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DMW
Assignment NO :- 05

Q->1:->Define Classification and prediction Explain decision tree based classification method with suitable Example.

Ans:-> Classification:-
Classification is the process of finding a good model that describes the data classes or concepts and the purpose of classification is to predict the class of objects whose class label is unknown.

Prediction:-
prediction is about predicting a missing/unknown element/(Continuous Value) of a dataset. the model used to predict the unknown values is called a predicts.

Decision Tree based classification method.
- Decision Tree is a supervised learning technique that can be used for both classification and Regression problem, but mostly it is preferred for solving classification problems. It is tree structured classifier where internal nodes represent the features of a dataset balance represents the decision rules & each leaf node represent outcome.

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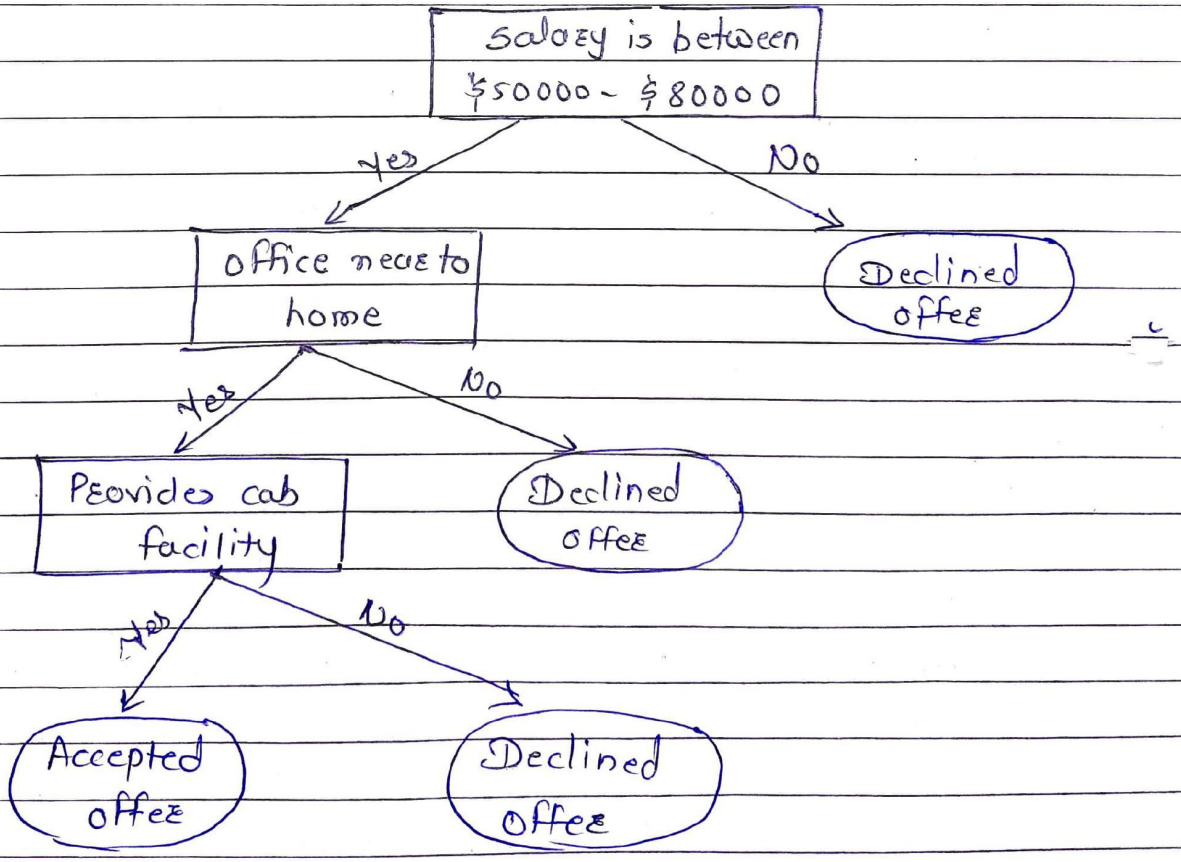
- A decision tree simply asks a question, and based on the answer (Yes / No), it further split the tree into subtrees.

Example:-

Suppose there is a candidate who has a job offer and wants to decide whether he should accept the offer or Not. to solve this problem, starts with root node, i.e. splits further into next node & one leaf based on the labels. The next node further gets splits into one node & one leaf node



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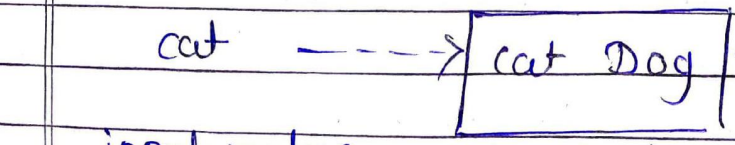
Q.2. Write and explain K-Nearest-Neighbour classification algorithm with example.

Ans. - K-Nearest Neighbour is one of the most basic yet essential classification algorithms in Machine learning. It belongs to the supervised learning domain and finds intense application in pattern recognition, data mining and intrusion detection.

- It is widely disposable in real-life scenarios since it is non-parametric, meaning, it does not any underlying assumptions about the distribution of data.

- KNN algorithm at the training phase just stores the dataset & when it gets new data, then it classifies that data into a category that is much similar to new data.

Example: Suppose, we have image of a cat and dog, but we want to know either it is cat or dog. So for this identification, we can use KNN algorithm, our KNN model will find the similar features of new data set to cats & dogs images based on features



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Q.3. Write short note on Rule induction Using a sequential Covering Algorithm.

Ans. Sequential Covering Algorithm can be used to extract IF-THEN rules from the training data. We do not require to generate a decision tree first. In this algorithm, each rule for a given class covers many of the tuples of that class.

Some of the sequential covering Algorithm are AQ, CN2 and RIPPER. As per the general strategy the rules are learned one at a time. For each time rules are learned, a tuple covered by the rule is removed & the process continues for the rest of the tuples. This is because the path to each leaf in a decision tree corresponds to a rule. 15

Note: The Decision tree induction can be considered as learning a set of rules simultaneously.

Q.4 What are Bayesian Classifiers?

Ans Bayesian classification is based on Bayes' Theorem. Bayesian classifiers are the statistical classifiers. Bayesian classifiers can predict class membership probabilities such as the probabilities that given tuple belongs to a particular class.

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Baye's Theorem:-

Bayes' Theorem is named after Thomas Bayes. There are two types of probabilities:

- Posterior Probability [P(H/X)]
- Prior Probability [P(H)]

Where X is data tuple & H is some hypothesis. According to Baye's Theorem,

$$P(H/X) = P(X/H)\,P(H) \,/\, P(X)$$

- A Bayesian classifier is based on the idea that the role of a (natural) class is to predict the values of features for members of that class. Examples are grouped in classes because they have common value for the features. Such classes are often called natural kinds.