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Machine learning CAT 1

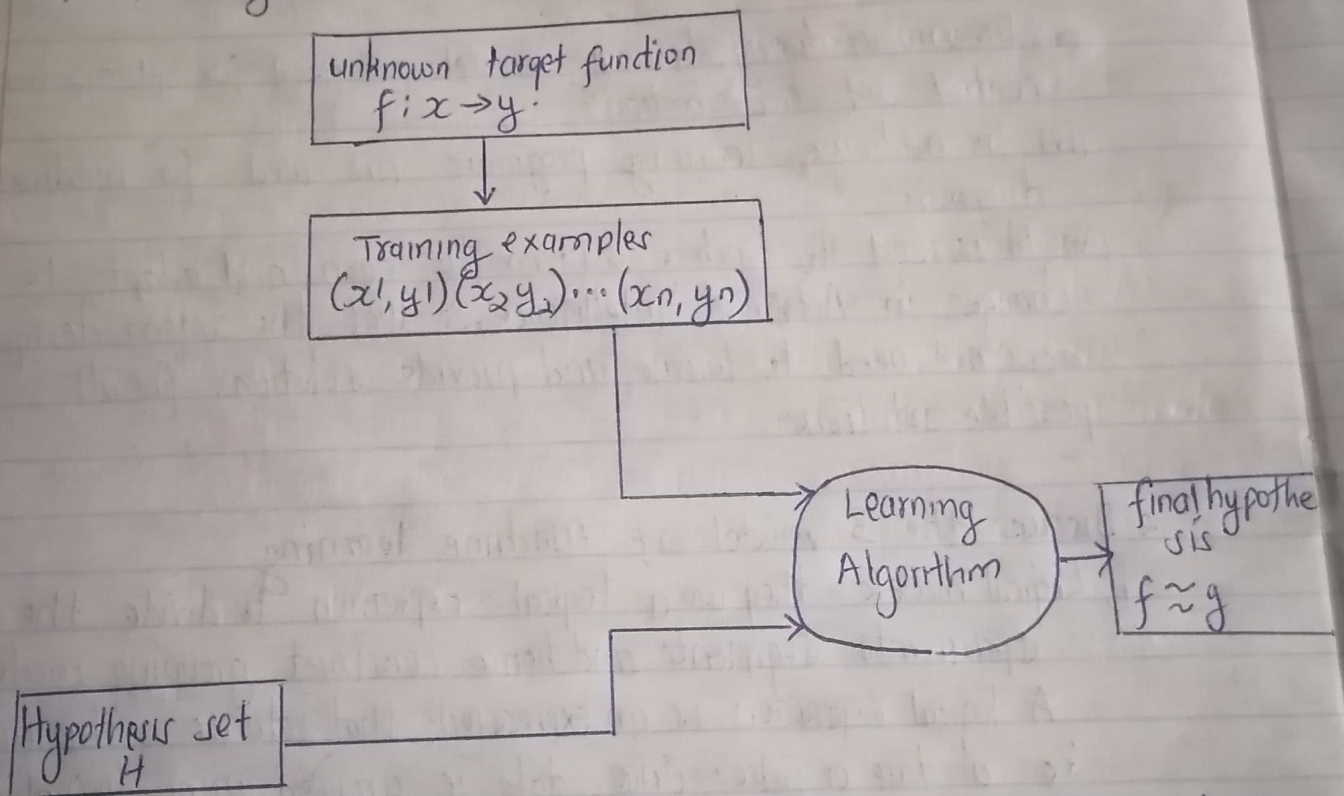
- 1) Discuss the applications of Machine learning
 - i) In retail business, ML is used to study consumer behaviour
 - ii) In finance, banks analyze their past data to build models to use in credit applications, fraud detection and the stock market
 - iii) In manufacturing, learning models are used for optimization, control and troubleshooting
 - iv) In medicine, learning programs are used for medical diagnosis
 - v) It is used to teach a system to learn and adapt to changes in Artificial Intelligence, so that the system designer does not need to foresee and provide solutions for all possible solutions.

2. Discuss the 3 models of Machine learning

- i) Logical models - they use a logical expression to divide the instance space into segments and hence construct grouping models.
A logical expression is an expression that returns a boolean value, i.e. a true or false. Once data is grouped using logical expression, the data is divided into homogenous groupings for the problem we are trying to solve.
- ii) Geometric models - This is a model which defines similarity by considering the geometry of the instance space. In this model, features could be described as points in two dimensions (X and Y-axis) or a dimensional space (X, Y and Z)
- iii) Linear models - In these models, the function is represented as a linear combination of its inputs. These models are parametric, which means that they have a fixed form which a small number of numeric parameters are needed to be learned from data.

3. Explain how to design a ML system.

- For any learning system, we must be knowing the 3 elements
 - (i) T (task)
 - (ii) P (performance) measure.
 - (iii) E (Training experience).



- The learning process starts with task T , performance measure P and training experience E and objective are to find an unknown target function.
- The target function is an exact knowledge to be learned from the training experience and its unknown. In a case of credit approval, the learning system will have customer application records as experience and task would be to classify whether the given customer application is eligible for a loan. So in this case, the training examples can be represented as $(x_1, y_1)(x_2, y_2) \dots (x_n, y_n)$ where x represents customer application details and y represents the status of credit approval.

4. Compare and contrast 3 types of learning in ML

(i) Supervised learning - In this model, a training set of examples with the correct responses ('targets') is provided and, based on this training set, the algorithm generalises to respond correctly to all possible inputs. It can also be called learning from examples.

~~(i) Linear~~ - Supervised learning is the machine learning a function that maps an input to an output based on example input-output pairs.

(ii) Unsupervised learning - This is a type of machine learning algorithm used to draw inferences from datasets consisting of input data without labeled responses. In this learning algorithm, a classification is not included in the observations. There are no values and so there is no estimation of functions.

(iii) Reinforcement learning - In this learning, the algorithm gets told when the answer is wrong, but does not get told how to correct it. It has to explore and try out different possibilities until it works out how to get the answer right.

5) Discuss issues in Machine learning

(i) Lack of quality data - The major ~~problem~~ issue facing Machine learning is the lack of good data. While enhancing algorithms often consumes most of the time of developers in AI, quality data is essential for the algorithm to function as intended. Noisy, dirty and incomplete data are the main enemies of ideal machine learning.

(ii) Inadequate infrastructure - machine learning requires vast amounts of data churning capabilities. Legacy systems often can't handle the workload and buckle under pressure.

(iii) Lack of skilled resources- deep analytics and machine learning in their current forms are still new technologies. Thus, there is a shortage of skilled employees available to manage and develop analytical content for machine learning.

iv) Implementation- Organizations often have analytics engines working with them by the time they choose to upgrade to machine learning. Integrating newer machine learning methodologies into existing methodologies is a complicated task.

v) Understanding which processes need automation - Its becoming increasingly difficult to separate fact from fiction in terms of Machine learning today. Before you decide on which AI platform to use, you need to evaluate which problems you are seeking to solve. The easiest processes to automate are the ones that are done manually every day with no variable output. Complicated processes require further inspection before automation.