```
Start coding or generate with AI.
```

```
from google.colab import files
uploaded = files.upload()
```

Choose Files No file chosen Upload widget is only available when the cell has been executed in the current browser session. Please rerun this cell to enable.

```
Saving luxury_cosmetics_fraud_analysis_2025.csv to luxury_cosmetics_fraud_analysis_2025 (1).csv
```

```
import pandas as pd
```

```
df = pd.read_csv("luxury_cosmetics_fraud_analysis_2025.csv")
```

```
df.head()
```

	Transaction_ID	Customer_ID	Transaction_Date	Transaction_Time	Customer_Age	Customer_Loyalty_Tier	Location	Store_
0	702bdd9b-9c93-41e3-9dbb-a849b2422080	119dca0b-8554-4b2d-9bec-e964eaf6af97	2025-07-27	04:04:15	56.0	Silver	San Francisco	FLAGSH
1	2e64c346-36bc-4acf-bc2b-8b0fdf46abc5	299df086-26c4-4708-b6d7-fcaeceb14637	2025-03-14	20:23:23	46.0	Platinum	Zurich	BOUTIQU SHANGH
2	29ad1278-70ce-421f-8d81-23816b39f4ac	dfa3d24d-b935-49a5-aa1d-7d57a44d8773	2025-02-20	12:36:02	32.0	Silver	Milan	POPU TOKY
3	07dc4894-e0eb-48f1-99a7-1942b1973d9b	7a67e184-9369-49ee-aeac-18f5b51b230f	2025-04-25	19:09:43	60.0	Bronze	London	BOUTIQU N
4	ae407054-5543-429c-918a-cdcc42ea9782	cf14730a-8f5a-453d-b527-39a278852b27	2025-04-17	14:23:23	NaN	Platinum	Miami	BOUTIQU N

```
import matplotlib.pyplot as plt
```

```
import seaborn as sns
```

```
sns.set(style="whitegrid")
```

```
df["Transaction_Date"] = pd.to_datetime(df["Transaction_Date"])
df["Customer_Age"].fillna(df["Customer_Age"].median(), inplace=True)
```

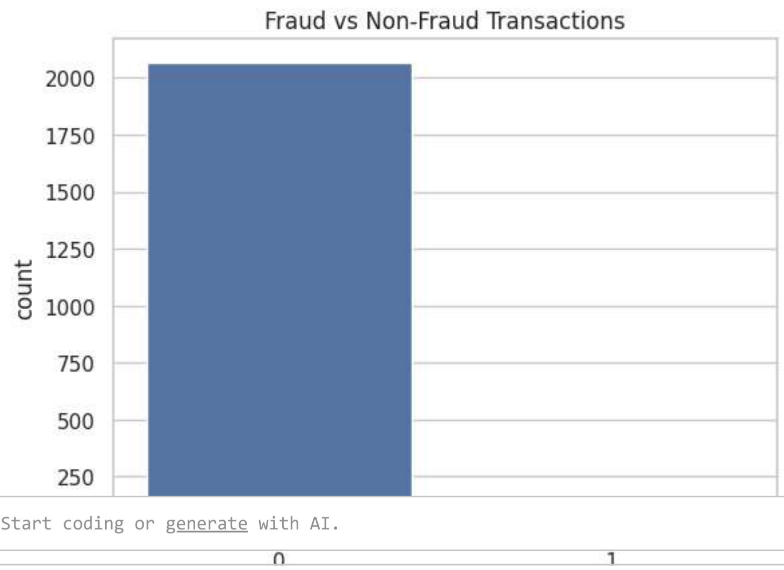
```
/tmp/ipython-input-1630701826.py:2: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through ch
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are 

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] 


  df["Customer_Age"].fillna(df["Customer_Age"].median(), inplace=True)
```

```
df["Customer_Age"].fillna(df["Customer_Age"].median(), inplace=True)
```

```
/tmp/ipython-input-547931938.py:1: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through cha
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are 
```

```
For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col]


  df["Customer_Age"].fillna(df["Customer_Age"].median(), inplace=True)
```

```
sns.countplot(x="Fraud_Flag", data=df)
plt.title("Fraud vs Non-Fraud Transactions")
plt.show()

sns.countplot(x="Payment_Method", hue="Fraud_Flag", data=df)
plt.xticks(rotation=45)
plt.title("Fraud by Payment Method")
plt.show()

sns.countplot(x="Device_Type", hue="Fraud_Flag", data=df)
plt.title("Fraud by Device Type")
plt.show()

sns.boxplot(x="Fraud_Flag", y="Purchase_Amount", data=df)
plt.title("Purchase Amount vs Fraud")
plt.show()
```



