Advanced Artificial Intelligence

Workshop 1 Answer Sheet

Stewart Charles Fisher II
ID: 25020928
25020928@students.lincoln.ac.uk

December 2022

School of Computer Science
University of Lincoln
United Kingdom

Word Count: (Word Count)

Contents

1 Task 1: Revise the Following Calculated Probabilities

1.1 What is the probability of not having measles given that a person has a rash? In other words, calculate $P(\neg m|r)$.

- $P(\neg m|r) = 1 - P(m|r)$

- $P(m|r) = \frac{P(m \cap r)}{P(r)}$

- $P(r) = P(m \cap r) + P(\neg m \cap r)$

- $P(\neg m|r) = 1 - \frac{P(m \cap r)}{P(m \cap r) + P(\neg m \cap r)}$

- $P(\neg m|r) = \frac{P(\neg m \cap r)}{P(m \cap r) + P(\neg m \cap r)}$

- $P(\neg m|r) = \frac{0.8}{0.1 + 0.8} = 0.89$

1.2 What is the probability of having measles given that a person has a rash? In other words, calculate $P(m|r)$.

- $P(m|r) = 1 - P(\neg m|r)$

- $P(m|r) = 1 - 0.89 = 0.11$

2 Task 2: Exercise Using the Bayes Rule

2.1 Calculate $P(d|t)$.

- $P(d|t) = \frac{P(t|d) \cdot P(d)}{P(t)}$

- $P(d|t) = \frac{P(t|d)}{10000 \cdot P(t)}$

- $P(d|t) = \frac{0.99}{10000 \cdot P(t)}$

- $P(t) = P(t|d) \cdot P(d) + P(t|\neg d) \cdot P(\neg d)$

- $P(t) = 0.99 \cdot \frac{1}{10000} + 0.05 \cdot \frac{9999}{10000} = 0.05$

- $P(d|t) = \frac{0.99}{10000 \cdot 0.05} = 0.002$