**DS 501: STATISTICAL AND MATHEMATICAL METHODS FOR DATA SCIENCE**

REPORT FOR ASSIGNMENT 02

ROLL No.:

**IMPORTANT:** Do not submit more than one page for this assignment.

**Problem 1:** MAP Probabilities using naïve Bayes' assumption

You can paste values from R here. Make sure the table is formatted properly.

|  |  |  |  |
| --- | --- | --- | --- |
| **No.** | **MAP probability:**  P(C=0|**x**) | **MAP probability**  P(C=1|**x**) | **Predicted label** |
| 1 | 0.119851016 | 0.880149 | 1 |
| 2 | 0.1326647 | 0.8673353 | 1 |
| 3 | 0.05099638 | 0.9490036 | 1 |
| 4 | 0.1141014 | 0.8858986 | 1 |
| 5 | 0.1263887 | 0.8736113 | 1 |
| 6 | 0.4173142 | 0.5826858 | 1 |
| 7 | 0.002126477 | 0.9978735 | 1 |
| 8 | 0.07497019 | 0.9250298 | 1 |
| 9 | 0.9250298 | 0.9074377 | 1 |
| 10 | 0.1531465 | 0.8468535 | 1 |

**Problem 2:** ML Probabilities using naïve Bayes' assumption

|  |  |  |  |
| --- | --- | --- | --- |
| **No.** | **ML probability:**  P(**x**|C=0) | **ML probability**  P(**x**|C=1) | **Predicted label (ML)** |
| .1 | 4.252127E-03 | 0.0122240289 | 1 |
| 2 | 0.00714502 | 0.01828642 | 1 |
| 3 | 0.00169277 | 0.01233162 | 1 |
| 4 | 0.004252127 | 0.01292388 | 1 |
| 5 | 0.00714502 | 0.01933335 | 1 |
| 6 | 0.01471218 | 0.008041593 | 0 |
| 7 | 1.750011e-05 | 0.003214766 | 1 |
| 8 | 9.525516e-05 | 0.0004600969 | 1 |
| 9 | 0.0007598912 | 0.00291627 | 1 |
| 10 | 0.004147858 | 0.00897881 | 1 |

**Problem 3: In two or three lines comment on the two methods.**

MLE is the probability of observing provided data points of the unknown parameters. It is the value of parameter that maximizes the likelihood. A MAP estimate is the mode of posterior distribution of the parameters (calculated using MLE). It is the value of parameters that maximizes entire posterior distribution. MLE and MAP are same where the prior is uniform.