# CREDIT SCORE PREDICTION REPORT

MSE1 INTRODUCTION TO AI

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# 1. Introduction

## Objective

The objective of this project is to develop a Credit Score Prediction Model using machine learning techniques. The model predicts a customer's credit score based on the following features:

- Age
- Income (annual)
- Loan Amount

This report walks through the data analysis, model training, evaluation, and visualizations to better understand the relationship between these features and credit scores.

# 2. Exploratory Data Analysis (EDA)

### Dataset Overview

The dataset contains 20 records with the following columns:

- CustomerID: Unique identifier for each customer.
- Age: Age of the customer.
- Income: Annual income of the customer.
- LoanAmount: Amount of loan taken by the customer.
- CreditScore: Target variable — the credit score.

# Summary Statistics

```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns

# Load data
file_path = '/mnt/data/credit_data.csv'
data = pd.read_csv(file_path)

# Summary statistics
print(data.describe())
```

# EDA

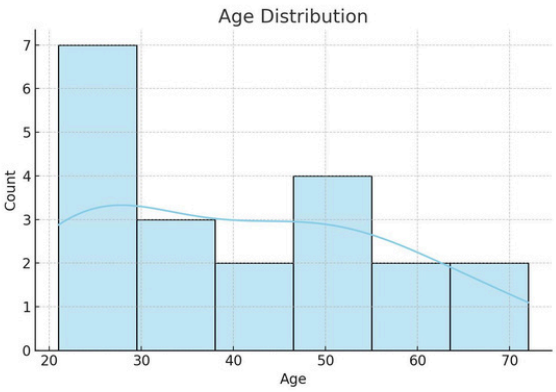
## *Visualizing Feature Distributions*

### 1. Age Distribution

```
plt.figure(figsize=(8, 5))
sns.histplot(data['Age'], kde=True, color='skyblue')
plt.title('Age Distribution')
plt.show()
```

### 2. Income Distribution

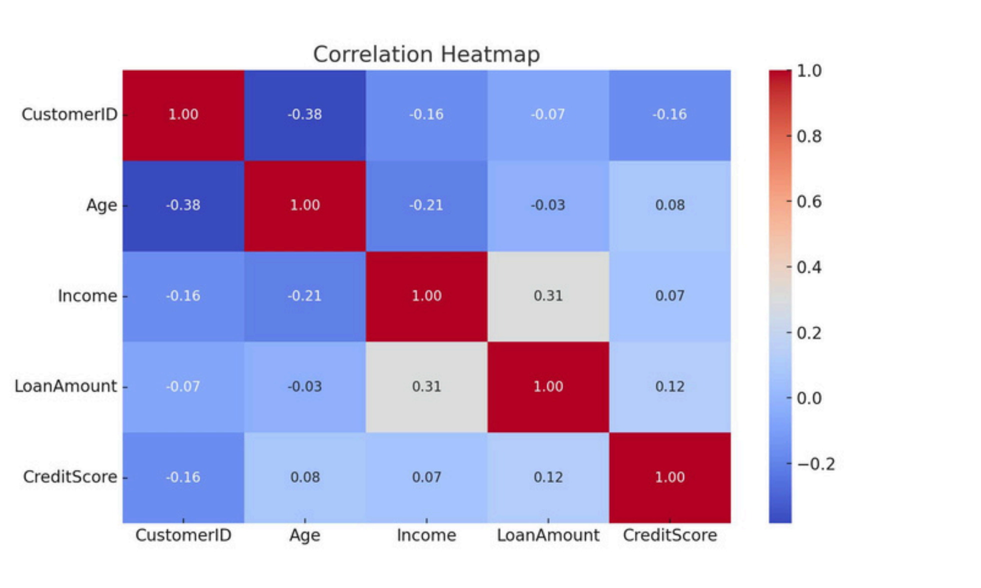
```
plt.figure(figsize=(8, 5))
sns.histplot(data['Income'], kde=True, color='orange')
plt.title('Income Distribution')
plt.show()
```



