SUBJECT:INTRODUCTION TO AI.

Report Title

CREDIT SCORE PREDICTOR: CLEAN AND TRANSFORM FINANCIAL DATA TO IMPROVE CREDIT RISK ASSESSMENT MODELS.

Name: [kushagra rastogi]

Roll No.: 2024011004001l3]

Institution: [KIET group of institution]

CLASS ROLL NO.=40

Credit Score Data Preprocessing and Analysis Report.

Introduction

Credit scoring is a crucial aspect of financial decision-making, used by banks and lenders to evaluate an individual's creditworthiness. The objective of this project is to preprocess and analyze a credit score dataset to ensure it is clean, normalized, and ready for machine learning models. This involves handling missing values, normalizing numerical features, encoding categorical variables, and visualizing key trends in the data.

Methodology

Step 1: Data Upload and Inspection

- The dataset was uploaded and read into a Pandas DataFrame.
- Basic information about the dataset, such as column names, data types, and missing values, was displayed.

Step 2: Handling Missing Values

- Missing values in numeric columns were filled with the **median** value to prevent data distortion.
- Missing categorical values were filled using the **mode** (most frequent value).

Step 3: Feature Scaling and Normalization

- Numerical features were scaled using **MinMaxScaler**, transforming all values into the range [0,1] to ensure uniformity.

Step 4: Encoding Categorical Variables

- Categorical columns (e.g., Credit History, Credit Score) were converted into numerical form using **Label Encoding**.

Step 5: Data Visualization

- **Credit Score Distribution:** A bar plot was used to visualize the distribution of credit scores.
- **Correlation Heatmap:** A heatmap was generated to show correlations between features.
- **Loan Amount vs. Income:** A scatter plot was created to analyze the relationship between **Loan Amount** and **Income** based on credit score categories.

Step 6: Data Preparation for Machine Learning

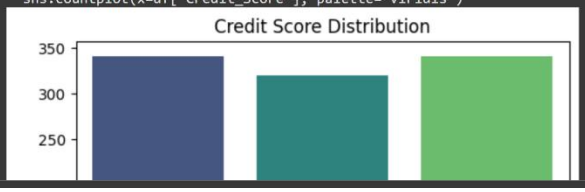
- The dataset was cleaned and transformed, making it ready for model training.
- The '**ID**' column was dropped as it does not contribute to predictions.
- Features (X) and target variable (y) were separated.

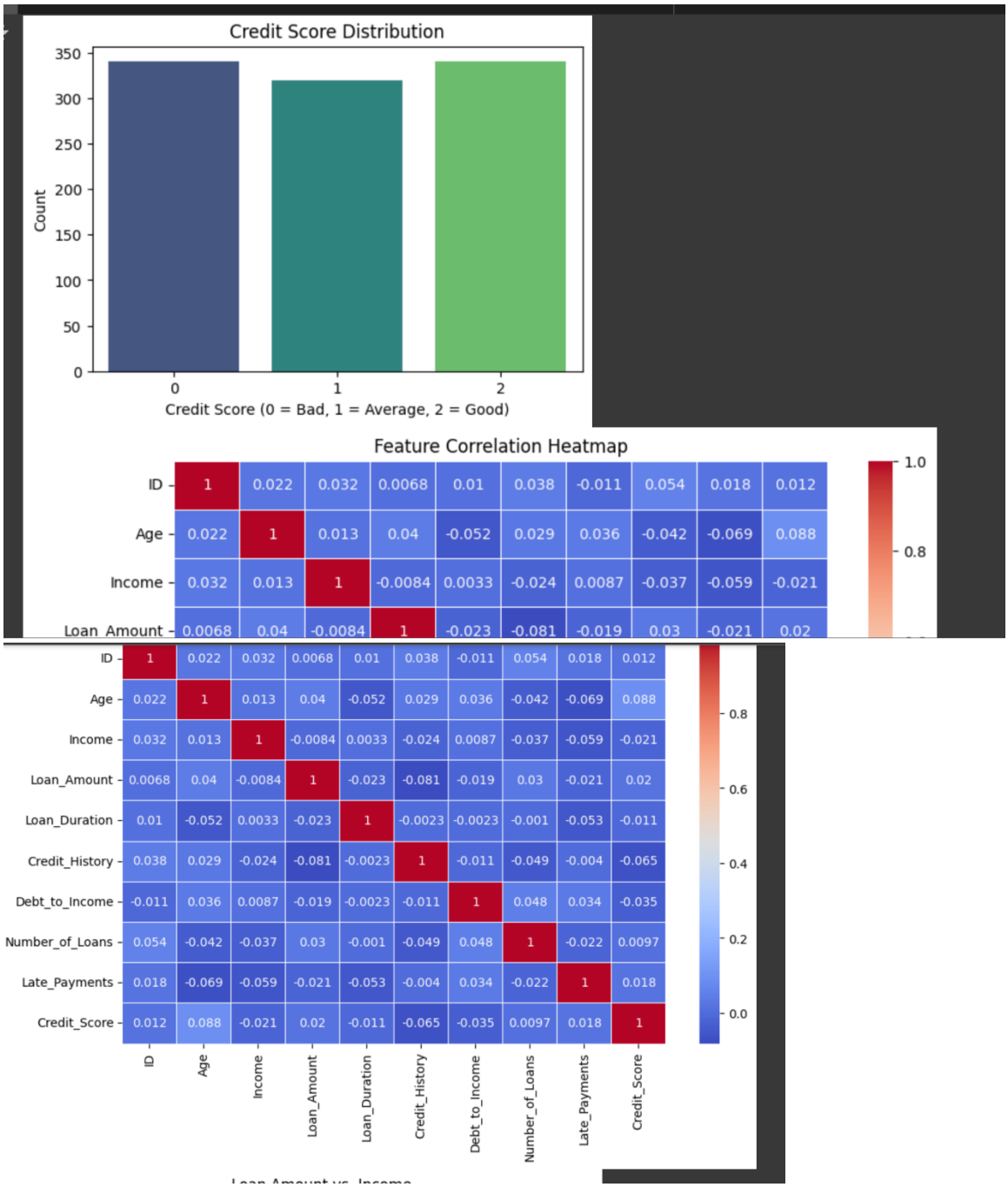
CODE:

