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Course: CSE 440

Quiz-04

Decision tree:

ID3 algorithm:
ID3 algorithm is one of the algorithm that uses in building decision tree.

ID3 algorithm selects the best feature at each step while building a decision tree. It selects the features with the highest or Maximum gain.

Taking supplies as the attribute.

Entropy $= -P+\log_2 P+ - P\log_2 P$

$= -[\frac{2}{5}\log(\frac{2}{5})]\log + \frac{3}{5}\log(\frac{5}{3})$

Here, we will take log to base 2.
Here total 12 yes/NO.
out of which 4 yes and 8 NO.

$$\therefore E(S) = -\left[\frac{4}{12}\log\left(\frac{4}{12}\right)\right) + \left(\frac{8}{12}\log\left(\frac{8}{12}\right)\right]$$

$$= 0.1589 - 0.1165$$

$$= 0.0424$$

Now, we calculate the average weighted entropy.

Here, we have 7 yes and 5 NO.

$$E(W) = -\left[\frac{7}{12}\log\left(\frac{7}{12}\right)\right] + \left(\frac{5}{12}\log\left(\frac{5}{12}\right)\right]$$

$$= 0.1367 - 0.1589$$

$$= -0.0217.$$

$$\text{Gain}(\text{supply}, B) = 0.0424 - \frac{8}{12}\log\frac{8}{12} - \frac{4}{12}\log\frac{4}{12} - \frac{8}{12}\log\frac{8}{12}$$

$$= 0.4362$$

$$\text{Gain(Weather, E)} = 0.0924 - \frac{4}{12}\log\frac{4}{12} - \frac{6}{12}\log\frac{6}{12} - \frac{4}{12}\log\frac{4}{12}$$

$$= 0.5109$$

$$\text{Gain(Worked, E)} = 0.0924 - \frac{7}{12}\log\frac{7}{12} - \frac{5}{12}\log\frac{5}{12}$$

$$= 0.3374$$

~~Gain(Supply shopped, E) = 0.0924~~

Decision tree: