taken in production, increase reproducibility, reduce the cost of production and optimise the processes using data produced from manufacturing processes in bio-manufacturing.
- The forefront of machine learning research in medicine is identifying the disease and diagnosing the ailments. Based on this they are encouraging the idea of biologists working with information scientists.
- Other hot research area which is closely related to disease assessment in a better way is personalised medicine which will be more effective and is based on the health data of an individual along with predictive analytics. This is presently done using supervised learning which is used to predict the risk of the patient based on the genetic information and the symptoms.
- It is used to discover the patterns from huge amounts of data that explain in detail the complex biological systems. Hence, machine learning is used for early stage drug discovery. Based on biological factors initial screening of drug compounds to predict the success rate can be an example.
- It can provide safety by real time data access and remote monitoring. Ex: monitoring the signals and detecting any sign of harm. In this way it helps in increasing the efficiency of clinical trials through addressing patient recruitment differences and detecting the best samples.

e. Online security

The rate of cybercrimes is increasing day by day and security is becoming a concern on the web. It was reported by media that many breaches are impacting at the corporate and even at the state level. Online criminals remain hidden. Their game gets over once they are discovered. But it is impossible for them to completely hide themselves though they use many significant resources to hide their presence. They use usage patterns which constantly keep changing whining huge amounts of genuine user interactions. And identifying or detecting those patterns is not only very difficult but also something which is beyond the human ability. But using machine learning, spotting of patterns is possible without saying patterns that it should exactly look for. We can train the machine learning algorithms on known non suspicious log data and lots of known brute –force attacks so that it can identify the brute force attacks. And over time, the algorithm will learn to differentiate between the two without the help of any human about what patterns it should look for.

VI. CONCLUSION

The future of machine learning is very bright and is coming into a golden age in the very near future bringing up many new innovations and discovering many new things and enhancing already existing systems making things much easier for people. There are vast amounts of applications of this in many major sectors of the world which can collectively bring about a very huge change in technology. It is already an incredible and very powerful tool which solves very tough classification problems. But all this is just the beginning of machine learning.

We can predict a lot more about machine learning. Reinforcement learning, deep learning are some of the branches of machine learning which accomplish great achievements in the future. Most of the learning algorithms of the machine learning depend on drawing insights from existing data i.e. upon supervised learning algorithms.

So we can infer from this that machine learning really inspires the great change in the future in various fields.

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