

$$b. P(\text{pass}) / \text{Math} = 2/5 = 0.4$$

$$P(\text{fail}) / \text{Math} = 2/5 = 0.4$$

$$\text{entropy class / edu background} = -(0.4 \times \log_2(0.4) + 0.4 \times \log_2(0.4)) = 0.811$$

$$P(\text{pass}) / \text{CS} = 1/5 = 0.2$$

$$P(\text{fail}) / \text{CS} = 2/5 = 0.4$$

$$\text{entropy class / CS} = -(0.2 \times \log_2(0.2) + 0.4 \times \log_2(0.4)) = 0.811$$

$$P(\text{pass}) / \text{other} = 1/5 = 0.2$$

$$P(\text{fail}) / \text{other} = 2/5 = 0.4$$

$$\text{entropy class / other} = -(0.2 \times \log_2(0.2) + 0.4 \times \log_2(0.4)) = 0.811$$

$$\text{entropy class / edu back} = (3/5 \times 0.811) + (2/5 \times 0.811) + (2/5 \times 0.811) = 0.811$$

$$\text{information gain} = \text{entropy class} - \text{entropy class edu back} = 0.947 - 0.811$$

$$= 0.136$$

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