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Results and Discussion:

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Method | True Pos | False Pos | False Neg | True Neg | Misclass. | Precision | Recall | F1 Score |
| XGBoost | 19155 | 254 | 2859 | 162 | 0.0972 | 0.9995 | 0.8993 | 0.9467 |
| Random Forest | 19446 | 0 | 2984 | 0 | 0.1330 | 1 | 0.8669 | 0.9287 |
| Elastic Net | 19435 | 11 | 2975 | 9 | 0.1331 | 0.9994 | 0.8672 | 0.9286 |
| LDA | 19414 | 32 | 2959 | 25 | 0.1333 | 0.9983 | 0.8677 | 0.9284 |
| QDA | 17475 | 1971 | 2496 | 488 | 0.1991 | 0.8986 | 0.8750 | 0.8866 |

Table X: Descriptive metrics of models run on the test data partition, sorted by F1 score. XGBoost values are means calculated over 5-fold cross validation.

Results indicate that most models are quite accurate, falling between the 80-90% accuracy range. Values for precision, accuracy and F1 score are also high for these models, although some models do perform better than others. XGBoost, Random Forest and Elastic Net models show the highest F1 scores of the 5 models. However, the highest precision, accuracy, recall and F1 score are shared by the XGBoost model. The only apparent drawback of the XGBoost model is runtime, requiring upwards of twelve hours to build models as accurate as the model presented in this report. Elastic Net also performed well in this scenario, with precision equal to XGBoost but with lower recall. One interesting observation is attributed to the Random Forest model. While the misclassification rate is low, and precision is high, the model fails to predict any true negative cases, rendering the model essentially useless despite performing well in some metrics. While other models performed well, XGBoost provided the best results in all metrics we considered. This model reduces both false positives and false negatives in testing, resulting in reduced economical impact on patients as well as reduces pressure on the healthcare system.