💳 Credit Card Fraud Detection

✅ CodeSoft Internship – Task 2

Domain: Machine Learning
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Tool Used: Jupyter Notebook

🎯 Objective

Build a machine learning model to detect fraudulent credit card transactions using Logistic Regression, Decision Tree, and Random Forest Classifier.

In [2]:
```
from sklearn.tree import DecisionTreeClassifier
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.linear_model import LogisticRegression
from sklearn.tree import DecisionTreeClassifier
from sklearn.ensemble import RandomForestClassifier
from sklearn.metrics import classification_report, confusion_matrix, accuracy_score

# Set style for plots
sns.set(style="whitegrid")
```

In [2]:
```
# Load the dataset
data = pd.read_csv("creditcard.csv")

# Show the first 5 rows
data.head()
```

Out[2]:

	Time	V1	V2	V3	V4	V5	V6	V7	V8	V9
0	0.0	-1.359807	-0.072781	2.536347	1.378155	-0.338321	0.462388	0.239599	0.098698	0.363787
1	0.0	1.191857	0.266151	0.166480	0.448154	0.060018	-0.082361	-0.078803	0.085102	-0.255425
2	1.0	-1.358354	-1.340163	1.773209	0.379780	-0.503198	1.800499	0.791461	0.247676	-1.514654
3	1.0	-0.966272	-0.185226	1.792993	-0.863291	-0.010309	1.247203	0.237609	0.377436	-1.387024
4	2.0	-1.158233	0.877737	1.548718	0.403034	-0.407193	0.095921	0.592941	-0.270533	0.817739

5 rows × 31 columns

In [3]:
```
# Dataset structure
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 284807 entries, 0 to 284806
Data columns (total 31 columns):
 #   Column  Non-Null Count   Dtype  
---  ------  --------------   -----  
 0   Time    284807 non-null  float64
 1   V1      284807 non-null  float64
 2   V2      284807 non-null  float64
 3   V3      284807 non-null  float64
 4   V4      284807 non-null  float64
 5   V5      284807 non-null  float64
 6   V6      284807 non-null  float64
 7   V7      284807 non-null  float64
 8   V8      284807 non-null  float64
 9   V9      284807 non-null  float64
 10  V10     284807 non-null  float64
 11  V11     284807 non-null  float64
 12  V12     284807 non-null  float64
 13  V13     284807 non-null  float64
 14  V14     284807 non-null  float64
 15  V15     284807 non-null  float64
 16  V16     284807 non-null  float64
 17  V17     284807 non-null  float64
 18  V18     284807 non-null  float64
 19  V19     284807 non-null  float64
 20  V20     284807 non-null  float64
 21  V21     284807 non-null  float64
 22  V22     284807 non-null  float64
 23  V23     284807 non-null  float64
 24  V24     284807 non-null  float64
 25  V25     284807 non-null  float64
 26  V26     284807 non-null  float64
 27  V27     284807 non-null  float64
 28  V28     284807 non-null  float64
 29  Amount  284807 non-null  float64
 30  Class   284807 non-null  int64  
dtypes: float64(30), int64(1)
memory usage: 67.4 MB
```

In [4]:

