**Letter Recognition**

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**Abstract:**

gives a brief paragraph on the main target of the project, and the achievement of the

project

**1 Introduction**

We aim to apply some multi-classifiers on the data set and get the best accuracy to make a model that can predict output according to our fetchers after applying (MLP, Random Forest, SVM) we found that the best accuracy we get in SVM and Random Forest we get in the SVM and get in Random Forest. On the other hand, we aim to apply MLP with different activation functions and optimization techniques.

**2 Dataset**

Dataset: <https://www.kaggle.com/nishan192/letterrecognition-using-svm>

More info about: <https://archive.ics.uci.edu/ml/datasets/Letter+Recognition>

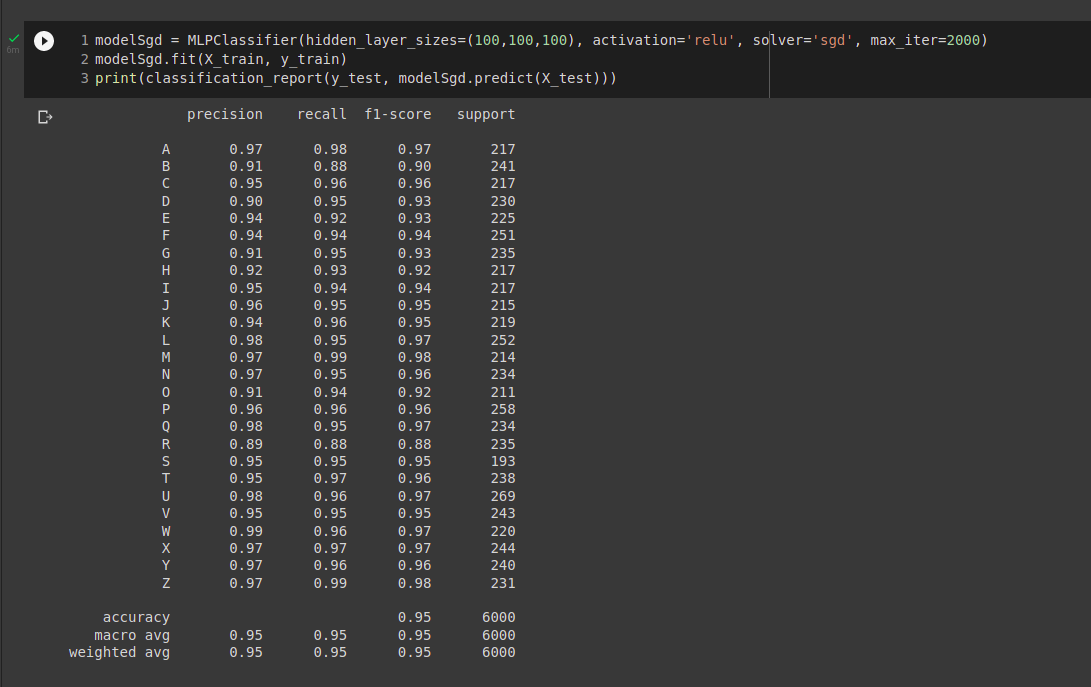
**3 Experimental Results**

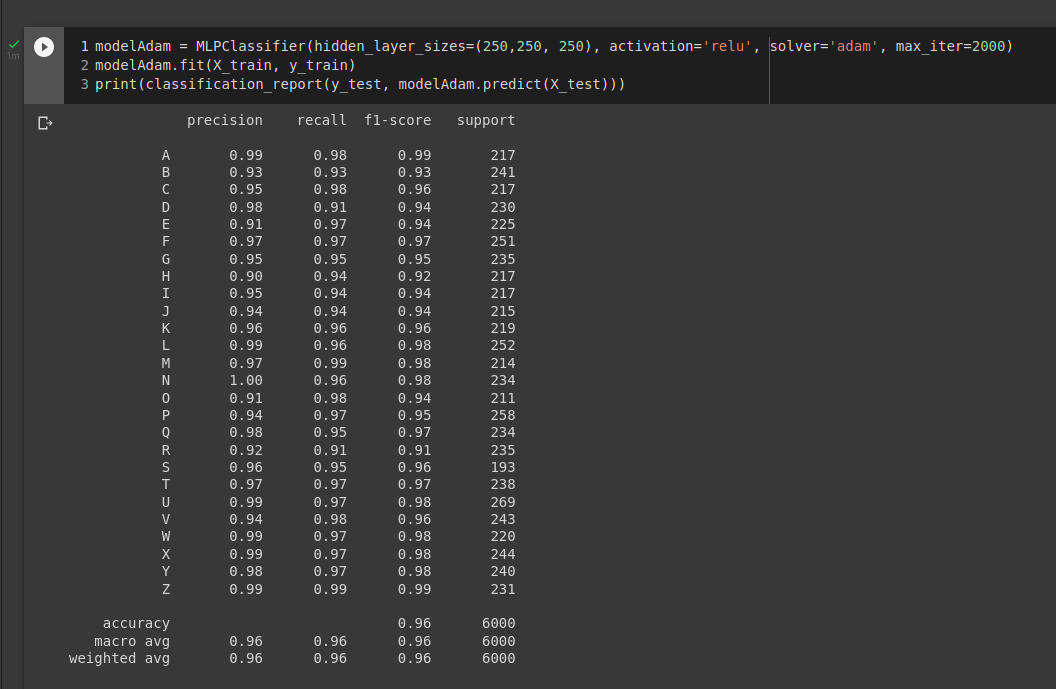
***MLP***

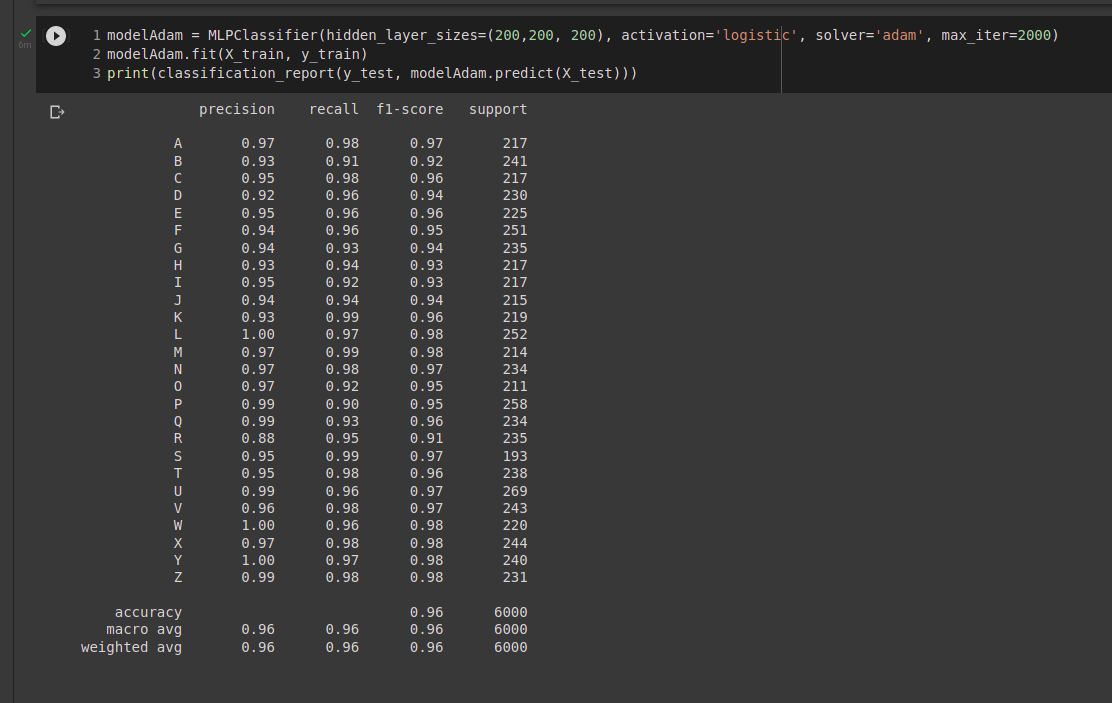
|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Classifier | Activation Function | Optimization | No Of Iterations | No Of Hidden layers | No Of  preceptrons | Accuracy | Precision | Recall |
| MLP | Relu | sgd | 2000 | 3 | 100 | 0.95 | 0.95 | 0.95 |
| MLP | Relu | adam | 2000 | 3 | 250 | 0.96 | 0.96 | 0.96 |
| MLP | logistic | adam | 2000 | 3 | 200 | 0.96 | 0.96 | 0.96 |

**References**

<https://www.kaggle.com/nishan192/letterrecognition-using-svm>

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***Random Forest Classifier***

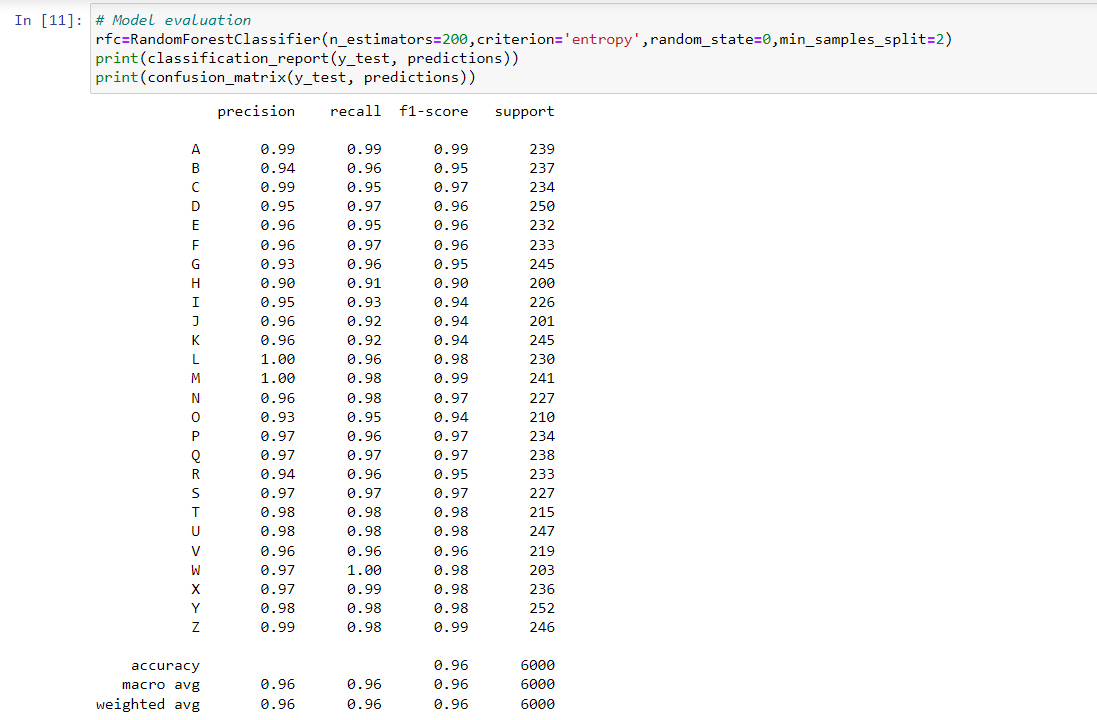
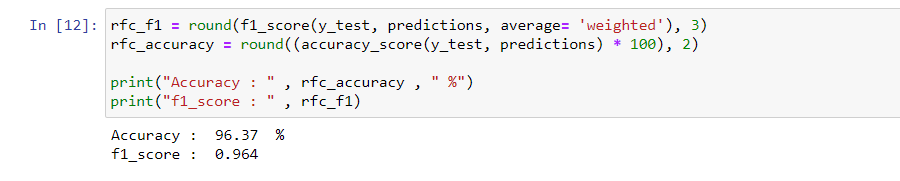
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Classifier | criterion | n\_estimators | Accuracy | Precision | Recall | F1- score |
| Random Forest | entropy | 200 | 96.37% | 0.96 | 0.96 | 0.964 |
| Random Forest | entropy | 250 | 95.75% | 0.96 | 0.96 | 0.958 |
| Random Forest | gini | 200 | 95.67% | 0.96 | 0.96 | 0.957 |
| Random Forest | gini | 250 | 95.95% | 0.96 | 0.96 | 0.96 |

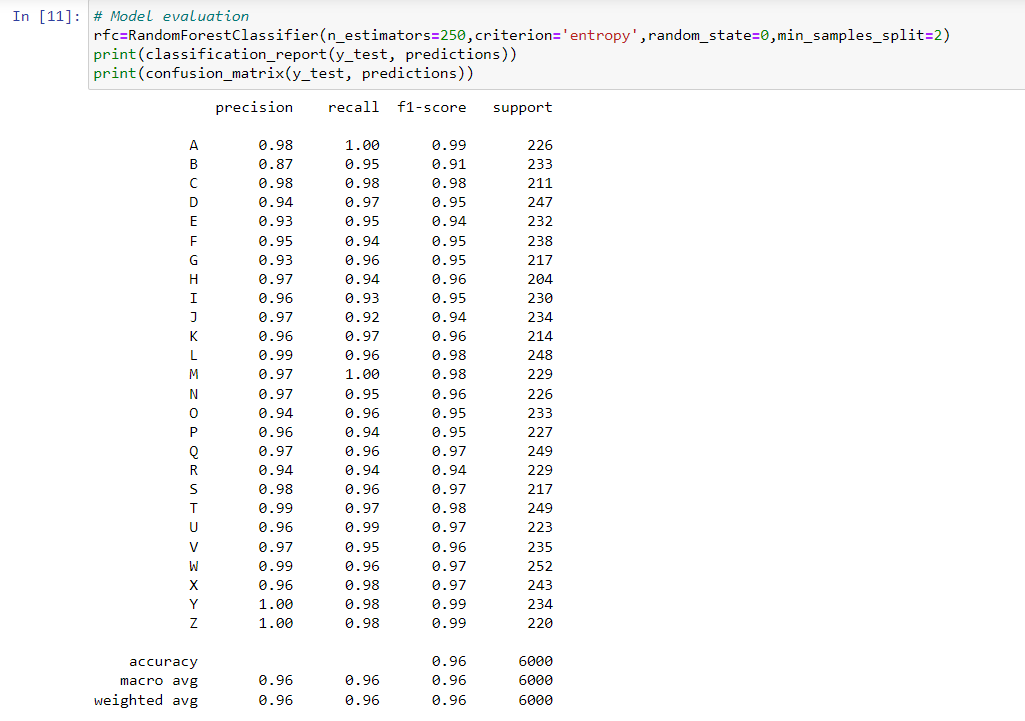
**References:** <https://www.kaggle.com/rahulvv/nb-and-rf-models-99-accuracy>

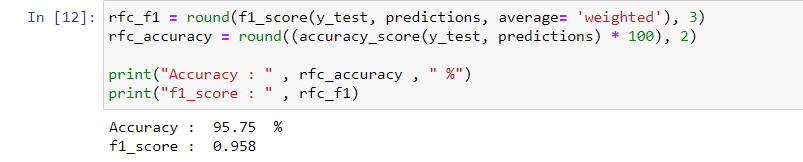
**&**

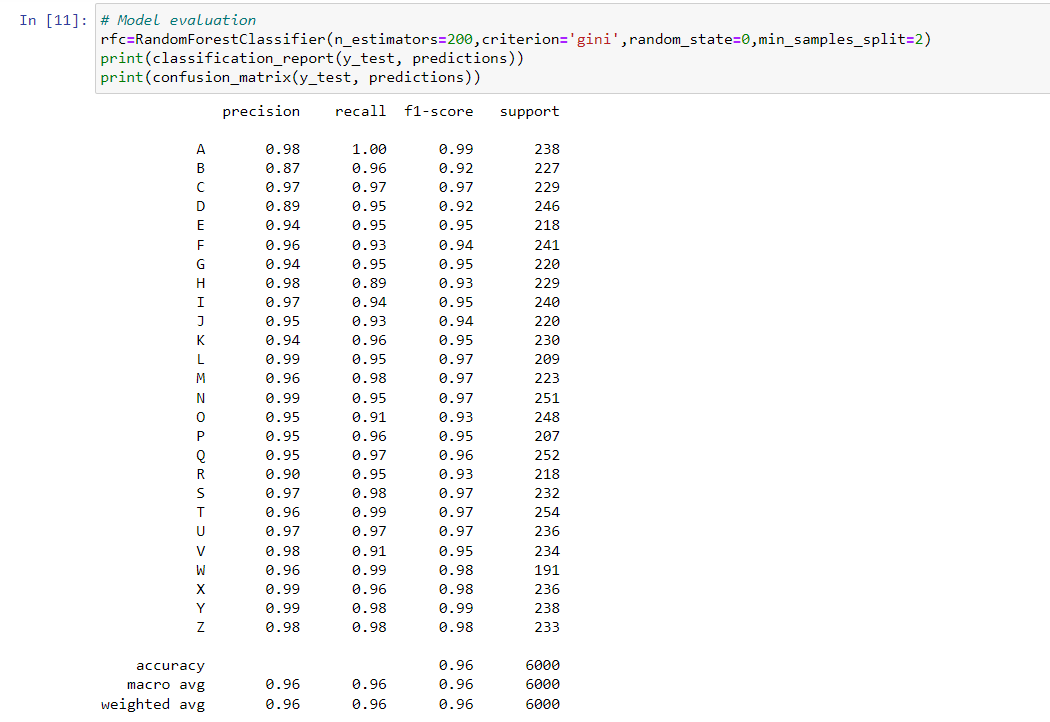
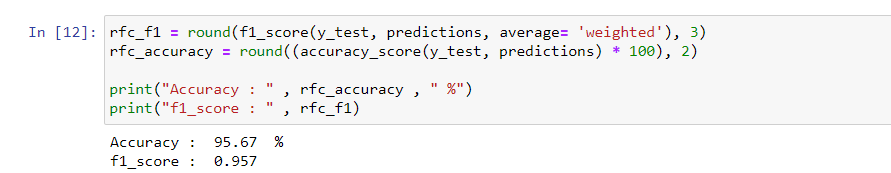
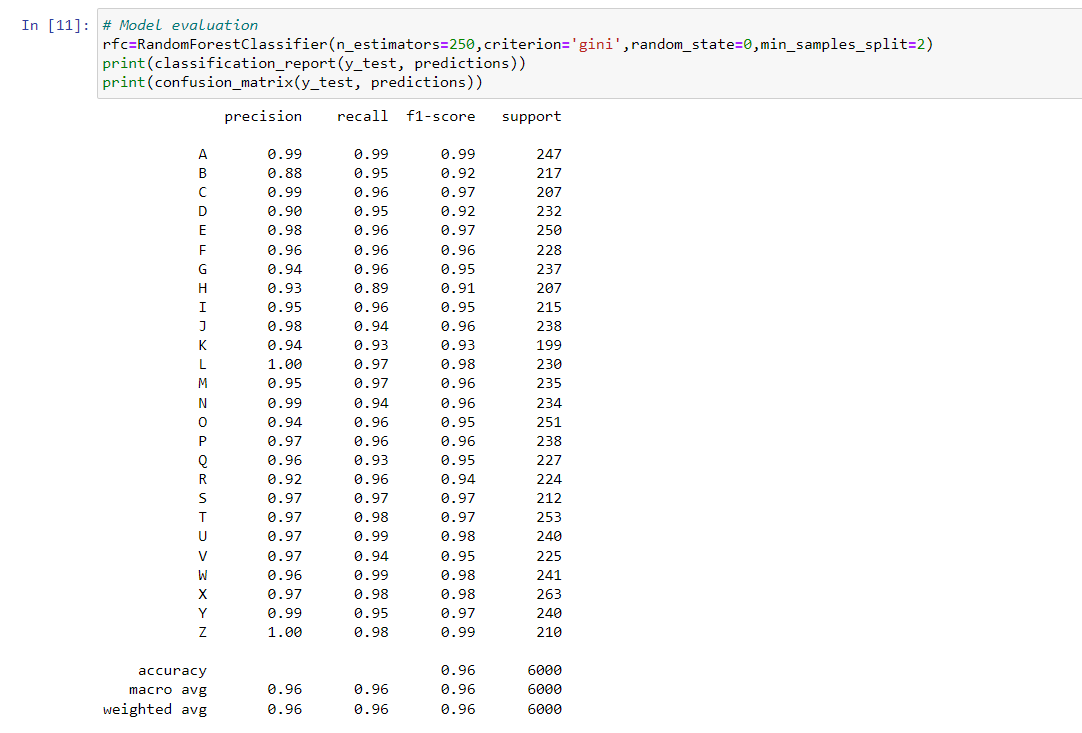
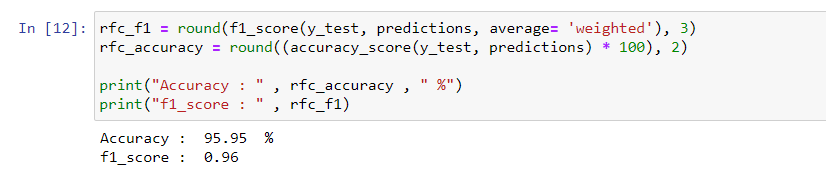
<https://scikit-learn.org/stable/modules/generated/sklearn.ensemble.RandomForestClassifier.html>

**Screenshots:**









***NAÏVE BAYES***

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| --- | --- | --- | --- | --- | --- | --- |
| Classifier | criterion | N\_estimators | Accuracy | Precision | Recall | F1- score |
| NB | GaussianNB | 2000 | 65 % | 0.66 | 0.65 | 0.65 |
| NB | multinomial | 2000 | 55% | 0.55 | 0.55 | 0.53 |
| NB | Bernoulli | 2000 | 11% | 0.17 | 0.11 | 0.09 |

Screenshot:

