|  |  |  |
| --- | --- | --- |
| **ID:22-47018-1** | **Name: FARJANA YESMIN OPI** | **Group ID: B09** |

**Q1. Consider the following data set describing the behavior of clients of a company where the class attribute Purchased represents whether the client will buy a specific product of that company.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **SL** | **Gender** | **Age** | **Estimated Salary** | **Purchased** |
| 1 | Male | Young | Medium | FALSE |
| 2 | Male | Young | Low | FALSE |
| 3 | Female | Young | Medium | FALSE |
| 4 | Male | Middle Aged | Medium | FALSE |
| 5 | Female | Young | Medium | FALSE |
| 6 | Female | Young | Medium | FALSE |
| 7 | Female | Young | Low | FALSE |
| 8 | Female | Aged | High | FALSE |
| 9 | Female | Elder | Medium | FALSE |
| 10 | Female | Middle Aged | Medium | FALSE |
| 11 | Female | Elder | Medium | FALSE |
| 12 | Female | Elder | Medium | FALSE |
| 13 | Female | Elder | Low | TRUE |
| 14 | Male | Middle Aged | High | TRUE |
| 15 | Female | Aged | High | TRUE |
| 16 | Female | Middle Aged | High | TRUE |
| 17 | Male | Aged | Medium | TRUE |
| 18 | Male | Aged | High | TRUE |
| 19 | Female | Elder | Low | TRUE |
| 20 | Female | Elder | Low | TRUE |

Now, use Naïve Bayes Classifier to classify the following unknown instances (Each Group Member will classify 1 unknown instance):

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Group Member** | **Gender** | **Age** | **Estimated Salary** | **Purchased** |
| 1 | Male | Elder | High | TRUE |
| 2 | Female | Young | High | FALSE |
| 3 | Male | Middle Aged | Medium | ? |

**Prior Probability**

|  |  |  |
| --- | --- | --- |
| **P(FALSE)** | **=** | **12/20 = 0.6** |
| **P(TRUE)** | **=** | **8/20 = 0.4** |

**Conditional Probability for Group Member 1:**

|  |
| --- |
| **P ( MALE | FALSE ) = 3/12 = 0.25** |
| **P ( MALE | TRUE ) = 3/8 = 0.375** |
| **P ( ELDER | FALSE ) = 3/12 = 0.25** |

|  |
| --- |
| **P ( ELDER | TRUE ) = 3/8 = 0.375** |
| **P ( HIGH | FALSE ) = 1/12 = 0.083** |
| **P ( HIGH | TRUE ) = 4/8 = 0.5** |

**Conditional Probability for Group Member 2:**

|  |
| --- |
| **P ( FEMALE | FALSE ) = 9/12 = 0.75** |
| **P ( FEMALE | TRUE ) = 5/8 = 0.625** |
| **P ( YOUNG | FALSE ) = 6/12 = 0.5** |

|  |
| --- |
| **P ( YOUNG | TRUE ) = 0/8 = 0** |
| **P ( HIGH | FALSE ) = 1/12 = 0.083** |
| **P ( HIGH | TRUE ) = 4/8 = 0.5** |

**Conditional Probability for Group Member 3:**

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|  |  |
| --- | --- |
| **Calculation for TRUE** | **Calculation for FALSE** |
| **FOR UNKNOWN INSTANCE 1:**  **P ( MALE & ELDER & HIGH | TRUE)**  **=P(TRUE)\*P(MALE|TRUE)\*P(ELDER|TRUE)\***  **P(HIGH|TRUE)**  **=0.4\*0.375\*0.375\*0.5**  **=0.028**  **FOR UNKNOWN INSTANCE 2:**  **P ( FEMALE & YOUNG & HIGH | TRUE)**  **=P(TRUE)\*P(FEMALE|TRUE)\*P(YOUNG|TRUE)\***  **P(HIGH|TRUE)**  **=0.4\*0.625\*0\*0.5**  **=0** | **FOR UNKNOWN INSTANE 1:**  **P ( MALE & ELDER & HIGH | FALSE)**  **=P(FALSE)\*P(MALE|FALSE)\*P(ELDER|FALSE)\***  **P(HIGH|FALSE)**  **=0.6\*0.25\*0.25\*0.083**  **=0.003**  **FOR UNKNOWN INSTANCE 2:**  **P ( FEMALE & YOUNG & HIGH | FALSE)**  **=P(FALSE)\*P(FEMALE|FALSE)\*P(YOUNG|FALSE)\***  **P(HIGH|FALSE)**  **=0.6\*0.75\*0.5\*0.083**  **=0.019** |