# 3. Model Training

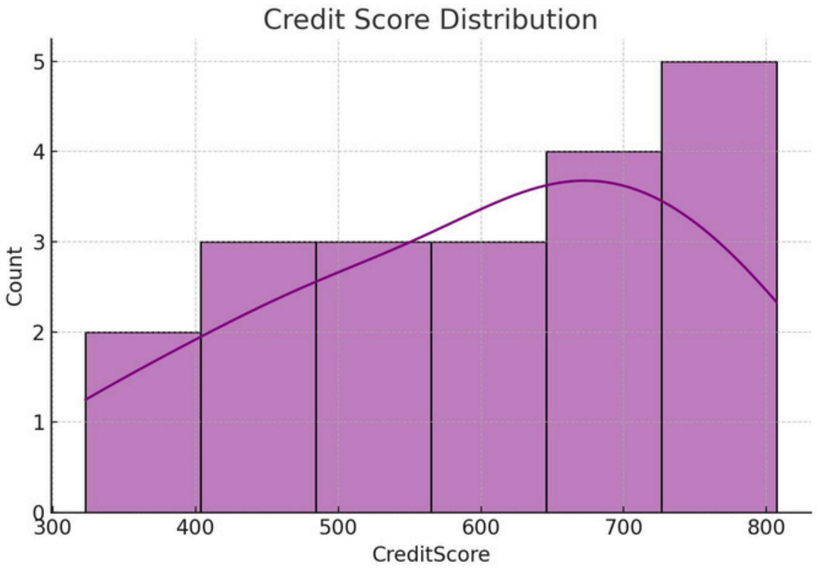
## Preparing DATA

```
from sklearn.model_selection import train_test_split

# Features and target variable
X = data[['Age', 'Income', 'LoanAmount']]
y = data['CreditScore']

# Train-test split
X_train,  X_test,  y_train,  y_test  =  train_test_split(X,  y,
test_size=0.3, random_state=42)
```



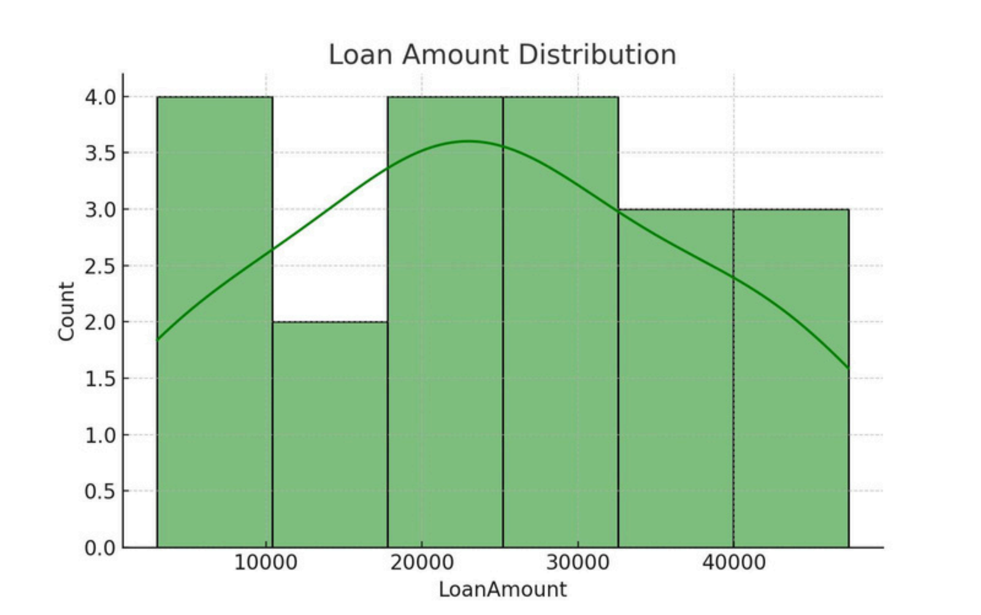
# Training the Model

```
from sklearn.model_selection import train_test_split
 # Features and target variable
X = data[['Age', 'Income', 'LoanAmount']] y = data['CreditScore']
#   Train-test   split   X_train,   X_test,   y_train,   y_test   =
train_test_split(X, y, test_size=0.3, random_state=42)
```



