Upload the Dataset

```
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.

Load the Dataset python Copy Edit

```
import pandas as pd

df = pd.read_csv("/content/card_transdata.csv")
df.head()
```

	distance_from_home	distance_from_last_transaction	ratio_to_median_purchase_price	repeat_retailer	used_chip	used_pin_number	onli
0	57.877857	0.311140	1.945940	1.0	1.0	0.0	
1	10.829943	0.175592	1.294219	1.0	0.0	0.0	
2	5.091079	0.805153	0.427715	1.0	0.0	0.0	
3	2.247564	5.600044	0.362663	1.0	1.0	0.0	
4	44.190936	0.566486	2.222767	1.0	1.0	0.0	

Data Exploration python Copy Edit

```
df.info()
df.describe()
df.shape
df.columns
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1000000 entries, 0 to 999999
Data columns (total 8 columns):
 #   Column                          Non-Null Count    Dtype  
---  ------                          --------------    -----  
 0   distance_from_home              1000000 non-null  float64
 1   distance_from_last_transaction  1000000 non-null  float64
 2   ratio_to_median_purchase_price  1000000 non-null  float64
 3   repeat_retailer                 1000000 non-null  float64
 4   used_chip                       1000000 non-null  float64
 5   used_pin_number                 1000000 non-null  float64
 6   online_order                    1000000 non-null  float64
 7   fraud                           1000000 non-null  float64
dtypes: float64(8)
memory usage: 61.0 MB
Index(['distance_from_home', 'distance_from_last_transaction',
       'ratio_to_median_purchase_price', 'repeat_retailer', 'used_chip',
       'used_pin_number', 'online_order', 'fraud'],
      dtype='object')
```

Check for Missing Values and Duplicates

```
# Missing values
df.isnull().sum()

# Duplicates
df.duplicated().sum()
```

```
np.int64(0)
```

Visualize a Few Features

```
print(df.columns.tolist())
```

```
['distance_from_home', 'distance_from_last_transaction', 'ratio_to_median_purchase_price', 'repeat_retailer', 'used_chip', 'used_pin_num
```

```
['distance_from_home', 'distance_from_last_transaction', 'ratio_to_median_purchase_price', 'repeat_retailer', 'used_chip', 'used_pin_number'
```

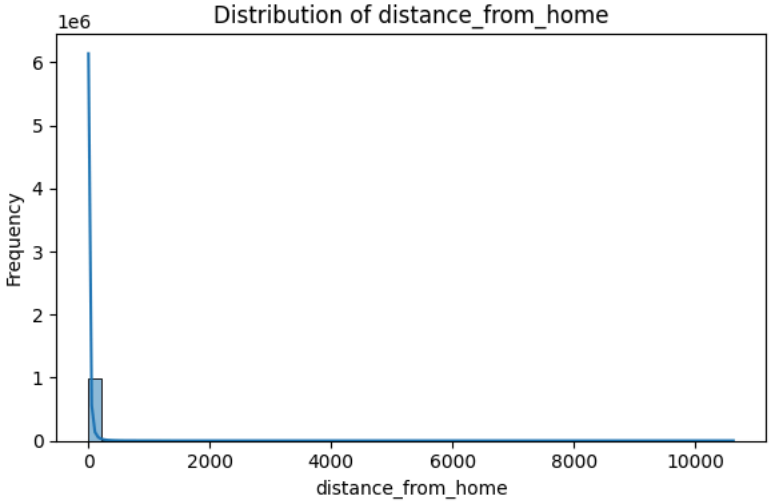
```
['distance_from_home',
 'distance_from_last_transaction',
 'ratio_to_median_purchase_price',
 'repeat_retailer',
 'used_chip',
 'used_pin_number',
 'online_order',
 'amount',
 'lat',
 'long',
 'is_fraud']
```

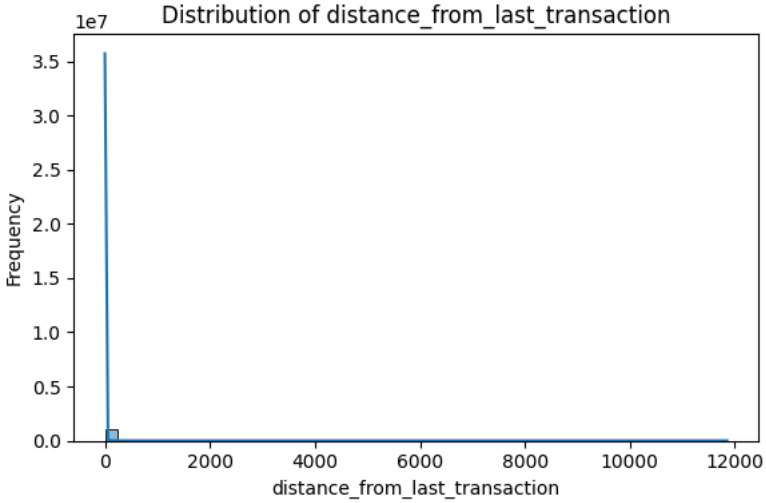
```
df.head()
```

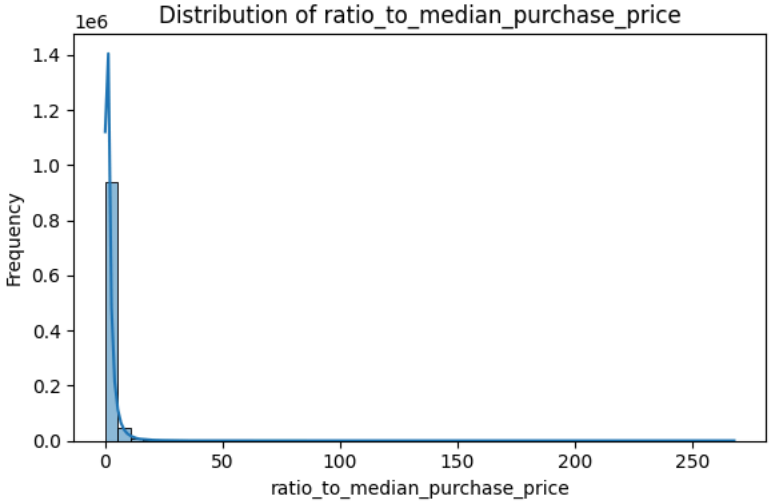
	distance_from_home	distance_from_last_transaction	ratio_to_median_purchase_price	repeat_retailer	used_chip	used_pin_number	onli
0	57.877857	0.311140	1.945940	1.0	1.0	0.0	
1	10.829943	0.175592	1.294219	1.0	0.0	0.0	
2	5.091079	0.805153	0.427715	1.0	0.0	0.0	
3	2.247564	5.600044	0.362663	1.0	1.0	0.0	
4	44.190936	0.566486	2.222767	1.0	1.0	0.0	

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

# Automatically select numeric columns
numeric_cols = df.select_dtypes(include=['float64', 'int64']).columns

# Histogram for each numeric column
for col in numeric_cols:
    plt.figure(figsize=(6, 4))
    sns.histplot(df[col], bins=50, kde=True)
    plt.title(f"Distribution of {col}")
    plt.xlabel(col)
    plt.ylabel("Frequency")
    plt.tight_layout()
    plt.show()

# Boxplot of all numeric features
plt.figure(figsize=(10, 6))
sns.boxplot(data=df[numeric_cols])
plt.title("Boxplot of Numeric Features")
plt.xticks(rotation=45)
plt.tight_layout()
plt.show()
```

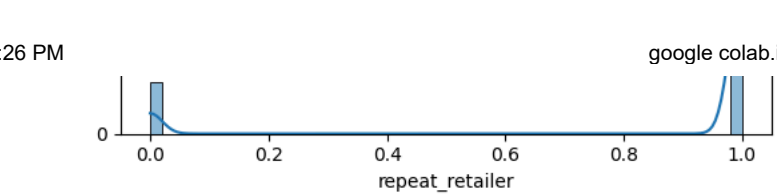
[+]

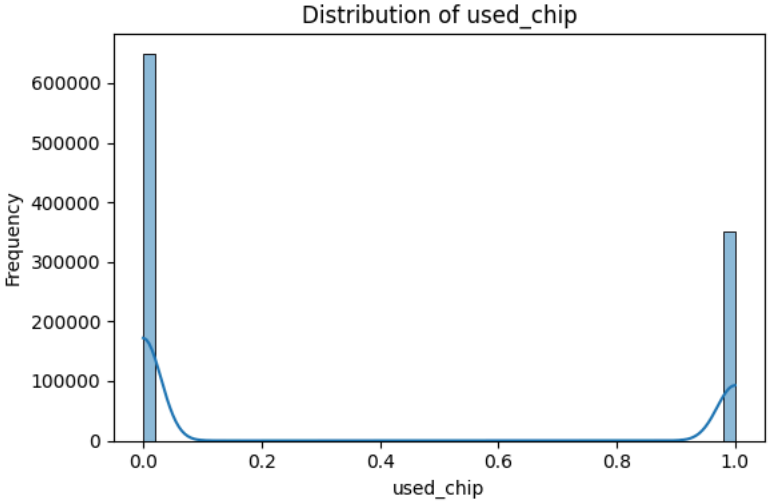

Distribution of distance_from_home
1e6
Frequency
distance_from_home

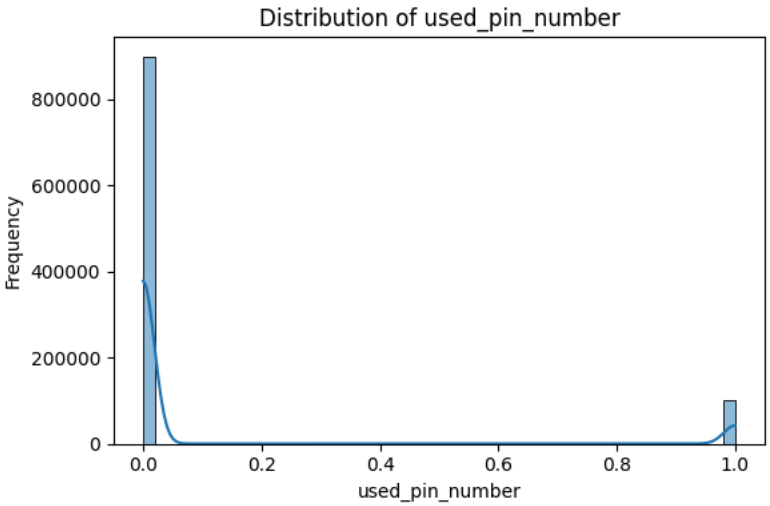

Distribution of distance_from_last_transaction
1e7
Frequency
distance_from_last_transaction

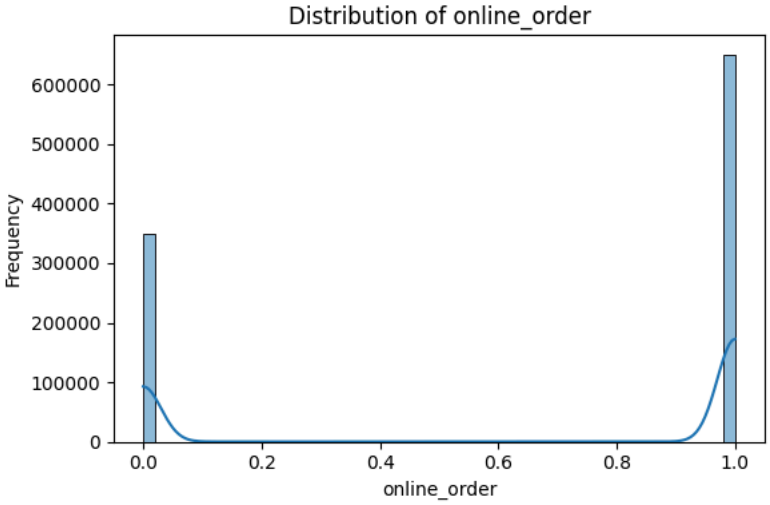

Distribution of ratio_to_median_purchase_price
1e6
Frequency
ratio_to_median_purchase_price

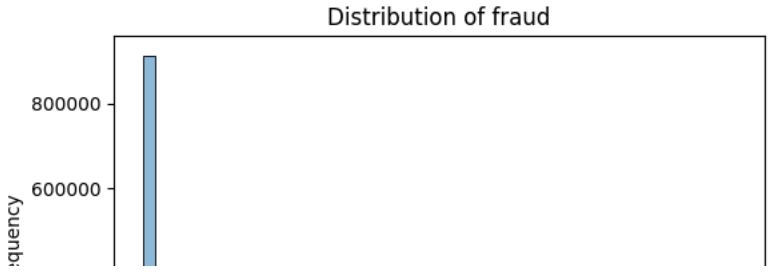

Distribution of repeat_retailer
Frequency

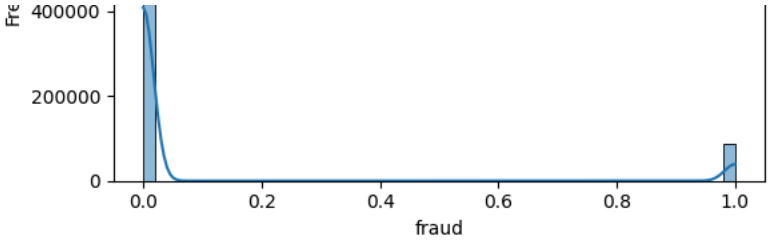

0
0.0
0.2
0.4
0.6
0.8
1.0
repeat_retailer

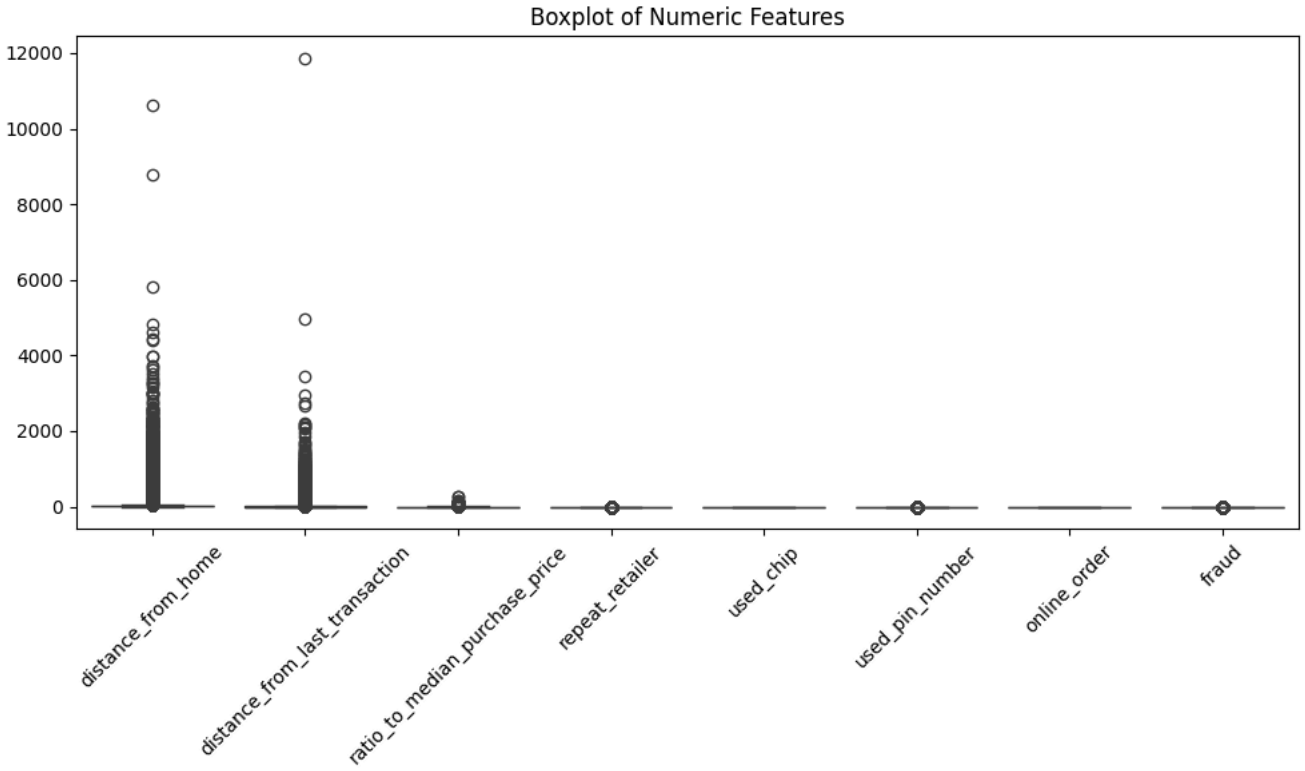

Distribution of used_chip
600000
500000
400000
300000
200000
100000
0
Frequency
0.0
0.2
0.4
0.6
0.8
1.0
used_chip


Distribution of used_pin_number
800000
600000
400000
200000
0
Frequency
0.0
0.2
0.4
0.6
0.8
1.0
used_pin_number


Distribution of online_order
600000
500000
400000
300000
200000
100000
0
Frequency
0.0
0.2
0.4
0.6
0.8
1.0
online_order


Distribution of fraud
800000
600000


Fre
400000
200000
0
0.0
0.2
0.4
0.6
0.8
1.0
fraud


Boxplot of Numeric Features
12000
10000
8000
6000
4000
2000
0
distance_from_home
distance_from_last_transaction
ratio_to_median_purchase_price
repeat_retailer
used_chip
used_pin_number
online_order
fraud

Identify Target and Features python Copy Edit

```
# Try to automatically detect the fraud column
target_candidates = [col for col in df.columns if 'fraud' in col.lower()]

if target_candidates:
    target = target_candidates[0]  # Use the first match
    print(f"Detected target column: {target}")
    X = df.drop(columns=[target])
    y = df[target]
else:
    raise ValueError("No column containing 'fraud' found in the dataset.")
```

```
Detected target column: fraud
```

Convert Categorical Columns to Numerical python Copy Edit

```
# Assuming 'category_column' as a placeholder for any categorical columns:
categorical_cols = X.select_dtypes(include='object').columns
X[categorical_cols] = X[categorical_cols].astype('category').apply(lambda x: x.cat.codes)
```

One-Hot Encoding

```
X = pd.get_dummies(X, columns=categorical_cols, drop_first=True)
```

Feature Scaling

```
from sklearn.preprocessing import StandardScaler

scaler = StandardScaler()
X_scaled = scaler.fit_transform(X)
```

Train-Test Split

```
from sklearn.model_selection import train_test_split

X_train, X_test, y_train, y_test = train_test_split(X_scaled, y, test_size=0.2, random_state=42)
```

. Model Building python Copy Edit

```
from sklearn.ensemble import RandomForestClassifier

model = RandomForestClassifier(random_state=42)
model.fit(X_train, y_train)
```

```
RandomForestClassifier
RandomForestClassifier(random_state=42)
```

Evaluation

```
from sklearn.metrics import classification_report, confusion_matrix

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

```
              precision    recall  f1-score   support

         0.0       1.00      1.00      1.00    182557
         1.0       1.00      1.00      1.00     17443
```

```
    accuracy                           1.00    200000
   macro avg       1.00      1.00      1.00    200000
weighted avg       1.00      1.00      1.00    200000

[[182557      0]
 [     2  17441]]
```

Make Predictions from New Input

```
sample_input = X_test[0].reshape(1, -1)
model.predict(sample_input)
```

```
array([0.])
```

Convert to DataFrame and Encode

```
import pandas as pd

# Load the dataset (replace with the correct path to your dataset)
df = pd.read_csv('/content/card_transdata.csv')

# Step 1: Print the column names to ensure 'Class' or the correct target column exists
print("Columns in dataset:", df.columns)

