

Credit Card Fraud Detection Model Report

1. Introduction

In this report, we present the development and evaluation of a credit card fraud detection model. The model aims to identify fraudulent transactions from a dataset containing various transaction features.

2. Data Exploration

- **Dataset Overview:** Initially, the dataset was loaded and inspected for its structure and content. It comprises several features including transaction date and time, customer information, and transaction details.
- **Data Quality:** Examination revealed no missing values in the dataset, ensuring the integrity of the data for analysis.
- **Feature Engineering:** Date and time features were extracted from the original timestamp for further analysis.

3. Preprocessing

- **Data Splitting:** The dataset was split into training and testing sets to facilitate model training and evaluation.
- **Handling Missing Values:** Numerical features were imputed using the mean strategy, while categorical features were imputed with the most frequent value and encoded using ordinal encoding.
- **Pipeline Construction:** A preprocessing pipeline was constructed to handle numerical and categorical features seamlessly.

4. Model Development

- **Model Selection:** A Decision Tree Classifier was chosen as the base model for its interpretability and suitability for binary classification tasks.
- **Pipeline Integration:** The preprocessing pipeline was integrated with the Decision Tree Classifier to form a unified model pipeline.
- **Model Training:** The model was trained on the training dataset to learn patterns and relationships between features and target labels.