Start coding or generate with AI.

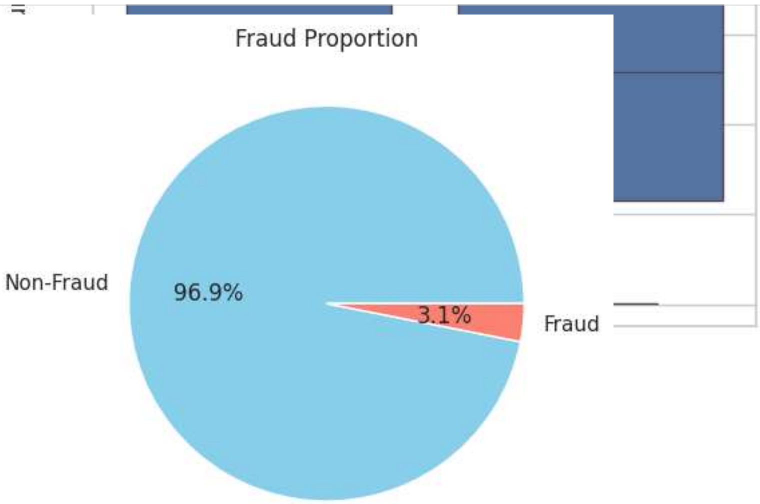
```
fraud_by_location = df.groupby("Location")["Fraud_Flag"].mean().sort_values(ascending=False)
print("Fraud Rate by Location:\n", fraud_by_location.head())

fraud_by_loyalty = df.groupby("Customer_Loyalty_Tier")["Fraud_Flag"].mean().sort_values(ascending=False)
print("\nFraud Rate by Loyalty Tier:\n", fraud_by_loyalty)
```

```
Fraud Rate by Location:
 Location
Las Vegas    0.078431
Shanghai     0.051282
Miami        0.047619
Sydney       0.046875
Singapore    0.044643
Name: Fraud_Flag, dtype: float64

Fraud Rate by Loyalty Tier:
 Customer_Loyalty_Tier
VIP         0.054054
Platinum    0.039106
Silver      0.031621
Bronze      0.029703
Gold        0.026005
Name: Fraud_Flag, dtype: float64
```