# Step 2: Clean up any spaces from the column names
df.columns = df.columns.str.strip()

# Step 3: Print the first few rows to visually check the data
print("First few rows:")
print(df.head())

# Step 4: Check for missing values (if any) and handle them (optional)
print("Missing values:")
print(df.isnull().sum())

# Step 5: Clean missing values or fill them with zero
df.fillna(0, inplace=True)

# Step 6: Check the data types to make sure all columns are as expected
print("Data types:")
print(df.dtypes)

# Step 7: If 'Class' is the target column (update accordingly if needed)
# For this example, I'm assuming 'Class' is the target column
X = df.drop('fraud', axis=1)  # Drop the target column for features
y = df['fraud']  # Set the target column

# Print the features and target to confirm
print("Features (X):")
print(X.head())
print("Target (y):")
print(y.head())
```

```
Columns in dataset: Index(['distance_from_home', 'distance_from_last_transaction',
       'ratio_to_median_purchase_price', 'repeat_retailer', 'used_chip',
       'used_pin_number', 'online_order', 'fraud'],
      dtype='object')
First few rows:
   distance_from_home  distance_from_last_transaction  \
0           57.877857                        0.311140
1           10.829943                        0.175592
2            5.091079                        0.805153
3            2.247564                        5.600044
4           44.190936                        0.566486

   ratio_to_median_purchase_price  repeat_retailer  used_chip  \
0                        1.945940              1.0        1.0
1                        1.294219              1.0        0.0
2                        0.427715              1.0        0.0
3                        0.362663              1.0        1.0
4                        2.222767              1.0        1.0
```

```
   used_pin_number  online_order  fraud
0              0.0           0.0    0.0
1              0.0           0.0    0.0
2              0.0           1.0    0.0
3              0.0           1.0    0.0
4              0.0           1.0    0.0
Missing values:
distance_from_home                0
distance_from_last_transaction    0
ratio_to_median_purchase_price    0
repeat_retailer                   0
used_chip                         0
used_pin_number                   0
online_order                      0
fraud                             0
dtype: int64
Data types:
distance_from_home                float64
distance_from_last_transaction    float64
ratio_to_median_purchase_price    float64
repeat_retailer                   float64
used_chip                         float64
used_pin_number                   float64
online_order                      float64
fraud                             float64
dtype: object
Features (X):
   distance_from_home  distance_from_last_transaction  \
0           57.877857                       0.311140
1           10.829943                       0.175592
2            5.091079                       0.805153
3            2.247564                       5.600044
4           44.190936                       0.566486

   ratio_to_median_purchase_price  repeat_retailer  used_chip  \
0                        1.945940              1.0        1.0
1                        1.294219              1.0        0.0
2                        0.427715              1.0        0.0
```

Predict the Final Grade (or Outcome)

```
def predict_fraud(V1, V2, V3, V28):
    # Create input DataFrame
    new_data = pd.DataFrame({
        'V1': [V1],
        'V2': [V2],
        'V3': [V3],
        'V28': [V28]
    })

    # Scale the input data
    scaled_new_data = scaler.transform(new_data)

    # Make prediction
    prediction = model.predict(scaled_new_data)

    # Return result
    return "Fraudulent" if prediction[0] == 1 else "Not Fraudulent"
```

Deployment - Building an Interactive App python Copy Edit

```
!pip install gradio
import gradio as gr
```

```
Collecting gradio
  Downloading gradio-5.29.0-py3-none-any.whl.metadata (16 kB)
Collecting aiofiles<25.0,>=22.0 (from gradio)
  Downloading aiofiles-24.1.0-py3-none-any.whl.metadata (10 kB)
Requirement already satisfied: anyio<5.0,>=3.0 in /usr/local/lib/python3.11/dist-packages (from gradio) (4.9.0)
Collecting fastapi<1.0,>=0.115.2 (from gradio)
  Downloading fastapi-0.115.12-py3-none-any.whl.metadata (27 kB)
Collecting ffmpy (from gradio)
  Downloading ffmpy-0.5.0-py3-none-any.whl.metadata (3.0 kB)
Collecting gradio-client==1.10.0 (from gradio)
  Downloading gradio_client-1.10.0-py3-none-any.whl.metadata (7.1 kB)
Collecting groovy~=0.1 (from gradio)
  Downloading groovy-0.1.2-py3-none-any.whl.metadata (6.1 kB)
```