# 4. Model Evaluation

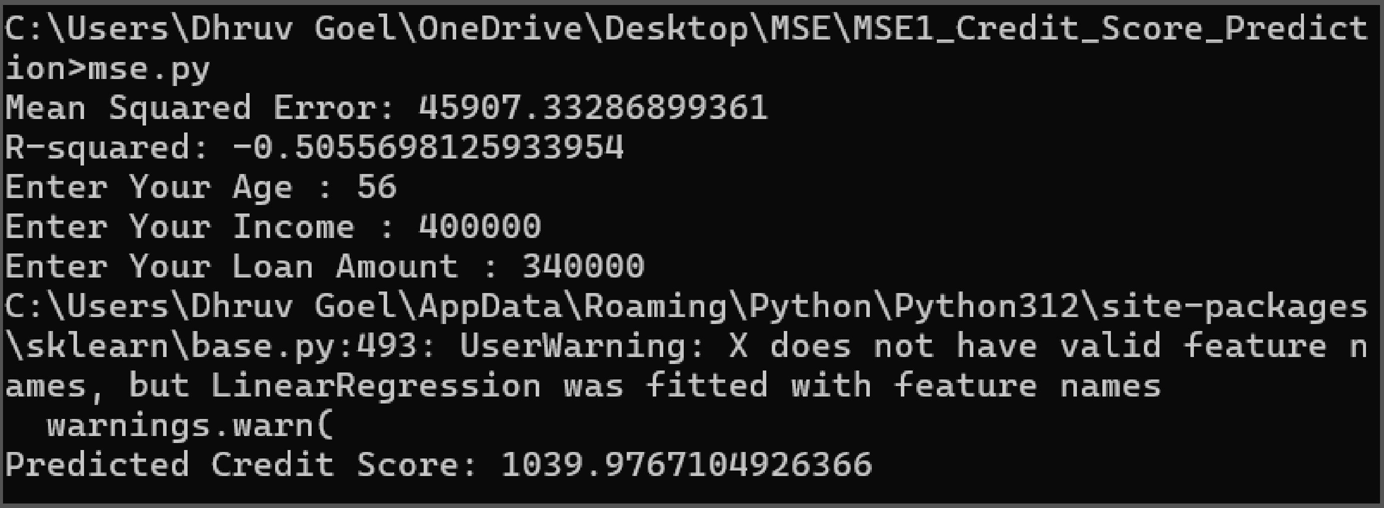
```
from sklearn.metrics import mean_squared_error, r2_score

# Predictions
y_pred = model.predict(X_test)

# Evaluation metrics
mse = mean_squared_error(y_test, y_pred)
r2 = r2_score(y_test, y_pred)

print(f'Mean Squared Error: {mse:.2f}')
print(f'R-squared: {r2:.2f}')
```



