**Model Development Phase Report**

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| Date | June 2025 |
| Team ID | SWTID1749841176 |
| Project Title | Online Payments Fraud Detection Using Machine Learning |
| Maximum Marks | 6 Marks |

**Model Selection Report**

In the forthcoming Model Selection Report, various models will be outlined, detailing their descriptions, hyperparameters, and performance metrics, including Accuracy or F1 Score. This comprehensive report will provide insights into the chosen models and their effectiveness.

**Model Selection Report:**

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| **Model** | **Description** |
| Random Forest Classifier | An ensemble learning method that builds multiple decision trees during training and outputs the mode (classification) of their predictions. It reduces overfitting and improves accuracy by averaging many deep decision trees. |
| Decision Tree Classifier | A tree-structured model that splits the data into branches based on feature values to make predictions. It's simple, interpretable, and prone to overfitting if not pruned. |
| ExtraTree Classifier | Similar to Random Forest but introduces more randomness by selecting split points randomly, not just the best ones. This often speeds up training and can reduce variance further. |
| Support Vector Machine Classifier | A powerful linear (and non-linear with kernel trick) classifier that finds the optimal hyperplane to separate data points of different classes with the maximum margin. |
| XgBoost Classifier | A highly efficient and scalable implementation of gradient boosting. It builds an ensemble of weak learners (typically decision trees) in a sequential manner, optimizing for speed and performance. |

**Model Performance Metrics:**

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| --- | --- | --- | --- | --- | --- |
| **Model** | **Precision** | **Recall** | **F1-Score** | **Macro Avg F1** | **Accuracy** |
| Random Forest Classifier | 0.98 | 0.79 | 0.88 | 0.94 | 1.00 |
| Decision Tree Classifier | 0.89 | 0.88 | 0.88 | 0.94 | 1.00 |
| Extra Tree Classifier | 0.99 | 0.78 | 0.87 | 0.93 | 1.00 |
| Support Vector Machine Classifier | 0.87 | 0.81 | 0.84 | 0.88 | 0.90 |
| XgBoost Classifier | 0.98 | 0.79 | 0.88 | 0.94 | 1.00 |