Machine Learning

Seminar

By Lokesh Singh

@SCTPL

'Machine learning is a core, transformative way by which we're rethinking everything we're doing,' Pichai said. 'We're thoughtfully applying it across all our products, be it search, ads, YouTube, or Play. We're in the early days, but you'll see us in a systematic way think about how we can apply machine learning to all these areas.'
– Sundar Pichai, CEO, Google

Machine Learning

what society thinks I do

what my friends think I do

what my parents think I do

$$L_p = \frac{1}{2}\|\mathbf{w}\|^2 - \sum_{i=1}^{l} \alpha_i y_i (\mathbf{x}_i \cdot \mathbf{w} + b) + \sum_{i=1}^{l} \alpha_i$$

$$\alpha_i \geq 0, \forall i$$

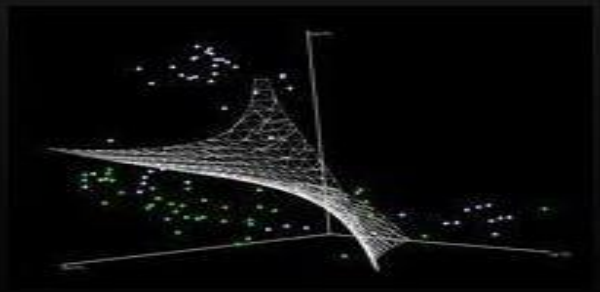
$$\mathbf{w} = \sum_{i=1}^{l} \alpha_i y_i \mathbf{x}_i, \sum_{i=1}^{l} \alpha_i y_i = 0$$

$$\nabla \hat{g}(\theta_t) = \frac{1}{n} \sum_{i=1}^{n} \nabla \ell(x_i, y_i; \theta_t) + \nabla r(\theta_t).$$

$$\theta_{t+1} = \theta_t - \eta_t \nabla \ell(x_{i(t)}, y_{i(t)}; \theta_t) - \eta_t \cdot \nabla r(\theta_t)$$

$$\mathbb{E}_{i(t)}[\ell(x_{i(t)}, y_{i(t)}; \theta_t)] = \frac{1}{n} \sum_i \ell(x_i, y_i; \theta_t).$$

what other programmers think I do



what I think I do

```
>>> from scipy import SVM
```

what I really do

So What is Machine Learning ?

"Machine Learning refers to the techniques involved in dealing with vast data in the most intelligent fashion (by developing algorithms) to derive actionable insights"

What do you think happens when you search for something on Google?
:-***Machine learning is a set of techniques, which help in dealing with vast data in the most intelligent fashion (by developing algorithms or set of logical rules) to derive actionable insights (delivering search for users in this case).***

How is machine learning different from X?

X = **Artificial Intelligence(AI):**

Machine Learning is a subset of AI where the machine is trained to learn from it's past experience. The past experience is developed through the data collected. Then it combines with algorithms such as **Naïve Bayes, Support Vector Machine(SVM)** to deliver the final results.

X **= Statistics:**

Statistics is that branch of mathematics which utilizes data, either of the entire population or a sample drawn from the population to carry out the analysis and present inferences. Some statistical techniques used are **regression , variance, standard deviation, conditional probability and many others.**

CONTINUE…

X = **Deep Learning:**

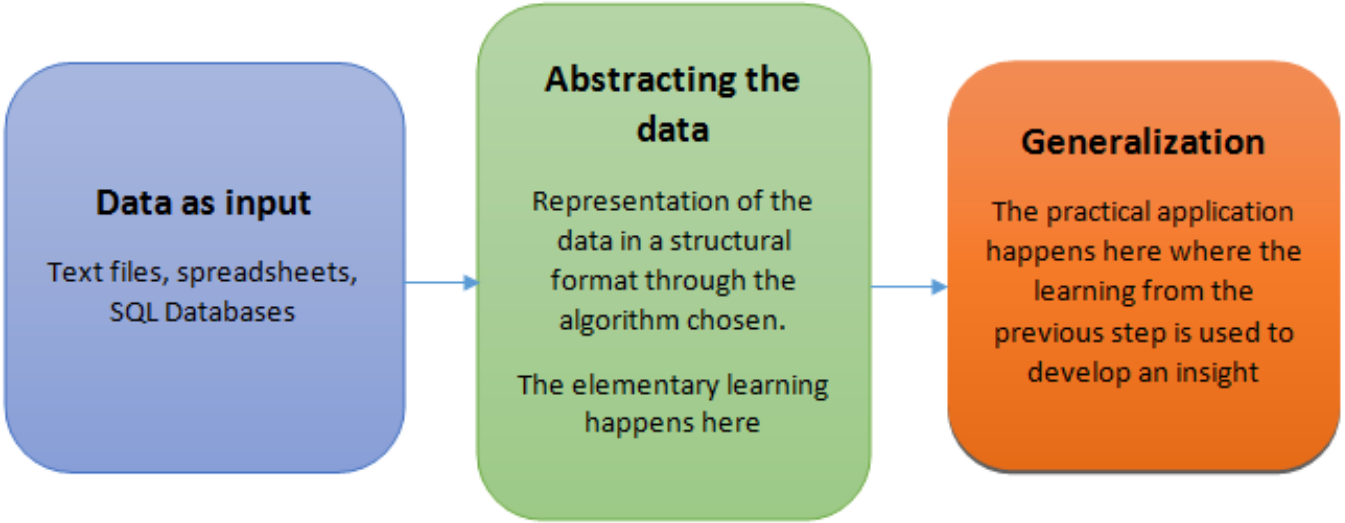
Deep Learning is associated with a machine learning algorithm **(Artificial Neural Network, ANN)** which uses the concept of human brain to facilitate the modeling of arbitrary functions. ANN requires a vast amount of data and this algorithm is highly flexible when it comes to model multiple outputs simultaneously.

