**RESULTS AND VISUALIZATIONS**

**Comparative Analysis:**

| **Metric** | **Random Forest** | **XGBoost** | **Logistic Regression** | **KNN** | **Decision Tree** | **SVM** | **Neural Network** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Precision | 99% | 97% | 98.5% | 97.3% | 98.9% | 96% | 98% |
| Recall | 99% | 88.6% | 89.2% | 90% | 91% | 96% | 93% |
| Accuracy | 99.1% | 99.2% | 99% | 94% | 96% | 95% | 94% |

The experimental results demonstrate that Logistic Regression, K-Nearest Neighbors (KNN), Decision Tree, Random Forest, XGBoost, Support Vector Machine (SVM), and Neural Network are all effective models for predicting financial fraud. Each algorithm offers distinct advantages based on the complexity and nature of the dataset.

Random Forest achieves high precision, recall, and overall accuracy, making it highly suitable for real-time fraud detection. XGBoost, with its boosting mechanism, delivers excellent accuracy and is particularly effective in handling complex fraud scenarios. Similarly, Neural Networks and SVM exhibit strong performance in learning non-linear patterns, while Logistic Regression and KNN provide competitive results with the added benefit of interpretability and simplicity.

Among all models, Random Forest and XGBoost stand out for their balanced performance across all evaluation metrics — precision, recall, and accuracy. According to the comparative analysis, XGBoost demonstrates slightly higher accuracy in complex conditions, whereas Random Forest is more consistent and reliable in real-time detection environments.