PHASE-3: PREPROCESSING AND VISUALIZATION

Step: 1 Import the necessary library

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
```

Step: 2 Import the the association rules.

```
from mlxtend.frequent_patterns import apriori
from mlxtend.frequent_patterns import association_rules
```

Step: 3 Upload the dataset

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

Choose Files Assignment-1_Data.xlsx

- **Assignment-1_Data.xlsx**(application/vnd.openxmlformats-officedocument.spreadsheetml.sheet) - 18146884 bytes, last modified: 10/12/2023 - 100% done

Saving Assignment-1_Data.xlsx to Assignment-1_Data.xlsx

Step: 4 Read the dataset using

```
df = pd.read_excel('Assignment-1_Data.xlsx')
print(df)
```

```
        BillNo                            Itemname  Quantity  \
0       536365   WHITE HANGING HEART T-LIGHT HOLDER         6
1       536365                  WHITE METAL LANTERN         6
2       536365       CREAM CUPID HEARTS COAT HANGER         8
3       536365  KNITTED UNION FLAG HOT WATER BOTTLE         6
4       536365       RED WOOLLY HOTTIE WHITE HEART.         6
...        ...                                  ...       ...
522059  581587          PACK OF 20 SPACEBOY NAPKINS        12
522060  581587          CHILDREN'S APRON DOLLY GIRL         6
522061  581587         CHILDRENS CUTLERY DOLLY GIRL         4
522062  581587      CHILDRENS CUTLERY CIRCUS PARADE         4
522063  581587         BAKING SET 9 PIECE RETROSPOT         3

                     Date  Price  CustomerID         Country
0      2010-12-01 08:26:00   2.55     17850.0  United Kingdom
1      2010-12-01 08:26:00   3.39     17850.0  United Kingdom
2      2010-12-01 08:26:00   2.75     17850.0  United Kingdom
3      2010-12-01 08:26:00   3.39     17850.0  United Kingdom
4      2010-12-01 08:26:00   3.39     17850.0  United Kingdom
...                    ...    ...         ...             ...
522059 2011-12-09 12:50:00   0.85     12680.0          France
522060 2011-12-09 12:50:00   2.10     12680.0          France
522061 2011-12-09 12:50:00   4.15     12680.0          France
522062 2011-12-09 12:50:00   4.15     12680.0          France
522063 2011-12-09 12:50:00   4.95     12680.0          France

[522064 rows x 7 columns]
```

Step: 5 Display the particular rows and columns in a dataset.

```
df.head(20)
```

	BillNo	Itemname	Quantity	Date	Price	CustomerID	Country
0	536365	WHITE HANGING HEART T-LIGHT HOLDER	6	2010-12-01 08:26:00	2.55	17850.0	United Kingdom
1	536365	WHITE METAL LANTERN	6	2010-12-01 08:26:00	3.39	17850.0	United Kingdom
2	536365	CREAM CUPID HEARTS COAT HANGER	8	2010-12-01 08:26:00	2.75	17850.0	United Kingdom
3	536365	KNITTED UNION FLAG HOT WATER BOTTLE	6	2010-12-01 08:26:00	3.39	17850.0	United Kingdom
4	536365	RED WOOLLY HOTTIE WHITE HEART.	6	2010-12-01 08:26:00	3.39	17850.0	United Kingdom
5	536365	SET 7 BABUSHKA NESTING BOXES	2	2010-12-01 08:26:00	7.65	17850.0	United Kingdom
6	536365	GLASS STAR FROSTED T-LIGHT HOLDER	6	2010-12-01 08:26:00	4.25	17850.0	United Kingdom
7	536366	HAND WARMER UNION JACK	6	2010-12-01 08:28:00	1.85	17850.0	United Kingdom

Step: 6 Preprocessing: Data Collection: Gather transactional data that includes information about items purchased together.

Data Cleaning: Handle missing values if any. Remove duplicate transactions or items. Ensure consistency in item names and encoding.

Transaction Consolidation: Group transactions by a unique identifier (e.g., customer ID or transaction ID).

Filtering Rules: Apply metrics like support, confidence, and lift to filter out rules that are not statistically significant or do not meet certain thresholds.

```
import pandas as pd
from mlxtend.frequent_patterns import apriori, association_rules

pd.set_option('display.max_columns', None)
pd.set_option('display.max_rows', None)
pd.set_option('display.width', 500)

df = pd.read_excel("Assignment-1_Data.xlsx")
def outlier_thresholds(dataframe, variable):
    quartile1 = dataframe[variable].quantile(0.01)
    quartile3 = dataframe[variable].quantile(0.99)
    interquantile_range = quartile3 - quartile1
    up_limit = quartile3 + 1.5 * interquantile_range
    low_limit = quartile1 - 1.5 * interquantile_range
    return low_limit, up_limit
def replace_with_thresholds(dataframe, variable):
    low_limit, up_limit = outlier_thresholds(dataframe, variable)
    dataframe.loc[(dataframe[variable] < low_limit), variable] = low_limit
    dataframe.loc[(dataframe[variable] > up_limit), variable] = up_limit
def retail_data_prep(dataframe):
    dataframe = dataframe[dataframe["Quantity"] > 0]
    dataframe = dataframe[dataframe["Price"] > 0]
    replace_with_thresholds(dataframe, "Quantity")
    replace_with_thresholds(dataframe, "Price")
    return dataframe

df = retail_data_prep(df)

df.describe().T
```

	count	mean	std	min	25%	50%	75%
Quantity	519551.0	9.397420	21.281261	1.000	1.00	3.00	10.00
Price	519551.0	3.326470	3.877380	0.001	1.25	2.08	4.13
CustomerID	387985.0	15317.042994	1721.813298	12346.000	13950.00	15265.00	16837.00

Step: 7 Find the null values on the dataset

