Problem Statement:

Credit Score Prediction: Data Cleaning and Transformation :

Clean and transform financial data to improve credit risk assessment models.

Personal Details:

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Introduction

Credit score prediction is a critical task in financial risk assessment. Lenders use credit scores to evaluate the creditworthiness of borrowers. This project aims to clean and transform financial data to enhance credit risk assessment models. The process involves handling missing values, detecting outliers, normalizing data, and preparing it for machine learning models. Proper data preprocessing ensures the model's accuracy and reliability.

Methodology

1. **Data Collection:** The dataset containing financial transaction details, credit history, and demographic information is gathered.

2. **Data Cleaning:**
   - Handle missing values using mean/median imputation or deletion methods.
   - Remove duplicate records.

3. **Data Transformation:**
   - Standardize numerical features using Min-Max scaling.
   - Convert categorical data into numerical form using one-hot encoding.

4. **Feature Engineering:**
   - Generate new features such as credit utilization ratio and payment history trends.

5. **Exploratory Data Analysis (EDA):**
   - Visualize data distributions and correlations between financial variables.

6. **Model Preparation:**
   - Split the dataset into training and testing sets.
   - Apply machine learning models such as logistic regression, decision trees, or neural networks.

Code

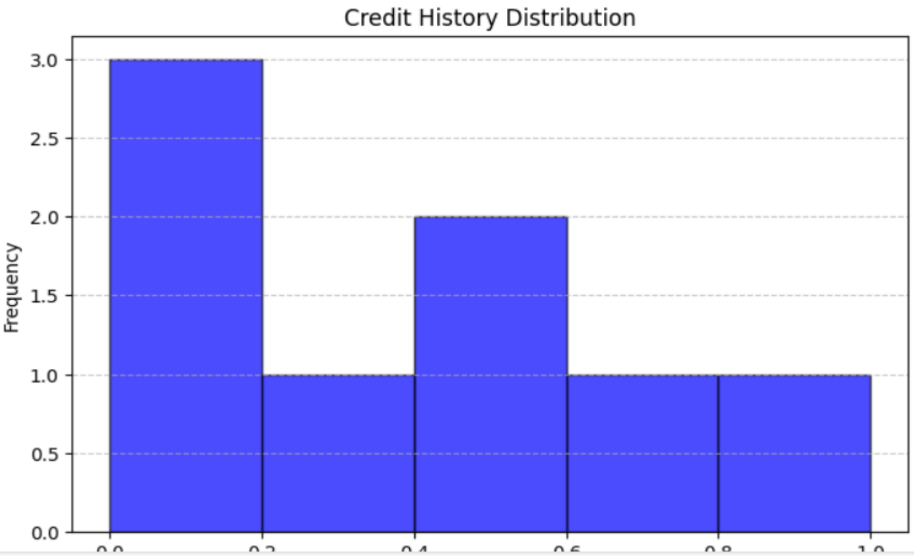
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.preprocessing import LabelEncoder, MinMaxScaler


# Step 1: Create Sample Dataset
data = {
    "ID": [1, 2, 3, 4, 5, 6, 7, 8],
    "Age": [25, 40, 35, 50, 30, 45, 28, 55],
    "Income": [45000, 80000, 60000, 100000, 50000, 90000, 48000, 120000],
    "Loan Amount": [10000, 25000, 15000, 40000, 12000, 35000, 11000, 50000],
    "Credit History (Years)": [2, 10, 7, 15, 5, 12, 3, 20],
    "Debt-to-Income Ratio": [0.35, 0.25, 0.30, 0.20, 0.32, 0.22, 0.33, 0.18],
    "Late Payments": [1, 0, 1, 0, 2, 0, 1, 0],
    "Credit Score Category": ["Fair", "Good", "Fair", "Excellent", "Poor", "Good", "Fair", "Excellent"]
}


