Decision tree learning

— Decision tree learning is one of the most widely used and practical methods for inductive inference.

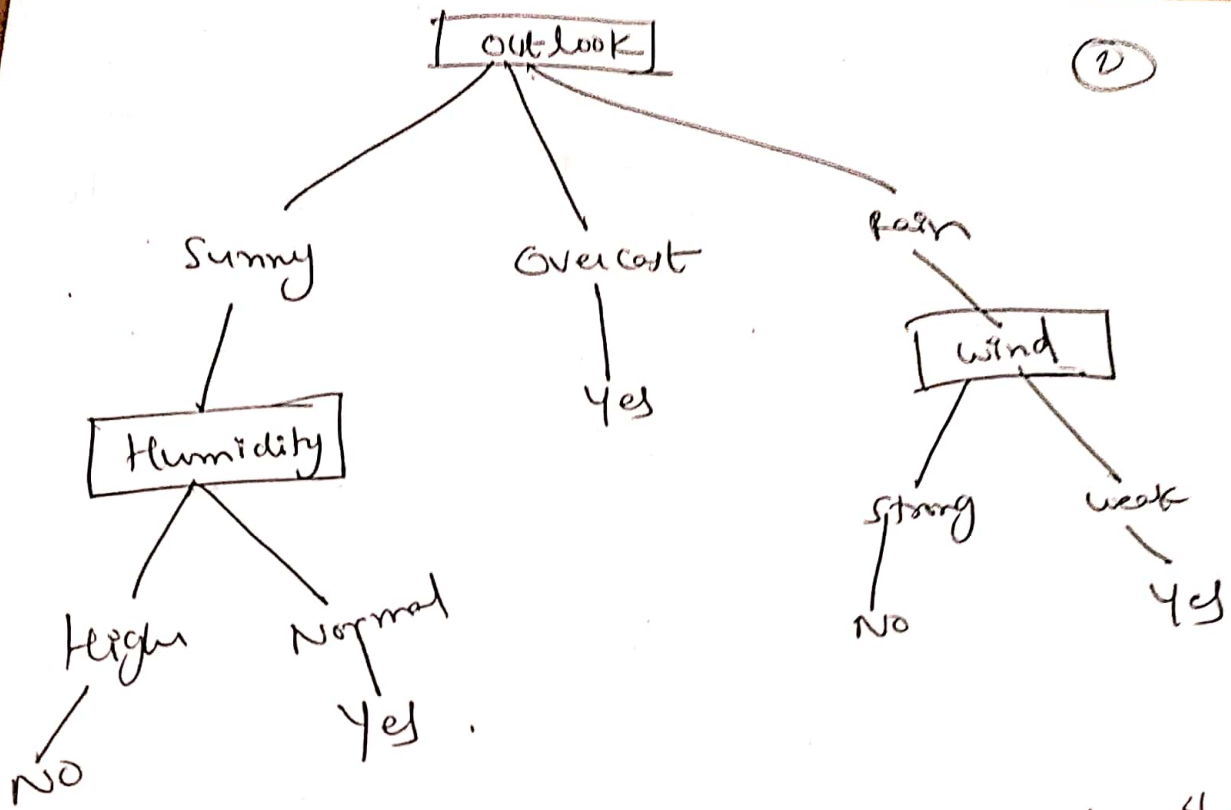
— Decision tree learning a method for approximating discrete-valued target functions, in which the learned function is represented by a decision tree.

— Learned tree also re-represented as sets of if-then rules to improve human readability.

Decision tree representation

— Decision trees are classified instances by sorting them down the tree from the root to some leaf node, which provides the classification of the instance.

— Each node in the tree specifies a test of some attribute of the instance, and each branch descending from the node corresponds to one of the possible values for this attribute.



A decision tree for the concept, Play tennis

Figure.

illustrates a typical learned desicion tree.

it classifies whether they are suitable for playing tennis.

$$(outlook = sunny \wedge Humidity = Normal)$$
$$\vee \quad (outlook = Overcast)$$
$$\vee \quad (outlook = Rain \wedge wind = weak)$$

BAYESIAN LEARNING

— Bayesian learning provides a probabilistic approch to inference.

— Bayesian learning methods are relant to our study of machine learning for two different reasons.

— First, Bayesian learning algorithms that calculate explicit probabilities for hypothesis, such as naive Bayes classifier.

— Second Bayesian methods are important to our study of machine learning is that they provide useful perspective for understanding many learning algorithm that do not explicitly manipulate probabilities.

Ex: FIND-S, Candidate elimination algo.

Appropriate Problems for Decision tree learning

(1) Instances are represented by attribute-value pairs.

(2) The target function has discrete output values.

(3) Disjunctive descriptions may be required.

(4) The training data may contain errors.