Aayush L. Roy
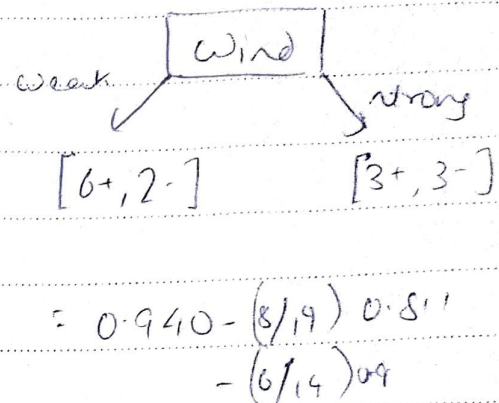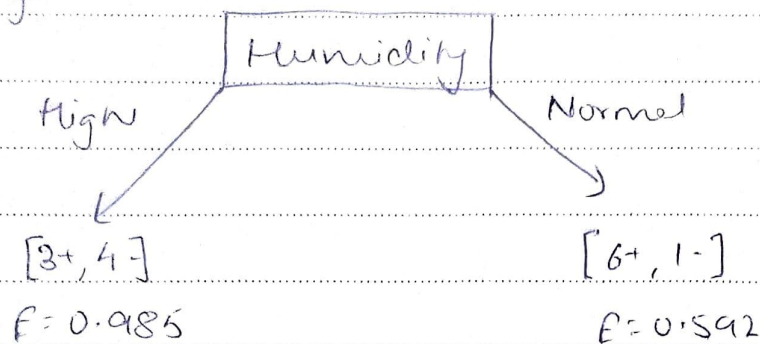1CR17CS003
7 'A'

CMR

ML Assignment-2

Q3) ID3 determines the information gain for each candidate
candidate attribute and then selects an with highest info
gain.

Humidity

High                    Normal              weak    Wind    strong

                                                    [6+,2-]         [3+,3-]

[3+,4-]                 [6+,1-]

F=0.985                 F=0.592             = 0.940 - (8/14) 0.811
                                                  - (6/14) 0.9

Gain (S, Humidity)                          = 0.048

= 0.940 - (7/14) 0.985 - (9/14) 0.592

= 1.57

The information gain values for all attributes are

Gain (S, outlook) = 0.246

Gain (S, Humidity) = 0.151

Gain (S, wind) 0.048

Gain (S, temp) = 0.029

The outlook provides the best production of the target attribute,
play tennin over training example

∴ Outlook is selected as the decision attribute for the root
node and branches are created below below the root for
each of its possible values i.e., Sunny, overcast and rain

Outlook

Sunny

{D1, D2, D8, D9, D11}

[2+, 3-]

?

Rain

overcast

{D4, D5, D6, D10, D14}

[3+, 2-]

?

{D3, D7, D12, D13}

[4+, 0-]

Yes
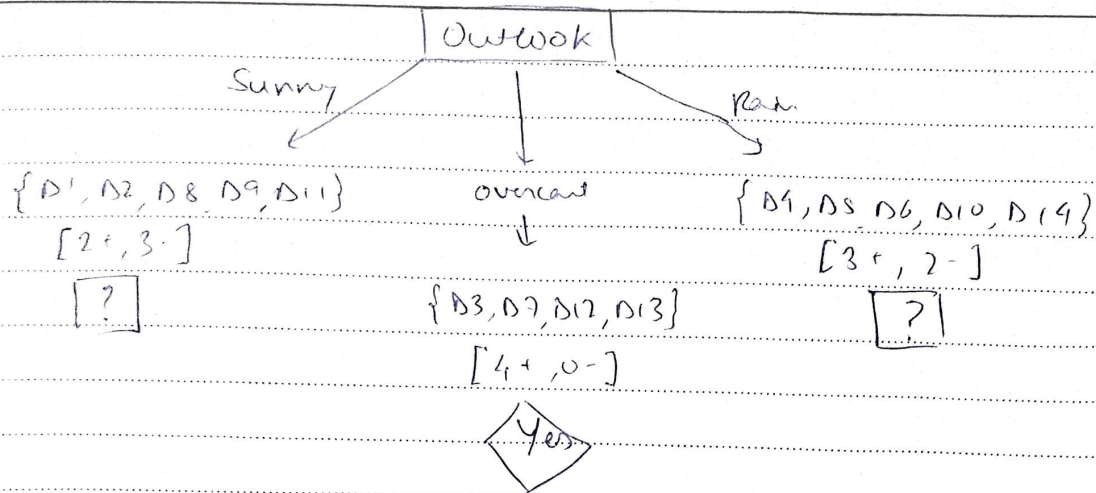
Sunny = {D1, D2, D8, D9, D11}

Gain (Sunny, Humidity) = 0.970 - (3/5)0.0 - (2/5)0.0 = 0.970

Gain (Srain, temp) = 0.970 - (2/5)0.0 - (2/5)1.0 - (1/5)0.0 = 0.570

Gain (Sunny, wind) = 0.970 - (2/5)1.0 - (3/5)0.918 = 0.014
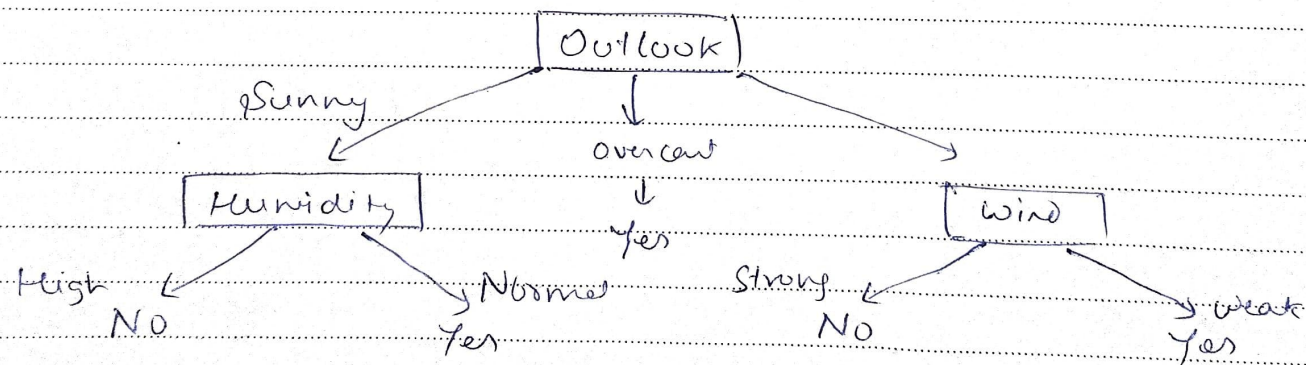
Srain = {D5, D6, D8, D10, D14}

Gain (Srain, Humidity) = 0.970 · (2/5)1.0 - (3/5)0.917 = 0.019

Gain (Srain, temp) = 0.970 - (0/5)0.0 - (3/5)0.918 - (2/5)1.0 = 0.019

Gain (Srain, wind) = 0.970 - (3/5)0.0 - (2/5)0.0 = 0.910

Outlook

Sunny

overcast

Yes

Rain

Humidity

High

No

Normal

Yes

Strong

No

weak

Yes

Wind

The complete decision tree