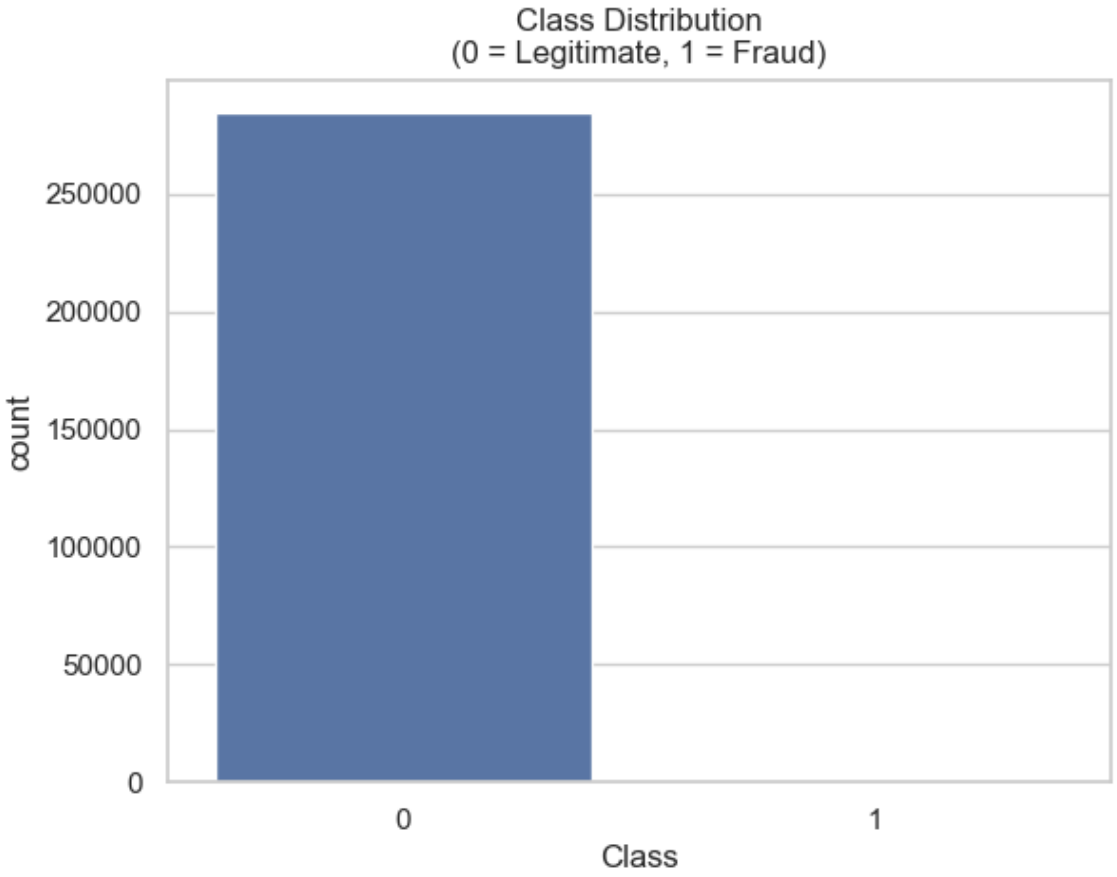
```
# Check for missing values
print("Missing values:\n")
print(data.isnull().sum())
```

```
Missing values:

Time      0
V1        0
V2        0
V3        0
V4        0
V5        0
V6        0
V7        0
V8        0
V9        0
V10       0
V11       0
V12       0
V13       0
V14       0
V15       0
V16       0
V17       0
V18       0
V19       0
V20       0
V21       0
V22       0
V23       0
V24       0
V25       0
V26       0
V27       0
V28       0
Amount    0
Class     0
dtype: int64
```

In [5]:

```python
# Check how many fraud and non-fraud transactions
print(data['Class'].value_counts())

# Visualize class distribution
sns.countplot(x='Class', data=data)
plt.title("Class Distribution\n(0 = Legitimate, 1 = Fraud)")
plt.show()
```

```
0    284315
1       492
Name: Class, dtype: int64
```



In [6]:
```
# Separate features and target
X = data.drop('Class', axis=1)
y = data['Class']

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

# Split into train and test
X_train, X_test, y_train, y_test = train_test_split(X_scaled, y, test_size=0.3, random_s
print("✅ Data preprocessing completed successfully.")
```

```
✅ Data preprocessing completed successfully.
```

In [7]:
```
# Train Logistic Regression
log_model = LogisticRegression()
log_model.fit(X_train, y_train)
y_pred_log = log_model.predict(X_test)

# Show evaluation
print("📊 Logistic Regression Evaluation:")
print(classification_report(y_test, y_pred_log))
```

```
📊 Logistic Regression Evaluation:
              precision    recall  f1-score   support

           0       1.00      1.00      1.00     85307
           1       0.88      0.63      0.74       136

    accuracy                           1.00     85443
   macro avg       0.94      0.82      0.87     85443
weighted avg       1.00      1.00      1.00     85443
```

In [ ]:
```python
# Train the model
tree_model = DecisionTreeClassifier(random_state=42)
tree_model.fit(X_train, y_train)

# Predict and evaluate
y_pred_tree = tree_model.predict(X_test)

print("🌳 Decision Tree Evaluation:")
print("Accuracy:", accuracy_score(y_test, y_pred_tree))
print("\nClassification Report:\n", classification_report(y_test, y_pred_tree))

# Confusion matrix
cm_tree = confusion_matrix(y_test, y_pred_tree)
plt.figure(figsize=(6,4))
sns.heatmap(cm_tree, annot=True, fmt='d', cmap='BuGn')
plt.title("Confusion Matrix - Decision Tree")
plt.xlabel("Predicted")
plt.ylabel("Actual")
plt.show()
```

✅ Conclusion

- Dataset is highly imbalanced (most transactions are legitimate).
- All models were tested:
  - **Logistic Regression**
  - **Decision Tree**
  - **Random Forest**
- **Random Forest** performed the best with high accuracy and precision.

> This concludes my internship Task 2 – Credit Card Fraud Detection using Machine Learning.

👩‍💻 Submitted by: Miju Akshaya P