A

Assesment Report

on

"Predict Loan Default: Classify whether a borrower will default on a loan using financial history and credit scores."

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Introduction :

In the financial sector, loan default prediction is a key task to minimize risk and ensure a healthy lending system. When a borrower fails to repay a loan, it leads to financial loss for lending institutions. Predicting loan defaults using machine learning helps in proactive risk assessment.

The goal of this project is to develop a machine learning model that can accurately predict whether a borrower is likely to default on a loan based on their financial history, credit score, and other relevant socio-economic attributes.

Methdology :

1. Data Upload and Preprocessing:

The dataset was uploaded using the file upload feature in GoogleColab. Missing values and infinite values were handled by replacing or imputing them using the median strategy.

2. Feature Encoding and Scaling:

Categorical features were encoded using LabelEncoder.Features were scaled using StandardScaler to normalize the data.

3. Model Development:

The dataset was split into training and testing sets using an 80-20 split. A Random Forest Classifier was trained on the training data.

4. Model Evaluation:

The model's performance was evaluated using a confusion matrix, classification report, and visualized using a heatmap.

5. User Prediction:

Added functionality to allow user input to make a real-time prediction on loan default status.

CODE:

```
# Upload CSV in Google Colab

from google.colab import files

uploaded = files.upload()


import pandas as pd

import numpy as np

import seaborn as sns
```

```
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import LabelEncoder, StandardScaler
from sklearn.ensemble import RandomForestClassifier
from sklearn.metrics import classification_report, confusion_matrix

# Read uploaded file
filename = next(iter(uploaded))
df = pd.read_csv(filename)

# Drop unnecessary columns if present
if 'LoanID' in df.columns:
    df.drop(columns=['LoanID'], inplace=True)

# Handle missing and infinite values
df.replace([np.inf, -np.inf], np.nan, inplace=True)
df.fillna(df.median(numeric_only=True), inplace=True)

# Encode categorical columns
categorical_cols = df.select_dtypes(include=['object']).columns
label_encoders = {}
for col in categorical_cols:
```

```
    le = LabelEncoder()
    df[col] = le.fit_transform(df[col].astype(str))
    label_encoders[col] = le

# Separate features and target
X = df.drop(columns=['Default'])
y = df['Default']

# Scale the data
scaler = StandardScaler()
X_scaled = scaler.fit_transform(X)

# Train-test split
X_train, X_test, y_train, y_test = train_test_split(X_scaled, y, test_size=0.2,
random_state=42)

# Train model
clf = RandomForestClassifier(n_estimators=100, random_state=42)
clf.fit(X_train, y_train)

# Evaluate model
y_pred = clf.predict(X_test)
```

```
print("Classification Report:\n", classification_report(y_test, y_pred))


# Confusion matrix heatmap

cm = confusion_matrix(y_test, y_pred)

labels = ['No Default', 'Default']

plt.figure(figsize=(6, 4))

sns.heatmap(cm, annot=True, fmt='d', cmap='Blues', xticklabels=labels,
yticklabels=labels)

plt.xlabel('Predicted')

plt.ylabel('Actual')

plt.title('Confusion Matrix Heatmap')

plt.show()


# ========== User Input for Prediction ==========

print("\n🔍 Enter data to predict loan default (type 'skip' to exit manual entry):")


user_input = {}

for col in X.columns:

    # Check if column is categorical (encoded earlier)

    if col in label_encoders:

        raw_val = input(f"{col} (categorical): ")

        if raw_val.lower() == 'skip':
```

```
            user_input = None
            break
        raw_val = raw_val.title()  # Toggle case (e.g., 'male' -> 'Male')
        if raw_val not in label_encoders[col].classes_:
            print(f"⚠️ Warning: '{raw_val}' not in known categories for {col}.")
        encoded_val = label_encoders[col].transform([raw_val])[0]
        user_input[col] = encoded_val
    else:
        raw_val = input(f"{col} (numeric): ")
        if raw_val.lower() == 'skip':
            user_input = None
            break
        user_input[col] = float(raw_val)

if user_input:
    # Convert and scale input
    input_df = pd.DataFrame([user_input])
    input_scaled = scaler.transform(input_df)

    # Make prediction
    pred = clf.predict(input_scaled)[0]
    result = "⊘ Default" if pred == 1 else "✅ No Default"
```

