

Credit Card Fraud Detection Using Random Forest Classifier

This project uses a Random Forest classifier to detect fraudulent transactions in a credit card dataset. The dataset contains 284,808 transactions, with 30 features representing transaction details and one target feature indicating whether a transaction is fraudulent (1) or legitimate (0).

Steps and Explanation:

Libraries Import:

- Import necessary libraries for data manipulation, visualization, machine learning, and oversampling

Loading and Verifying Dataset:

- Load the dataset using `pd.read_csv()`.
- Verify if the dataset is loaded correctly by checking its shape and ensuring it matches the expected shape (284,808 rows and 31 columns).
- Display any missing values in the dataset.

Exploratory Data Analysis (EDA):

- Display the first few rows of the dataset.
- Plot class distribution to visualize the imbalance between legitimate and fraudulent transactions.
- Plot the correlation matrix to understand relationships between different features.

Data Preparation:

- Separate features (X) and target variable (y).
- Check for and handle any NaN values in the target variable.

Handling Imbalanced Data:

- Use `RandomOverSampler` from `imblearn` to balance the dataset by oversampling the minority class (fraudulent transactions).

Splitting the Data:

- Split the balanced dataset into training and testing sets using `train_test_split()`.

Model Training:

Initialize and train a Random Forest classifier with 641 estimators on the training set.

Model Evaluation:

- Make predictions on the test set.
- Calculate the number of errors, accuracy, precision, recall, F1-score, and confusion matrix.
- Visualize the confusion matrix.

Classification Report:

- Print a detailed classification report to show precision, recall, and F1-score for each class.

User Input Prediction:

- Define a function to predict the class of a transaction based on user input data.

Dataset:

https://drive.google.com/file/d/1B2z6_Kjh1AsIkVaExpl_HDA3FAuFTabR/view?usp=sharing