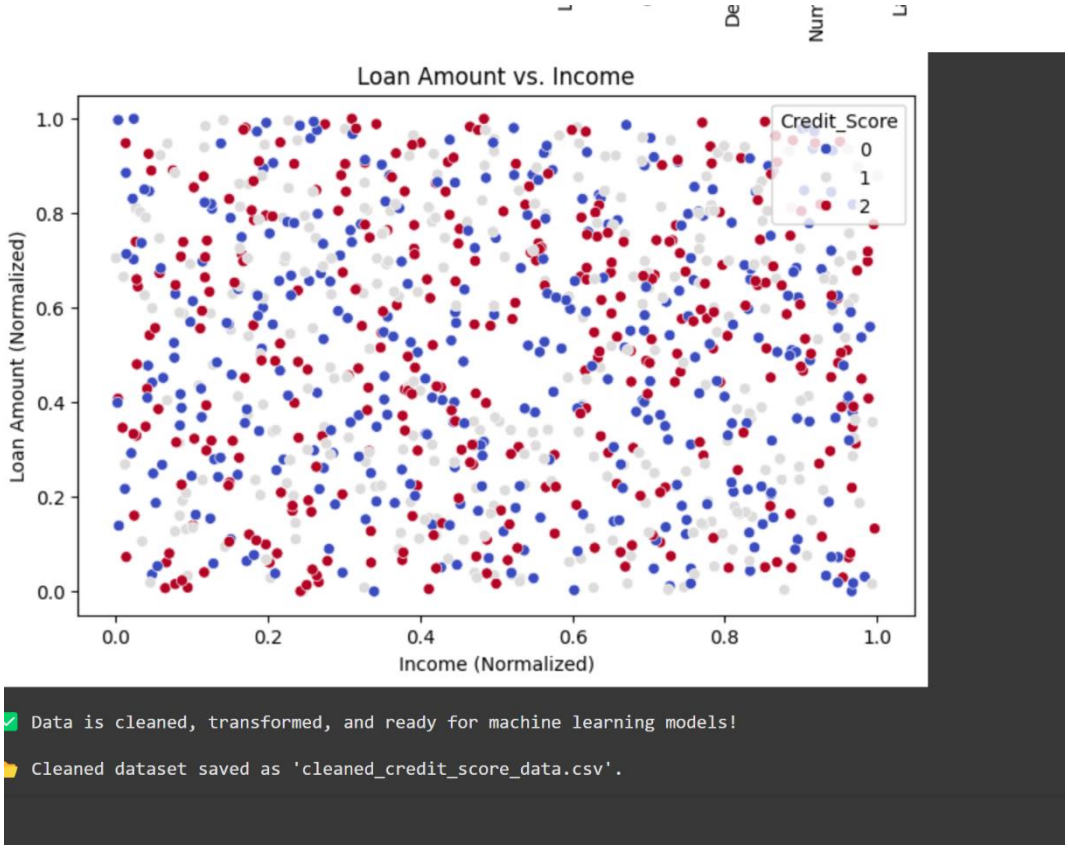
```
# Step 1: Install and Import Required Libraries
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.preprocessing import MinMaxScaler, LabelEncoder
from google.colab import files

# Step 2: Ask User to Upload CSV File
print("📂 Please upload the 'credit_score_data.csv' file.")
uploaded = files.upload()

# Step 3: Read the uploaded CSV file
file_name = list(uploaded.keys())[0]  # Get the uploaded file name
df = pd.read_csv(file_name)

# Step 4: Display basic info about the dataset
print("\n🔍 First 5 rows of the dataset:")
print(df.head())

print("\n📊 Dataset Info:")
print(df.info())

print("\n☑ Checking for Missing Values:")
print(df.isnull().sum())

# Step 5: Handle Missing Values (if any)
df.fillna(df.median(numeric_only=True), inplace=True)  # Fill missing values with median

# Step 6: Normalize Numeric Features (Scaling)
scaler = MinMaxScaler()
num_cols = ["Age", "Income", "Loan_Amount", "Loan_Duration", "Debt_to_Income", "Number_of_Loans", "Late_Payments"]
df[num_cols] = scaler.fit_transform(df[num_cols])

# Step 7: Encode Categorical Features
df["Credit_History"] = df["Credit_History"].astype("category").cat.codes
df["Credit_Score"] = df["Credit_Score"].astype("category").cat.codes  # Target variable

# Step 8: Data Visualization

#  ◇  Credit Score Distribution
plt.figure(figsize=(6,4))
sns.countplot(x=df["Credit_Score"], palette="viridis")
plt.title("Credit Score Distribution")
plt.xlabel("Credit Score (0 = Bad, 1 = Average, 2 = Good)")
plt.ylabel("Count")
plt.show()

#  ◇  Correlation Heatmap
plt.figure(figsize=(10,6))
sns.heatmap(df.corr(), annot=True, cmap="coolwarm", linewidths=0.5)
plt.title("Feature Correlation Heatmap")
plt.show()

#  ◇  Loan Amount vs. Income (Scatter Plot)
plt.figure(figsize=(8,5))
sns.scatterplot(x=df["Income"], y=df["Loan_Amount"], hue=df["Credit_Score"], palette="coolwarm")
plt.title("Loan Amount vs. Income")
plt.xlabel("Income (Normalized)")
plt.ylabel("Loan Amount (Normalized)")
plt.show()

# Step 9: Prepare Data for Model Training
X = df.drop(["ID", "Credit_Score"], axis=1)  # Features
y = df["Credit_Score"]  # Target

print("\n☑ Data is cleaned, transformed, and ready for machine learning models!")

# Optional: Save cleaned data
df.to_csv("cleaned_credit_score_data.csv", index=False)
print("\n📂 Cleaned dataset saved as 'cleaned_credit_score_data.csv'.")
```

Output/Result

```
📂 Please upload the 'credit_score_data.csv' file.
Choose Files credit_score_data.csv
• credit_score_data.csv(text/csv) - 36620 bytes, last modified: 3/10/2025 - 100% done
Saving credit_score_data.csv to credit_score_data (1).csv

🔍 First 5 rows of the dataset:
   ID  Age  Income  Loan_Amount  Loan_Duration  Credit_History  \
0   1   18  125724         9392             54               1
1   2   54  104563        33843             30               0
2   3   60  102528        41954             14               0
3   4   28   30879        16072             10               1
4   5   52   88309         9267             25               1

   Debt_to_Income  Number_of_Loans  Late_Payments  Credit_Score
0           45.97               10              4             1
1           25.05                0             19             2
2           27.39                0              5             0
3           44.37                2             19             1
4           15.14                2              5             0

📊 Dataset Info:
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1000 entries, 0 to 999
Data columns (total 10 columns):
 #   Column           Non-Null Count  Dtype
---  ------           --------------  -----
 0   ID               1000 non-null   int64
 1   Age              1000 non-null   int64
 2   Income           1000 non-null   int64
 3   Loan_Amount      1000 non-null   int64
 4   Loan_Duration    1000 non-null   int64
 5   Credit_History   1000 non-null   int64
 6   Debt_to_Income   1000 non-null   float64
 7   Number_of_Loans  1000 non-null   int64
 8   Late_Payments    1000 non-null   int64
 9   Credit_Score     1000 non-null   int64
dtypes: float64(1), int64(9)
memory usage: 78.3 KB
None

✅ Checking for Missing Values:
ID                 0
Age                0
Income             0
Loan_Amount        0
Loan_Duration      0
Credit_History     0
Debt_to_Income     0
Number_of_Loans    0
Late_Payments      0
Credit_Score       0
dtype: int64
<ipython-input-12-fe3d700e0459>:43: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=F

  sns.countplot(x=df["Credit_Score"], palette="viridis")
```




Credit Score Distribution
Count
Credit Score (0 = Bad, 1 = Average, 2 = Good)
Feature Correlation Heatmap
ID
Age
Income
Loan_Amount
Loan_Duration
Credit_History
Debt_to_Income
Number_of_Loans
Late_Payments
Credit_Score



References/Credits

1.Dataset Source: CHAT GPT

2.Libraries Used: Pandas, NumPy, Matplotlib, Seaborn, Scikit-learn

3.Images and Graphs generated using Python visualization libraries.