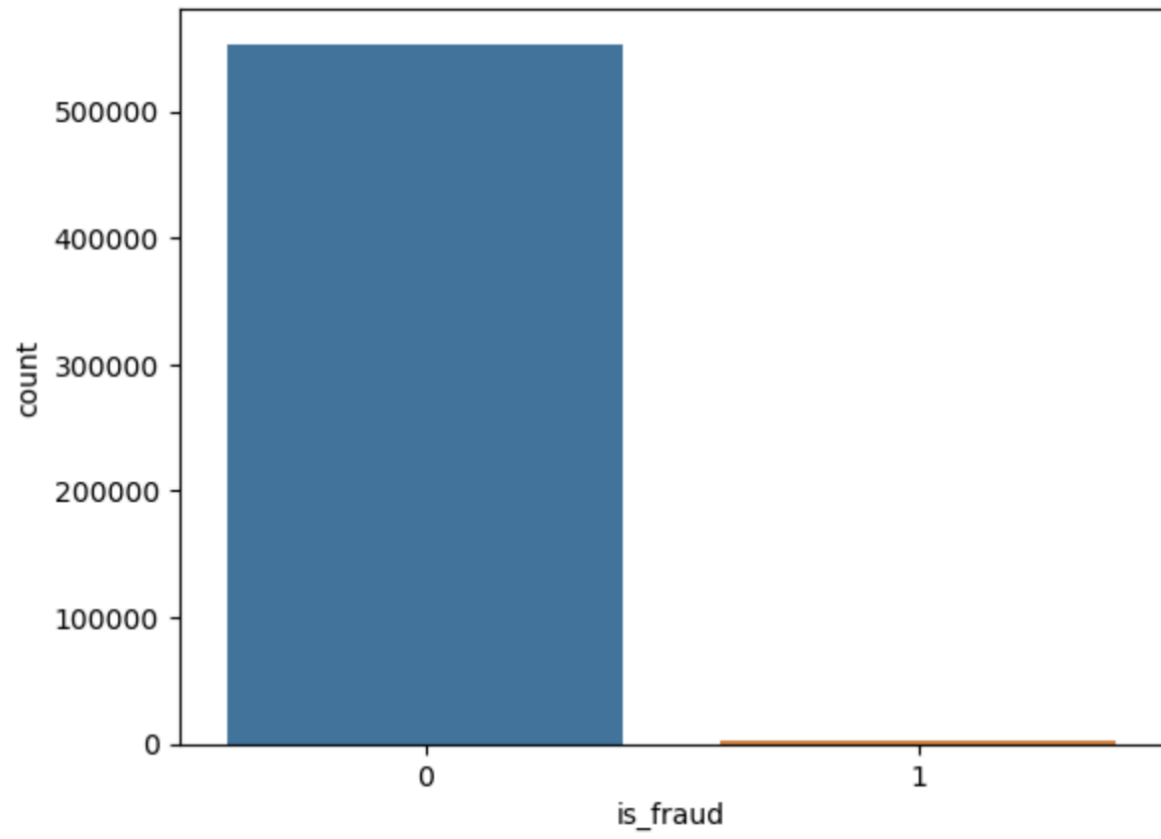
5. Model Evaluation

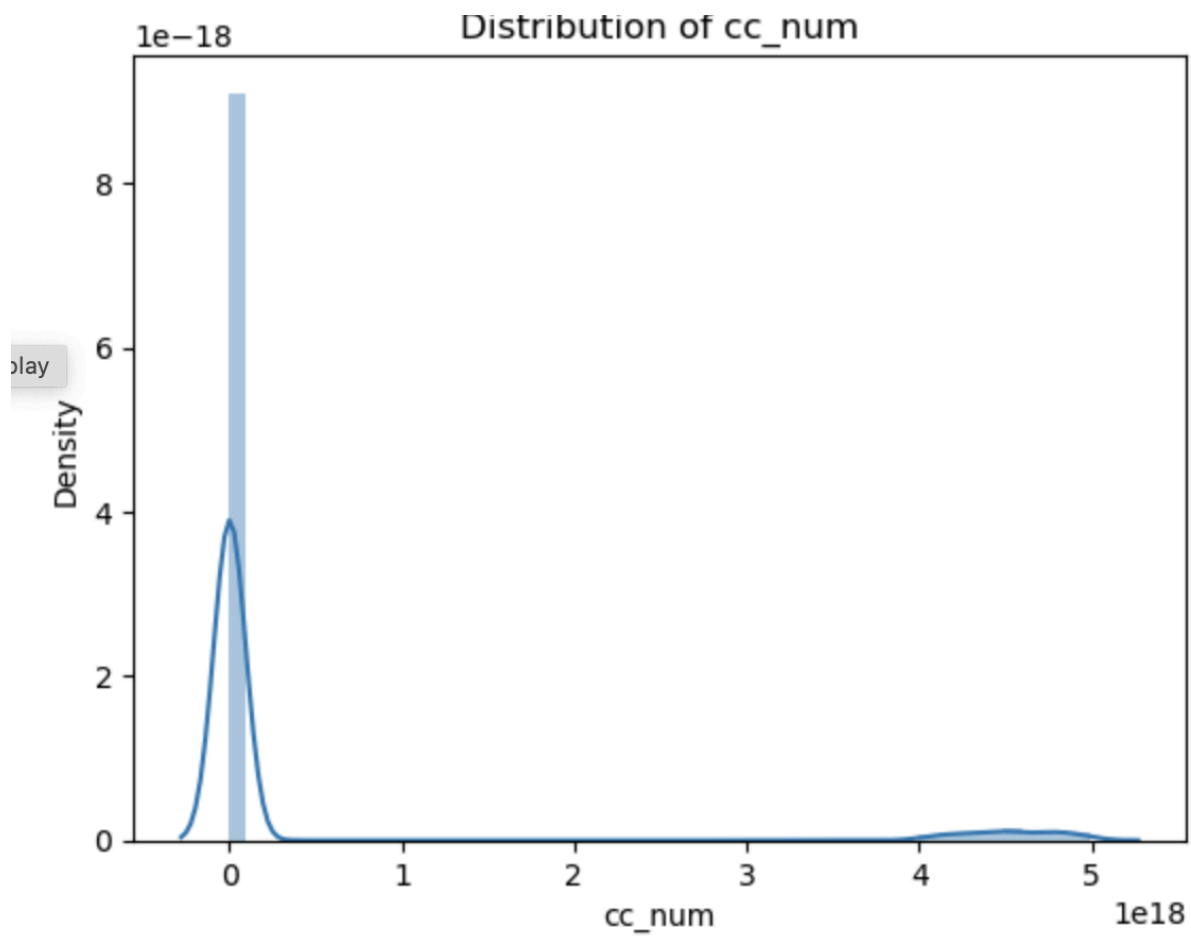
- **Accuracy Assessment:** The model achieved an accuracy score of 0.9966 on the test dataset, indicating its performance in classifying transactions as fraudulent or legitimate.
- **Confusion Matrix Analysis:** A confusion matrix was generated to visualize the model's performance in terms of true positive, true negative, false positive, and false negative predictions.

6. Recommendations and Conclusion

- **Insights and Learnings:** The analysis of the dataset revealed some insights as images shown below, highlighting key patterns and trends in fraudulent transactions.
- **Model Enhancements:** To further improve the model's performance, future iterations may consider exploring advanced algorithms, feature engineering techniques, and ensemble methods.
- **Business Implications:** Deploying an effective fraud detection model can significantly mitigate financial losses and enhance customer trust and satisfaction.
- **Conclusion:** In conclusion, the developed credit card fraud detection model demonstrates promising performance in identifying fraudulent transactions. Continued refinement and integration with real-time monitoring systems can bolster its efficacy in combating fraudulent activities.

Distribution of Fraudulent Transactions





File display