# Convert dictionary to DataFrame
df = pd.DataFrame(data)


# Save to CSV
csv_file = "credit_data.csv"
df.to_csv(csv_file, index=False)
```

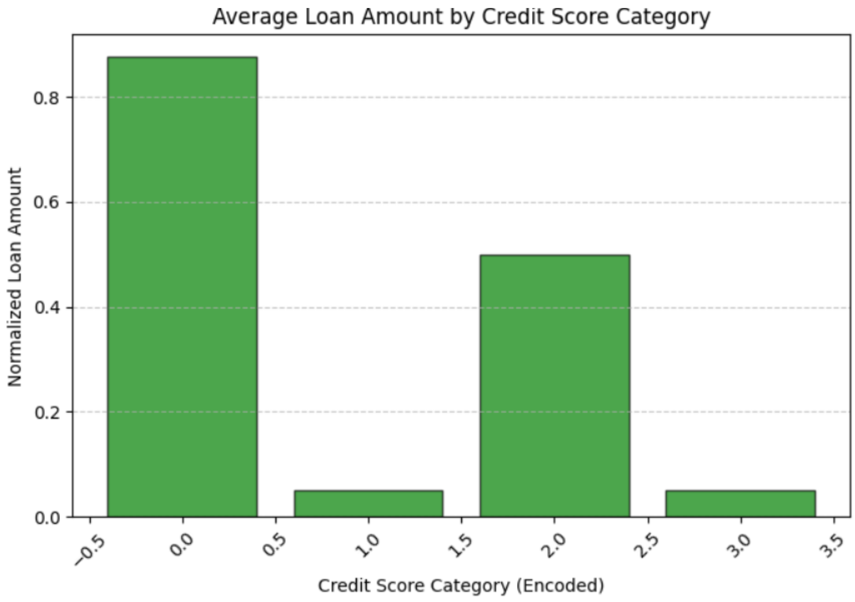
```
print(f"Dataset saved as {csv_file}")


# Step 2: Load Data
df = pd.read_csv(csv_file)


# Display basic information
print("\nDataset Overview:\n", df.info())
print("\nMissing Values:\n", df.isnull().sum())


# Step 3: Data Cleaning - Handle Missing Values Only for Numeric Columns
df.fillna(df.select_dtypes(include=[np.number]).mean(), inplace=True)


# Step 4: Encode Categorical Column (Credit Score Category)
label_encoder = LabelEncoder()
df["Credit Score Category"] = label_encoder.fit_transform(df["Credit Score Category"])


print("\nEncoded Credit Score Categories:\n", df["Credit Score Category"].unique())


# Step 5: Normalize Numerical Data (Min-Max Scaling)
scaler = MinMaxScaler()
numeric_cols = ["Age", "Income", "Loan Amount", "Credit History (Years)", "Debt-to-Income Ratio", "Late Payments"]
df[numeric_cols] = scaler.fit_transform(df[numeric_cols])


print("\nNormalized Data:\n", df.head())
```

```
# Step 6: Plot Data Distributions

# Histogram for Credit History
plt.figure(figsize=(8, 5))
plt.hist(df["Credit History (Years)"], bins=5, color="blue", edgecolor="black", alpha=0.7)
plt.title("Credit History Distribution")
plt.xlabel("Normalized Credit History (Years)")
plt.ylabel("Frequency")
plt.grid(axis='y', linestyle='--', alpha=0.7)
plt.show()

# Bar Chart for Average Loan Amount by Credit Score Category
categories = df["Credit Score Category"].unique()
avg_loan = [df[df["Credit Score Category"] == cat]["Loan Amount"].mean() for cat in categories]

plt.figure(figsize=(8, 5))
plt.bar(categories, avg_loan, color="green", edgecolor="black", alpha=0.7)
plt.title("Average Loan Amount by Credit Score Category")
plt.xlabel("Credit Score Category (Encoded)")
plt.ylabel("Normalized Loan Amount")
plt.xticks(rotation=45)
plt.grid(axis='y', linestyle='--', alpha=0.7)
plt.show()
```

Output/Results

Attach the screenshot of the code execution results, including graphs, data visualizations, or model performance metrics.





References/Credits

1 CHATGPT