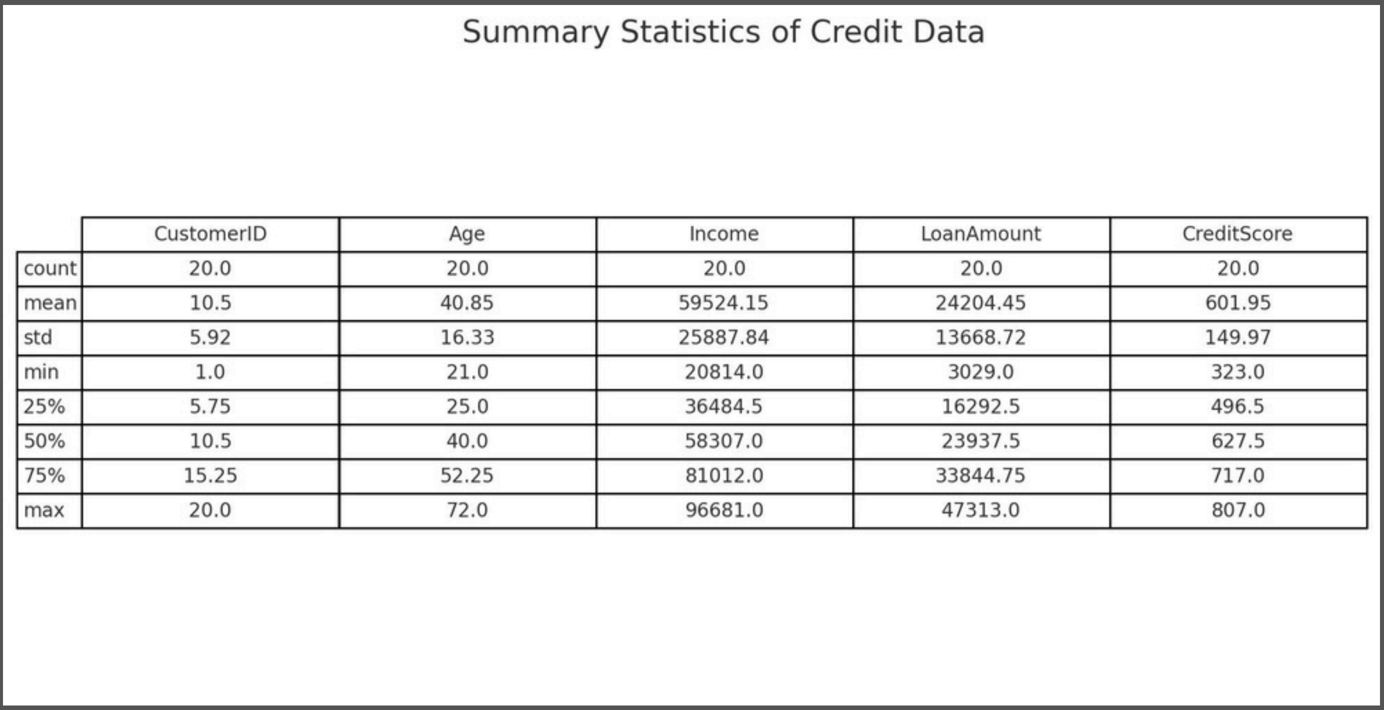
# CODE

```
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_error, r2_score

# Load data
file_path = 'credit_data.csv'
data = pd.read_csv(file_path)

# Features and target variable
X = data[['Age', 'Income', 'LoanAmount']]
y = data['CreditScore']

# Split data into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, y,
test_size=0.3, random_state=42)

# Initialize and train the model
model = LinearRegression()
model.fit(X_train, y_train)

# Make predictions
y_pred = model.predict(X_test)

# Evaluate the model
mse = mean_squared_error(y_test, y_pred)
r2 = r2_score(y_test, y_pred)

# Display results
print("Mean Squared Error:", mse)
print("R-squared:", r2)

# Predict function
def predict_credit_score(age, income, loan_amount):
  prediction = model.predict([[age, income, loan_amount]])
  return prediction[0]
#Taking user input for prediction
ag = int(input("Enter Your Age : "))
inc = int(input("Enter Your Income : "))
lamt = int(input("Enter Your Loan Amount : "))
credit_prediction = predict_credit_score(ag, inc, lamt)
print("Predicted Credit Score:", credit_prediction)
```

# OUTPUT



```
C:\Users\Dhruv Goel\OneDrive\Desktop\MSE\MSE1_Credit_Score_Predict
ion>mse.py
Mean Squared Error: 45907.33286899361
R-squared: -0.5055698125933954
Enter Your Age : 56
Enter Your Income : 400000
Enter Your Loan Amount : 340000
C:\Users\Dhruv Goel\AppData\Roaming\Python\Python312\site-packages
\sklearn\base.py:493: UserWarning: X does not have valid feature n
ames, but LinearRegression was fitted with feature names
  warnings.warn(
Predicted Credit Score: 1039.9767104926366
```



Summary Statistics of Credit Data

| | CustomerID | Age | Income | LoanAmount | CreditScore |
|---|---|---|---|---|---|
| count | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| mean | 10.5 | 40.85 | 59524.15 | 24204.45 | 601.95 |
| std | 5.92 | 16.33 | 25887.84 | 13668.72 | 149.97 |
| min | 1.0 | 21.0 | 20814.0 | 3029.0 | 323.0 |
| 25% | 5.75 | 25.0 | 36484.5 | 16292.5 | 496.5 |
| 50% | 10.5 | 40.0 | 58307.0 | 23937.5 | 627.5 |
| 75% | 15.25 | 52.25 | 81012.0 | 33844.75 | 717.0 |
| max | 20.0 | 72.0 | 96681.0 | 47313.0 | 807.0 |

# Areas for Improvement

Let's make sure our content tackles all areas needed.

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# 6. Conclusion

## What we learnt

The linear regression model provides a baseline for predicting credit scores using age, income, and loan amount. The next steps for improving this model could include:

- Experimenting with more complex algorithms (e.g., Random Forest, Gradient Boosting).
- Performing feature engineering to uncover hidden patterns.
- Collecting more data for better generalization.

# 7. Recommendations

## Future proofing

- Enhance feature selection by exploring additional variables like debt-to-income ratio.
- Apply cross-validation to reduce overfitting.
- Visualize residuals to check for any non-linearity.