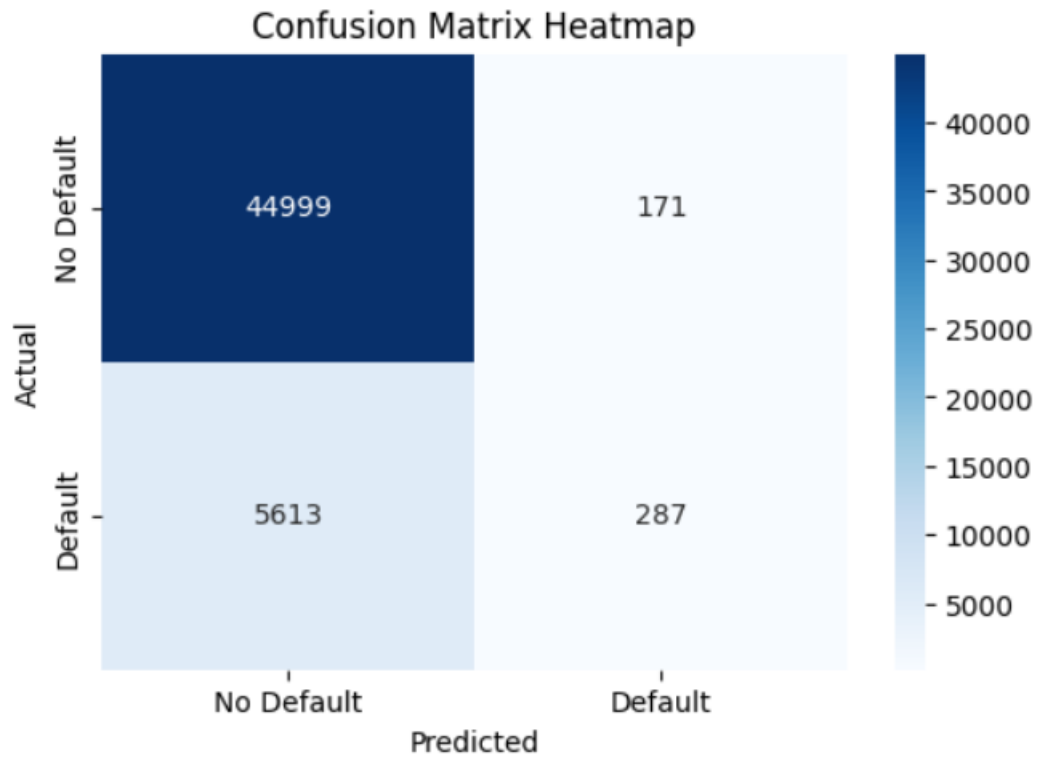
```
    print(f"\n🔮 Prediction Result: {result}")
else:
    print("✔ Skipped manual input. Program finished.")
```

RESULT/OUTPUT:

```
Classification Report:
              precision    recall  f1-score   support

           0       0.89      1.00      0.94     45170
           1       0.63      0.05      0.09      5900

    accuracy                           0.89     51070
   macro avg       0.76      0.52      0.51     51070
weighted avg       0.86      0.89      0.84     51070
```



Inputted data for the prediction:

```
🔍 Enter data to predict loan default (type 'skip' to exit manual entry):
Age (numeric): 34
Income (numeric): 50000
LoanAmount (numeric): 100000
CreditScore (numeric): 500
MonthsEmployed (numeric): 12
NumCreditLines (numeric): 4
InterestRate (numeric): 12.00
LoanTerm (numeric): 24
DTIRatio (numeric): 0.32
Education (categorical): High School
EmploymentType (categorical): Unemployed
MaritalStatus (categorical): Single
HasMortgage (categorical): No
HasDependents (categorical): Yes
LoanPurpose (categorical): Auto
HasCoSigner (categorical): No

🔮 Prediction Result: ✅ No Default
```

References/Credits

- Dataset Source: [Provided by Instructor / UCI / Kaggle]
- Libraries Used: pandas, numpy, seaborn, matplotlib, scikit-learn
- Tools: Google Colab, GitHub