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A

Assesment Report

on

"Predict Loan Default"

submitted as partial fulfillment for the award of

BACHELOR OF TECHNOLOGY DEGREE

SESSION 2024-25

in

CSE(AIML)

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Introduction:

This project aims to predict loan defaults using logistic regression. Loan default prediction helps financial institutions minimize risk by identifying customers who are more likely to default. The dataset includes information such as credit history, loan amount, and income, which are used to train the prediction model.

Methodology:

1.Data Preprocessing:

1.The dataset was loaded and preprocessed to remove unwanted columns (e.g., `LoanID`).

2.Categorical features were encoded using `LabelEncoder` for compatibility with machine learning models.

2.Feature Engineering:

1.Sampled 20,000 rows to optimize computational efficiency.

2.Defined features (`X`) and the target variable (`y`).

3.Model Training:

1.Split the dataset into training (80%) and testing (20%).

2.Standardized features using `StandardScaler`.

3.Used Logistic Regression to train the model with a maximum iteration limit of 1000 for convergence.

4.Evaluation Metrics:

1.Performance metrics such as accuracy, precision, and recall were calculated.

2.A confusion matrix heatmap was visualized for detailed insights.

CODE:

```
# --- Step 1: Upload CSV file ---
from google.colab import files
uploaded = files.upload()


# --- Step 2: Check uploaded files ---
print(uploaded.keys())  # This will print the file name(s) of the uploaded files
```

```
# --- Step 3: Load into pandas ---
import io
import pandas as pd
```

```
# Ensure the correct filename is selected based on the uploaded files
file_name = list(uploaded.keys())[0]  # This will pick the first uploaded file
print(f"File being loaded: {file_name}")  # Check which file is being used
```

```
# --- Step 4: Read the CSV file with proper encoding ---
loan_df = pd.read_csv(io.BytesIO(uploaded[file_name]), encoding='utf-8')  # Add encoding if needed
```

```
# --- Step 5: Drop ID column ---
loan_df.drop(columns=["LoanID"], inplace=True)
```

```
# --- Step 6: Encode categorical columns ---
cat_cols = loan_df.select_dtypes(include=["object"]).columns
```

```
label_encoders = {}

for col in cat_cols:
    le = LabelEncoder()
    loan_df[col] = le.fit_transform(loan_df[col])
    label_encoders[col] = le

# --- Step 7: Sample 20,000 rows to speed up ---
loan_sample = loan_df.sample(n=20000, random_state=42)

# --- Step 8: Define features and target ---
X = loan_sample.drop(columns=["Default"])
y = loan_sample["Default"]

# --- Step 9: Train-test split ---
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)

# --- Step 10: Feature scaling ---
from sklearn.preprocessing import StandardScaler
scaler = StandardScaler()
X_train_scaled = scaler.fit_transform(X_train)
X_test_scaled = scaler.transform(X_test)

# --- Step 11: Train model ---
model = LogisticRegression(max_iter=1000)
model.fit(X_train_scaled, y_train)
```

```
y_pred = model.predict(X_test_scaled)
```

```
# --- Step 12: Evaluate ---
from sklearn.metrics import confusion_matrix, classification_report, accuracy_score, precision_score, recall_score
```

```
conf_matrix = confusion_matrix(y_test, y_pred)
accuracy = accuracy_score(y_test, y_pred)
precision = precision_score(y_test, y_pred)
recall = recall_score(y_test, y_pred)
report = classification_report(y_test, y_pred)
```

```
# --- Step 13: Print metrics ---
print("Classification Report:\n", report)
print("Accuracy:", accuracy)
print("Precision:", precision)
print("Recall:", recall)
```

```
# --- Step 14: Confusion matrix heatmap ---
import seaborn as sns
import matplotlib.pyplot as plt
```

```
plt.figure(figsize=(6, 4))
sns.heatmap(conf_matrix, annot=True, fmt="d", cmap="Blues",
            xticklabels=["No Default", "Default"],
            yticklabels=["No Default", "Default"])
plt.title("Confusion Matrix - Logistic Regression")
```

```
plt.xlabel("Predicted")
plt.ylabel("Actual")
plt.tight_layout()
plt.show()
```

```
# --- Step 15: Save model (optional) ---
import joblib
joblib.dump(model, 'loan_default_model.pkl')  # Save the trained model for later use
```

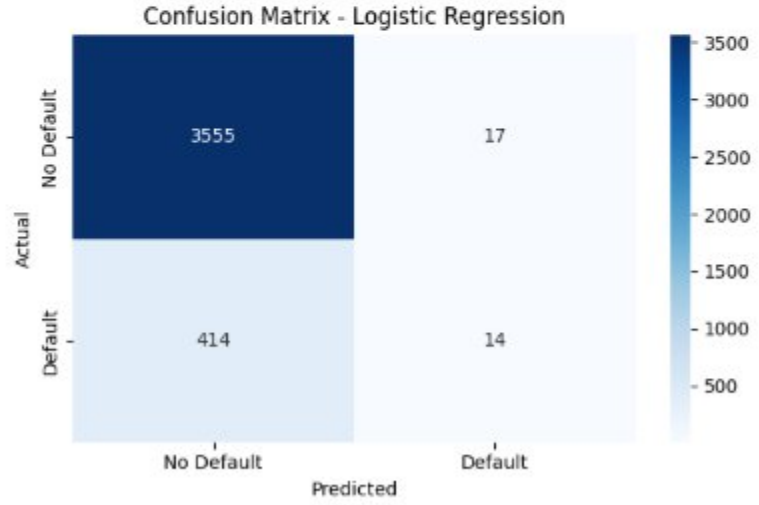
OUTPUT:

```
Choose Files  1. Predict L... Default.csv
• 1. Predict Loan Default.csv(text/csv) - 24834870 bytes, last modified: 4/18/2025 - 100% done
Saving 1. Predict Loan Default.csv to 1. Predict Loan Default (4).csv
dict_keys(['1. Predict Loan Default (4).csv'])
File being loaded: 1. Predict Loan Default (4).csv
Classification Report:
              precision    recall  f1-score   support

           0       0.90      1.00      0.94      3572
           1       0.45      0.03      0.06       428

    accuracy                           0.89      4000
   macro avg       0.67      0.51      0.50      4000
weighted avg       0.85      0.89      0.85      4000

Accuracy: 0.89225
Precision: 0.45161290322580644
Recall: 0.03271028037383177
```




```
['loan_default_model.pkl']
```

References/Credits:

1.Dataset: Kaggle.

2.Libraries Used: `pandas`, `scikit-learn`, `seaborn`, `matplotlib`.

3.Supervisor: Abhishek Shukla.