X = **Data Mining:**

Data Mining deals with searching specific information. And Machine Learning solely concentrates on performing a given task. Let me cite **the example which helped me to remember the difference; Teaching someone how to dance is Machine Learning. And using someone to find best dance centers in the city is Data Mining.**

But, How exactly do we teach machines?

Teaching the machines involve a structural process where every stage builds a better version of the machine. For simplification purpose, the process of teaching machines can broken down into 3 parts:



What are the types of Machine Learning algorithms?

Supervised Learning / Predictive models:

Predictive model as the name suggests is used to predict the future outcome based on the historical data. Predictive models are normally given clear instructions right from the beginning as in what needs to be learnt and how it needs to be learnt. These class of learning algorithms are termed as **Supervised Learning.**

For example: Supervised Learning is used when a marketing company is trying to find out which customers are likely to churn. We can also use it to predict the likelihood of occurrence of perils like earthquakes, tornadoes etc. with an aim to determine the Total Insurance Value. Some examples of algorithms used are: Nearest neighbour, Naïve Bayes, Decision Trees, Regression etc.

Unsupervised learning / Descriptive models:

It is used to train descriptive models where no target is set and no single feature is important than the other. The case of unsupervised learning can be: **When a retailer wishes to find out what are the combination of products, customers tends to buy more frequently.**
Furthermore, in pharmaceutical industry, unsupervised learning may be used to predict which diseases are likely to occur along with diabetes. Example of algorithm used here is: K-means Clustering Algorithm

Reinforcement learning (RL):

It is an example of machine learning where the machine is trained to take specific decisions based on the business requirement with the sole motto **to maximize efficiency (performance).**

The idea involved in reinforcement learning is: The machine/ software agent trains itself on a continual basis based on the environment it is exposed to, and applies it's enriched knowledge to solve business problems.

This continual learning process ensures **less involvement of human expertise which in turn saves a lot of time!**

A good example to understand the difference is self driving cars. Self driving cars use Reinforcement learning to make decisions continuously – **which route to take? what speed to drive on?**

What are the steps used in Machine Learning?

There are 5 basic steps used to perform a machine learning task:

Collecting data: Be it the raw data from excel, access, text files etc., this step (gathering past data) forms the foundation of the future learning. The better the variety, density and volume of relevant data, better the learning prospects for the machine becomes.

Preparing the data: Any analytical process thrives on the quality of the data used. One needs to spend time determining the quality of data and then taking steps for fixing issues such as missing data and treatment of outliers.

Training a model: This step involves choosing the appropriate algorithm and representation of data in the form of the model. The cleaned data is split into two parts – train and test (proportion depending on the prerequisites);

the first part (training data) is used for developing the model. The second part (test data), is used as a reference.

Evaluating the model: This step determines the precision in the choice of the algorithm based on the outcome. A better test to check accuracy of model is to see its performance on data which was not used at all during model build.