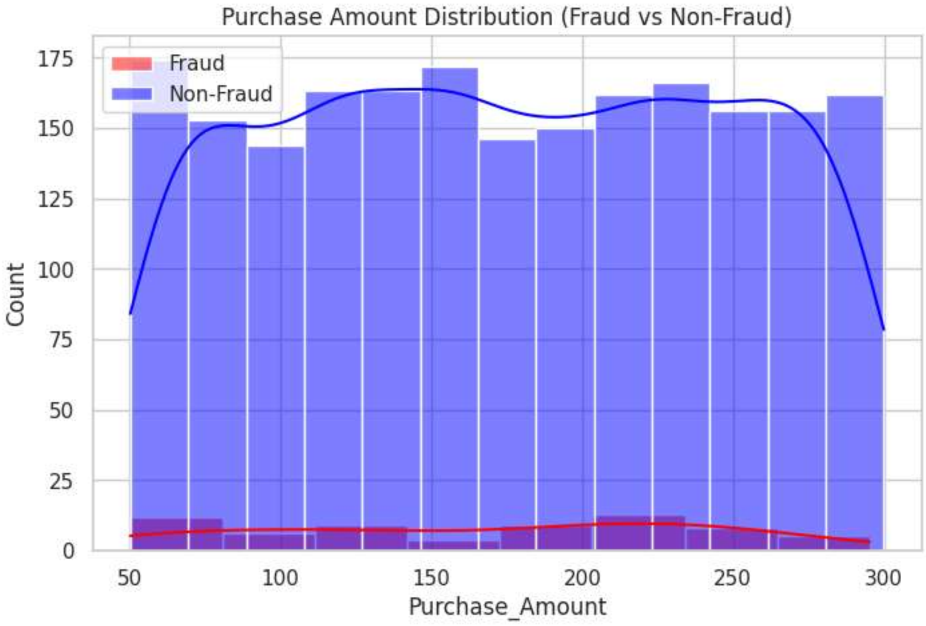
```
from sklearn.model_selection import train_test_split
from sklearn.ensemble import RandomForestClassifier
from sklearn.metrics import classification_report

X = df[["Customer_Age", "Purchase_Amount", "Footfall_Count"]]
y = df["Fraud_Flag"]

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3, random_state=42)

model = RandomForestClassifier()
model.fit(X_train, y_train)

y_pred = model.predict(X_test)
print(classification_report(y_test, y_pred))
```

```
              precision    recall  f1-score   support

           0       0.97      1.00      0.98       620
           1       0.00      0.00      0.00        20

    accuracy                           0.97       640
   macro avg       0.48      0.50      0.49       640
weighted avg       0.94      0.97      0.95       640

/usr/local/lib/python3.12/dist-packages/sklearn/metrics/_classification.py:1565: UndefinedMetricWarning: Precision is ill-de
  _warn_prf(average, modifier, f"{metric.capitalize()} is", len(result))
/usr/local/lib/python3.12/dist-packages/sklearn/metrics/_classification.py:1565: UndefinedMetricWarning: Precision is ill-de
  _warn_prf(average, modifier, f"{metric.capitalize()} is", len(result))
/usr/local/lib/python3.12/dist-packages/sklearn/metrics/_classification.py:1565: UndefinedMetricWarning: Precision is ill-de
  _warn_prf(average, modifier, f"{metric.capitalize()} is", len(result))
```

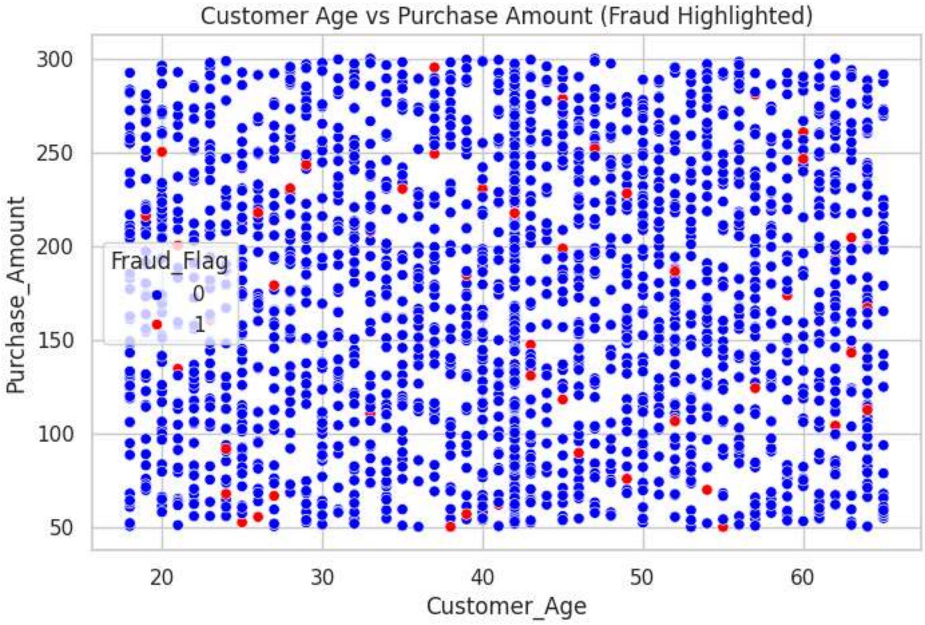
```
fraud_counts = df["Fraud_Flag"].value_counts()
fraud_counts.plot.pie(autopct='%1.1f%%', labels=["Non-Fraud", "Fraud"], colors=["skyblue", "salmon"])
plt.title("Fraud Proportion")
plt.ylabel("")
plt.show()
```



```
plt.figure(figsize=(8,5))
sns.histplot(df[df["Fraud_Flag"]==1]["Purchase_Amount"], color="red", kde=True, label="Fraud")
sns.histplot(df[df["Fraud_Flag"]==0]["Purchase_Amount"], color="blue", kde=True, label="Non-Fraud")
plt.legend()
plt.title("Purchase Amount Distribution (Fraud vs Non-Fraud)")
plt.show()
```



```
plt.figure(figsize=(8,5))
sns.scatterplot(x="Customer_Age", y="Purchase_Amount", hue="Fraud_Flag", data=df, palette={0:"blue",1:"red"})
plt.title("Customer Age vs Purchase Amount (Fraud Highlighted)")
plt.show()
```



