Classification Assignment:

1. Identify your problem statement:
   1. Machine Learning
   2. Supervised
   3. Classification
2. Tell basic info about the dataset (Total number of rows, columns):
   1. 399 rows × 25 columns
3. Mention the pre-processing method if you’re doing any (like converting string to number – nominal data):
   1. Changed string to number – nominal data – Classification
4. Develop a good model with good evaluation metric. You can use any machine learning algorithm; you can create many models. Finally, you have to come up with final model.
5. All the research values of each algorithm should be documented. (You can make tabulation or screenshot of the results.)

**Accuracy:**

* 1. Random Forest 🡪 0.98
  2. Decision Tree 🡪 0.97
  3. SVM\_Kernal 🡪 0.99 -- 0.9924946382275899
  4. Logistic 🡪 0.99 -- 0.9924946382275899
  5. KNN 🡪 0. 94
  6. CategoricalNB 🡪 0.99 -- 0.9924946382275899
  7. ComplementNB 🡪 0.82 -- 0.8215780250262184
  8. MultinomialNB 🡪 0.82 -- 0.8215780250262184
  9. GaussianNB 🡪 0.98 -- 0.9775556904684072
  10. BernoulliNB 🡪 0.98 -- 0.9775556904684072
      + 1. Random Forest:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| n\_estimators | criterion | max\_features | Accuracy | f1\_score |
| 200 | entropy | sqrt | 0.98 | 0.984962406 |

* + - 1. Decision Tree

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| splitter | criterion | max\_features | Accuracy | f1\_score |
| random | entropy | log2 | 0.97 | 0.970116329 |

* + - 1. SVM\_Kernal

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| C | kernel | gamma | Accuracy | f1\_score |
| 10 | sigmoid | scale | 0.99 | 0.992494638 |

* + - 1. Logistic

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| penalty | solver | multi\_class | Accuracy | f1\_score |
| l2 | lbfgs | multinomial | 0.99 | 0.992494638 |

* + - 1. KNN

|  |  |  |  |
| --- | --- | --- | --- |
| weights | algorithm | Accuracy | f1\_score |
| distance | auto | 0.94 | 0.940494593 |

* + - 1. CategoricalNB

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| force\_alpha | fit\_prior | alpha | Accuracy | f1\_score |
| TRUE | TRUE | 0.1 | 0.99 | 0.992494638 |

* + - 1. ComplementNB

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| alpha | force\_alpha | fit\_prior | class\_prior | Accuracy | f1\_score |
| 1 | TRUE | TRUE | None | 0.82 | 0.821578 |

* + - 1. MultinomialNB

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| alpha | force\_alpha | fit\_prior | class\_prior | Accuracy | f1\_score |
| 1 | TRUE | TRUE | None | 0.82 | 0.821578 |

* + - 1. GaussianNB

|  |  |  |
| --- | --- | --- |
| priors | Accuracy | f1\_score |
| None | 0.98 | 0.97755569 |

* + - 1. BernoulliNB

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| alpha | force\_alpha | binarize | fit\_prior | class\_prior | Accuracy | f1\_score |
| 1 | TRUE | 0 | TRUE | None | 0.98 | 0.977556 |