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Assignment #09

Hope To Skills

Free Artificial Intelligence Course

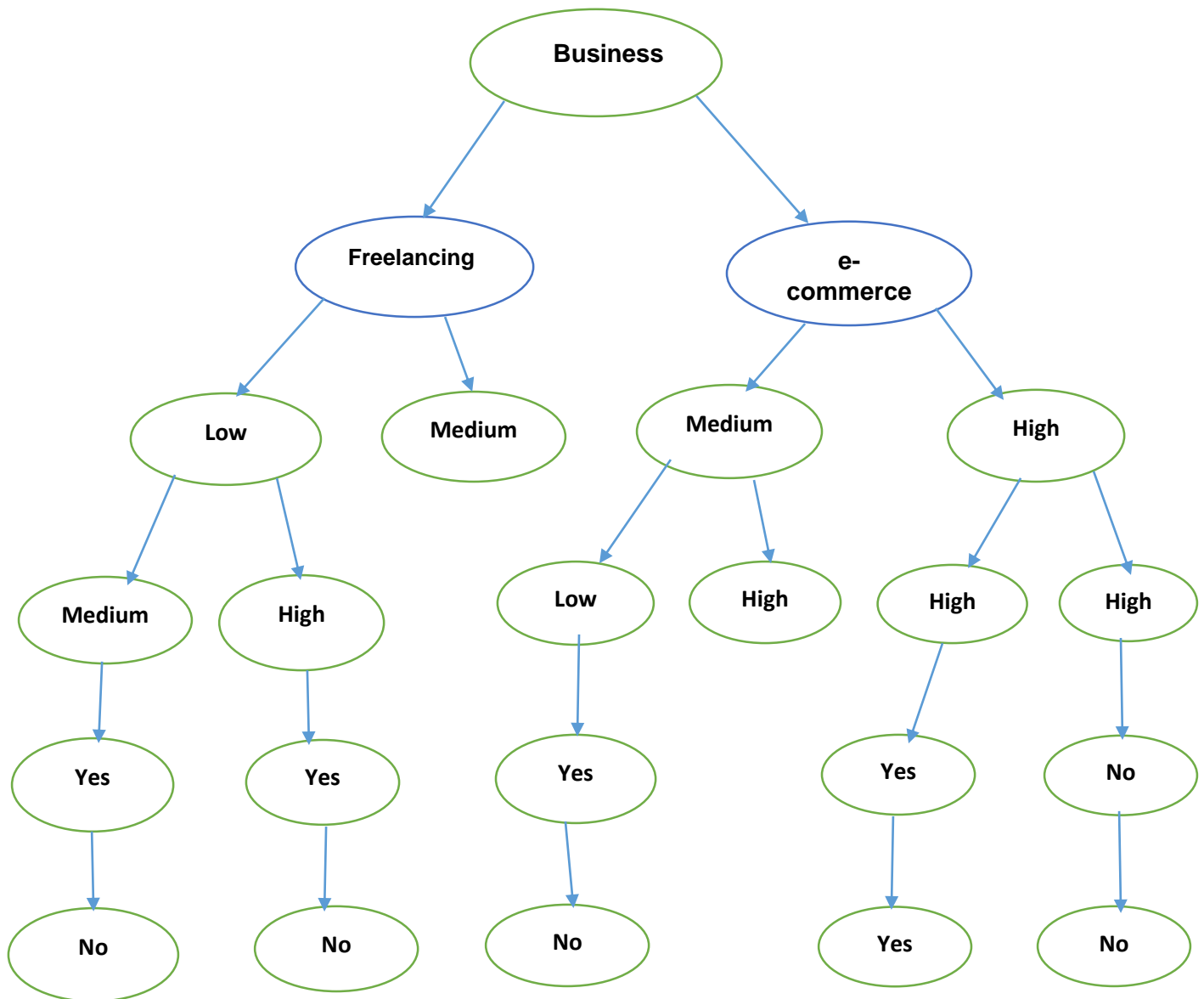
Instructor: Irfan Malik, Dr. Sheraz

1. Make the Decision tree for the following dataset.

Business	Competition	Value	Profit
Freelancing	Low	Medium	Yes
E-commerce	Medium	Low	Yes
e-commerce	High	High	No
Freelancing	Low	High	Yes
e-commerce	High	High	Yes
Free lancing	Low	Medium	No

Answer:

The target variable is "**Profit**" (Yes or No), we want to build a decision tree that predicts whether a business will have a profit based on the values of the "**Business**," "**Competition**," and "**Value**" attributes.



