



Daffodil International University

Department of Computer Science and Engineering (CSE)
Faculty of Science and Information Technology (FSIT)

Bayes' Theorem Mathematical Examples Lecture Sheet 2

Semester: Spring 2024

Course Code and Title: CSE315 – Introduction to Data Science

Course Teacher and Initial: Fahim Faisal (FF)

Section: 61_L

Problem: Imagine you are a data scientist currently engaged in social science research, specially, anthropology. You have gathered quite a large amount of data on ancient human races and how different races were treated and evaluated socially. Based on different groups' social standings and physical attributes (e.g., skin tone, height, body fitness), you have compiled a modest dataset which is given below. Based on the given data, determine the probability of a Negroid person to be labelled as 'good_looking'. Specify required formula(s) and show step-by-step calculations.

Race	Fair	Tall	Fit	Total
Caucasoid	350	450	0	650
Mongoloid	400	300	350	400
Negroid	0	100	50	150
Total	800	850	400	1200

Solution:

$$P(\text{Fair} | \text{Negroid}) = \frac{P(\text{Fair}) \times P(\text{Negroid} | \text{Fair})}{P(\text{Negroid})}$$

$$\text{Or, } P(\text{Fair} | \text{Negroid}) = \frac{\frac{800}{1200} \times \frac{0}{800}}{\frac{150}{1200}}$$

$$\text{Or, } P(\text{Fair} | \text{Negroid}) = 0.00$$

$$P(\text{Tall} | \text{Negroid}) = \frac{P(\text{Tall}) \times P(\text{Negroid} | \text{Tall})}{P(\text{Negroid})}$$

$$\text{Or, } P(\text{Tall} | \text{Negroid}) = \frac{\frac{850}{1200} \times \frac{100}{850}}{\frac{150}{1200}}$$

$$\text{Or, } P(\text{Tall} | \text{Negroid}) = 0.66$$

$$P(\text{Fit} | \text{Negroid}) = \frac{P(\text{Fit}) \times P(\text{Negroid} | \text{Fit})}{P(\text{Negroid})}$$

$$Or, P(Fit | Negroid) = \frac{\frac{400}{1200} \times \frac{50}{400}}{\frac{150}{1200}}$$

$$Or, P(Fit | Negroid) = 0.33$$

So, Probability of a Negroid person to be labelled as 'good_looking' is $0.00 \times 0.66 \times 0.33 = 0.00$