**Report**

The following features listed below are taken into consideration for model building:

1. 'Hospital Name',
2. 'Age',
3. 'Gender',
4. 'Cultural\_group',
5. 'Days\_spend\_hsptl',
6. 'Admission\_type',
7. 'Home or self care,',
8. 'ccs\_diagnosis\_description',
9. 'ccs\_procedure\_description',
10. 'apr\_drg\_description',
11. 'apr\_mdc\_description',
12. 'Code\_illness',
13. 'Description\_illness',
14. 'Mortality risk',
15. 'Surg\_Description',
16. 'Payment\_typology\_1',
17. 'Emergency dept\_yes/No',
18. 'Tot\_charg',
19. 'Tot\_cost',
20. 'ratio\_of\_total\_costs\_to\_total\_charges',
21. 'Result'

The features which do not appear above are removed since they have more than 50% of null values or they share the least correlation with the target variable which is **‘Result**’ in this case.

**Model Building Algorithms**

1. **Decision Tree**

**Overall Accuracy -** 61.88%

**Precision -** (0.25,0.75) - (Fraud, Genuine)

**Recall -** (0.26,0.74) - (Fraud, Genuine)

**F1 Score -** (0.26,0.74) - (Fraud, Genuine)

**Sensitivity -** 0.25

**Specificity -** 0.75

* SMOTE Analysis

**Overall Accuracy -** 61.72%

**Precision -** (0.25,0.75) - (Fraud, Genuine)

**Recall -** (0.27,0.73) - (Fraud, Genuine)

**F1 Score -** (0.26,0.74) - (Fraud, Genuine)

**Sensitivity -** 0.25

**Specificity -** 0.75

1. **Neural Networks**

* MLP Classifier

**Overall Accuracy -** 74.92%

**Precision -** (0, 0.75) - (Fraud, Genuine)

**Recall -** (0, 1) - (Fraud, Genuine)

**F1 Score -** (0, 0.86) - (Fraud, Genuine)

**Sensitivity -** 0

**Specificity -** 0.75

1. **Naïve Bias**

GaussianNB:

precision recall f1-score support

0 0.23 0.01 0.02 78587

1 0.75 0.99 0.85 235986

micro avg 0.74 0.74 0.74 314573

macro avg 0.49 0.50 0.44 314573

weighted avg 0.62 0.74 0.64 314573

MultinomialNB:

precision recall f1-score support

0 0.25 0.26 0.26 78587

1 0.75 0.74 0.74 235986

micro avg 0.62 0.62 0.62 314573

macro avg 0.50 0.50 0.50 314573

weighted avg 0.63 0.62 0.62 314573

From the above measures, Neural Networks is the best model.