2: Apply the Min-Max Scaling for the range [1,0] on the following dataset

[450, 652, 236, 968, 465, 456, 963, 789, 741, 321, 852, 951]

Answer:

First sort it in ascending order:

[236,321,450,456,465,652,741,789,852,951,963,968]

Min= 236

Max = 968

Formula:

$$\mathbf{X_scaled = (X - X_min) / (X_max - X_min)(1-0)}$$

$$\mathbf{X_scaled = (450 - 236) / (968 - 236)(1-0) = 214 / 732 = 0.2923}$$

$$\mathbf{X_scaled = (652 - 236) / (968 - 236) (1-0) = 416 / 732 = 0.5694}$$

$$\mathbf{X_scaled = (236 - 236) / (968 - 236) (1-0) = 0}$$

$$\mathbf{X_scaled = (968 - 236) / (968 - 236) (1-0) = 732 / 732 = 1}$$

$$\mathbf{X_scaled = (465 - 236) / (968 - 236) (1-0) = 229 / 732 = 0.3128}$$

$$\mathbf{X_scaled = (456 - 236) / (968 - 236) (1-0) = 220 / 732 = 0.3005}$$

$$\mathbf{X_scaled = (963 - 236) / (968 - 236) (1-0) = 727 / 732 = 0.9932}$$

$$\mathbf{X_scaled = (789 - 236) / (968 - 236) (1-0) = 553 / 732 = 0.7555}$$

$$\mathbf{X_scaled = (741 - 236) / (968 - 236) (1-0) = 505 / 732 = 0.6892}$$

$$\mathbf{X_scaled = (321 - 236) / (968 - 236) (1-0) = 85 / 732 = 0.1161}$$

$$\mathbf{X_scaled = (852 - 236) / (968 - 236) (1-0) = 616 / 732 = 0.8415}$$

$$\mathbf{X_scaled = (951 - 236) / (968 - 236) (1-0) = 715 / 732 = 0.9772}$$

3: Apply the z-Score Scaling on the following dataset

[963,321,135, 852, 258, 456, 741, 951, 753, 665, 452, 520]

Answer:

First sort it in ascending order:

[135,258,321,452,456,520,665,741,852,963]

Min= 135

Max= 963

Formula:

$$Z = (X - \mu) / \sigma$$

First of all calculate Mean (μ):

$$\mu = (963 + 321 + 135 + 852 + 258 + 456 + 741 + 951 + 753 + 665 + 452 + 520) / 12$$

$$= 6402 / 12$$

$$= 533.5$$

Now calculate standard deviation (σ):

$$\sigma = \sqrt{[(963 - 533.5)^2 + (321 - 533.5)^2 + (135 - 533.5)^2 + (852 - 533.5)^2 + (258 - 533.5)^2 + (456 - 533.5)^2 + (741 - 533.5)^2 + (951 - 533.5)^2 + (753 - 533.5)^2 + (665 - 533.5)^2 + (452 - 533.5)^2 + (520 - 533.5)^2] / 12}$$

$$= \sqrt{[196523.25 + 68725.25 + 157053.25 + 96543.25 + 92933.25 + 9800.25 + 30477.25 + 195286.25 + 26581.25 + 18030.25 + 172425.25 + 17379.25] / 12}$$

$$= \sqrt{1169881.75 / 12}$$

$$= \sqrt{97490.1458}$$

$$= 312.3138$$

Now Applying z scoring scaling:

$$Z = (X - \mu) / \sigma$$

For X = 963:

$$Z = (963 - 533.5) / 312.3138 = 1.3441$$

For X = 321:

$$Z = (321 - 533.5) / 312.3138 = -0.6819$$

For X = 135:

$$Z = (135 - 533.5) / 312.3138 = -1.5993$$

For X = 852:

$$Z = (852 - 533.5) / 312.3138 = 1.0182$$

For X = 258:

$$Z = (258 - 533.5) / 312.3138 = -0.8795$$

For X = 456:

$$Z = (456 - 533.5) / 312.3138 = -0.2477$$

For X = 741:

$$Z = (741 - 533.5) / 312.3138 = 0.6669$$

For X = 951:

$$Z = (951 - 533.5) / 312.3138 = 1.3389$$

For X = 753:

$$Z = (753 - 533.5) / 312.3138 = 0.7038$$

For X = 665:

$$Z = (665 - 533.5) / 312.3138 = 0.4203$$

For X = 452:

$$Z = (452 - 533.5) / 312.3138 = -0.2603$$

For X = 520:

$$Z = (520 - 533.5) / 312.3138 = -0.0433$$