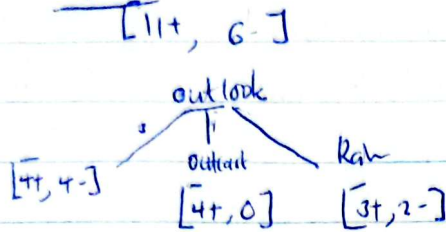Zacharia Massa

CIT-223-040/2020

Qn 1

→ Machine translation: is basically a branch of artificial intelligence AI and Conceptual Linguistics that focuses on mainly /automatically translating texts of various languages, from one language to another.

Qn 2

[11+, 6-]

outlook

[7+, 4-]   Overcast   Rain
           [4+, 0]   [3+, 2-]

$Entropy = -P_{\oplus} \log_2 P_{\oplus} - P_{\ominus} \log_2 P_{\ominus}$

$Entropy(s) = -\frac{11}{17} \log_2 \frac{11}{17} - \frac{6}{17} \log_2 \frac{6}{17}$

$= 0.9365$

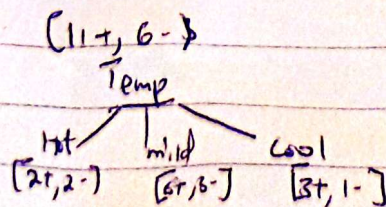Sunny $-\frac{4}{8} \log_2 \frac{4}{8} - \frac{4}{8} \log_2 \frac{4}{8} = 1$

Overcast $= \frac{4}{4} \log_2 \frac{4}{4} - \frac{0}{4} \log \frac{0}{4} = 0$

Rain $= -\frac{3}{5} \log \frac{3}{5} - \frac{2}{5} \log_2 \frac{2}{5} = 0.971$

$info\ gain = 0.9365 - (\frac{8}{17}(1) + \frac{4}{17}(0) + \frac{5}{17}(0.971)$

$= 0.18$

Temperature

(11+, 6-)

Temp

Hot   mild   Cool
[2+,2-]   [6+,6-]   [3+, 1-]

Hot $= (-\frac{2}{4} \log_2 \frac{2}{4} - \frac{2}{4} \log \frac{2}{4}) \frac{4}{17} = \frac{4}{17}(1)$

mild $= (-\frac{6}{9} \log_2 \frac{6}{9} - \frac{3}{9} \log_2 \frac{3}{9}) \frac{9}{17} = \frac{9}{17}(0.9163)$

cool $= (-\frac{3}{4} \log_2 \frac{3}{4} - \frac{1}{4} \log_2 \frac{1}{4}) \frac{4}{17} = \frac{4}{17}(0.8113)$

hot + mild + cool = 0.928
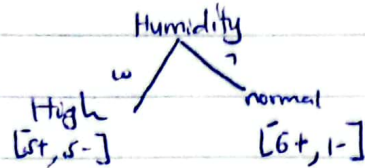
$$\text{win} = 0.9365 - 0.928$$

$$\approx 0.0085$$

humidity   [11+, 6-]

Humidity
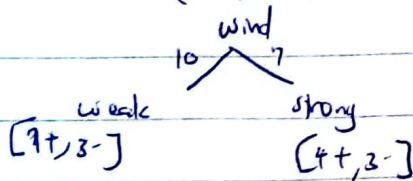
       w   7

High   normal
[5+, 5-]   [6+, 1-]

high Entropy = 1 if the values are half then entropy is and either of them
is 0 then Ntexapy is 0

$$\text{Normal} = -\frac{6}{7} \log_2 \frac{6}{7} - \frac{1}{7} \log \frac{1}{7} = 0.5917$$

$$\text{Gain} = 0.9365 - \left(\left\{ \frac{10}{17} \times 1 \right\} + \left\{ \frac{7}{17} \times 0.5917 \right\} \right) = 0.1058$$

≈

wind   (11+, 6-)

wind

     10   7

weak   strong
[9+, 3-]   [4+, 3-]

weak

$$\text{entropy} = -\frac{7}{10} \log_2 \frac{7}{10} - \frac{3}{16} \log_2 \frac{3}{10} = 0.8813$$

$$\text{strong} = -\frac{4}{7} \log_2 \frac{4}{7} - \frac{3}{7} \log_2 \frac{3}{7} = 0.9852$$

$$\text{Gain} = 0.9365 - \left(\left\{ \frac{10}{17} \times 0.8813 \right\} + \left\{ \frac{7}{17} \times 0.9852 \right\} \right) = 0.0101$$

Decision tree