Improving the performance:This step might involve choosing a different model altogether or introducing more variables to augment the efficiency. That's why significant amount of time needs to be spent **in data collection and preparation.**

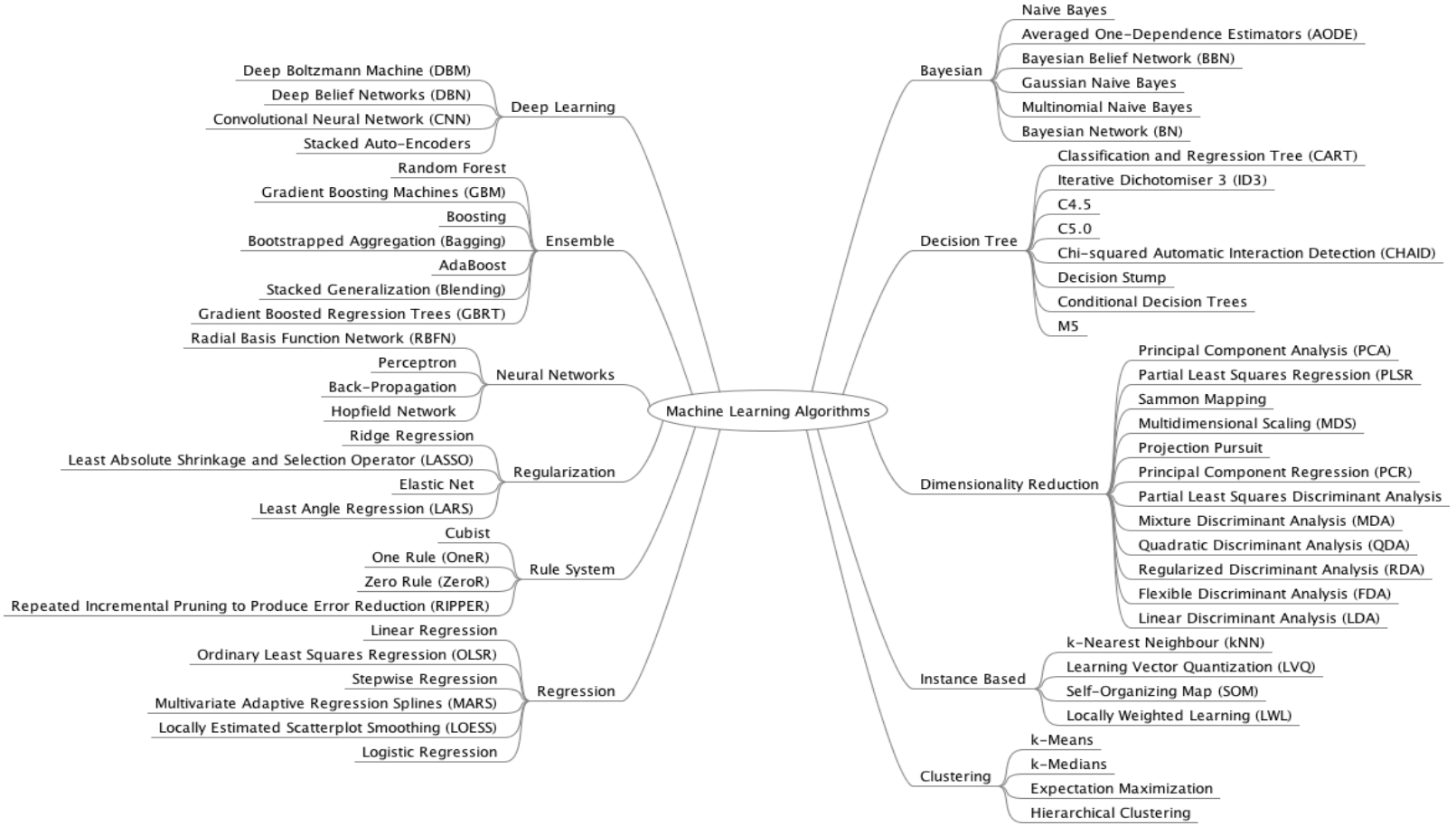
What are the applications of Machine Learning?

Banking & Financial services: ML can be used to **predict the customers who are likely to default from paying loans or credit card bills**. This is of paramount importance as machine learning would help the banks to identify the customers who can be granted loans and credit cards.

Healthcare: **It is used to diagnose deadly diseases (e.g. cancer) based on the symptoms of patients** and tallying them with the past data of similar kind of patients.

Retail: It is used to identify products which **sell more frequently (fast moving) and the slow moving products which help the retailers to decide what kind of products to introduce or remove from the shelf.** Also, machine learning algorithms can be used to find which two / three or more products sell together. This is done to design customer loyalty initiatives which in turn helps the retailers to develop and maintain loyal customers.

How Many Algorithm are there in ML ?



What to do Now ?

Step 1: Check Syllabus of **Data Analytics and machine learning using R programming** from http://db.suvenconsultants.com/

Step 2: Check Syllabus of **Python –Django (With many Machine Learning Examples)** from http://monster.suvenconsultants.com/

Step 3: Enroll For above Course Or for any track from SCTPL and See Machine Learning Algos in Running Phase ;)

Step 3: Check out http://db.suvenconsultants.com/ for many resources of machine learning Examples : Ebooks, blogs, tools and examples (Will be updated Soon...)


Q&A
You have
Questions
We have
Answers
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