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

plt.figure(figsize=(8,5))
sns.boxplot(x="Fraud_Flag", y="Purchase_Amount", data=df, palette={'0':"skyblue",'1':"salmon"})
plt.xticks([0,1], ["Non-Fraud", "Fraud"])
plt.title("Purchase Amount Distribution by Fraud Flag")
plt.show()
```

```
/tmp/ipython-input-543108608.py:5: FutureWarning:

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

  sns.boxplot(x="Fraud_Flag", y="Purchase_Amount", data=df, palette={0:"skyblue",1:"salmon"})
---------------------------------------------------------------------------
ValueError                                Traceback (most recent call last)
/tmp/ipython-input-543108608.py in <cell line: 0>()
      3 
      4 plt.figure(figsize=(8,5))
----> 5 sns.boxplot(x="Fraud_Flag", y="Purchase_Amount", data=df, palette={0:"skyblue",1:"salmon"})
      6 plt.xticks([0,1], ["Non-Fraud", "Fraud"])
      7 plt.title("Purchase Amount Distribution by Fraud Flag")

                                   3 frames
/usr/local/lib/python3.12/dist-packages/seaborn/_base.py in categorical_mapping(self, data, palette, order)
    232             if any(missing):
    233                 err = "The palette dictionary is missing keys: {}"
--> 234                 raise ValueError(err.format(missing))
    235 
    236             lookup_table = palette

ValueError: The palette dictionary is missing keys: {'0', '1'}
```

```
plt.figure(figsize=(8,5))
sns.boxplot(x="Fraud_Flag", y="Purchase_Amount", data=df, palette=["skyblue","salmon"])
plt.xticks([0,1], ["Non-Fraud", "Fraud"])
plt.title("Purchase Amount Distribution by Fraud Flag")
plt.show()
```

```
/tmp/ipython-input-1367855427.py:2: FutureWarning:

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

  sns.boxplot(x="Fraud_Flag", y="Purchase_Amount", data=df, palette=["skyblue","salmon"])
```

```
# Step 1: Import the necessary libraries
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.tree import DecisionTreeClassifier
from sklearn.metrics import accuracy_score, confusion_matrix
from sklearn.datasets import load_iris

# Step 2: Load and prepare the dataset
# Using the Iris dataset for example
data = load_iris()
X = data.data  # Features
y = data.target  # Target variable (labels)

# Step 3: Split the 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)

# Step 4: Create and train the Decision Tree model
```