```
df.isnull().sum()
```

```
/usr/local/lib/python3.10/dist-packages/ipykernel/ipkernel.py:283: DeprecationWarning: `should_run_async` will not call `transform_cell`
  and should_run_async(code)
BillNo             0
Itemname           0
Quantity           0
Date               0
Price              0
CustomerID    131566
Country            0
dtype: int64
```

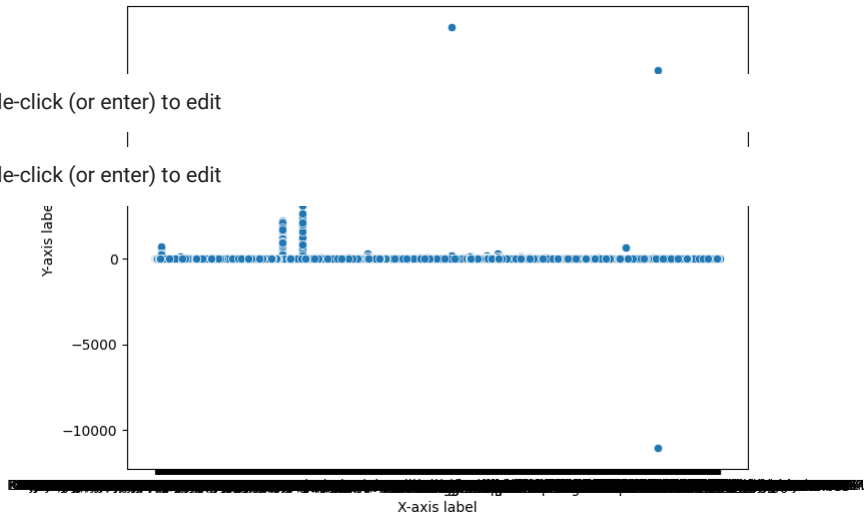
```
import pandas as pd
from mlxtend.frequent_patterns import apriori
from mlxtend.frequent_patterns import association_rules


data = pd.read_excel('Assignment-1_Data.xlsx')

transactions = data.groupby(['Price', 'Itemname'])['Quantity'].sum().unstack().reset_index().fillna(0).set_index('Price')
transactions = transactions.applymap(lambda x: 1 if x > 0 else 0)


min_support = 0.05
frequent_itemsets = apriori(transactions, min_support=min_support, use_colnames=True)


min_threshold = 1.0
association_rules = association_rules(frequent_itemsets, metric="lift", min_threshold=min_threshold)
print("Frequent Itemsets:")
print(frequent_itemsets)

print("\nAssociation Rules:")
print(association_rules)
```

```
/usr/local/lib/python3.10/dist-packages/ipykernel/ipkernel.py:283: DeprecationWarning: `should_run_async` will not call `transform_cell`
  and should_run_async(code)
Frequent Itemsets:
    support          itemsets
0  0.534630  (DOTCOM POSTAGE)
1  0.097276          (Manual)

Association Rules:
Empty DataFrame
Columns: [antecedents, consequents, antecedent support, consequent support, support, confidence, lift, leverage, conviction, zhangs_metr
Index: []
/usr/local/lib/python3.10/dist-packages/mlxtend/frequent_patterns/fpcommon.py:110: DeprecationWarning: DataFrames with non-bool types re
  warnings.warn(
```

Step: 9 Visualization: "Visualization in our project refers to the art and science of representing complex market basket data in a visually intuitive and meaningful way. Through the use of various graphical techniques such as heatmaps, network diagrams, bar charts, and interactive dashboards, we aim to transform raw transactional data into insightful visual representations. These visualizations serve as a powerful tool for unraveling patterns, relationships, and trends within the market basket, providing a clear and accessible means for stakeholders to comprehend and act upon the underlying insights derived from the data."

```
import seaborn as sns
dataset = pd.read_excel("Assignment-1_Data.xlsx")
print(dataset.head())
plt.figure(figsize=(8, 6))
sns.histplot(dataset, kde=True)
plt.xlabel('X-axis label')
plt.ylabel('Y-axis label')
plt.title('Histogram of Numerical Column')
plt.show()
plt.figure(figsize=(8, 6))
sns.scatterplot(x='Itemname', y='Price', data=dataset)
plt.xlabel('X-axis label')
plt.ylabel('Y-axis label')
plt.title('Scatter Plot of Column1 vs. Column2')

plt.figure(figsize=(8, 6))
```

```
sns.countplot(x='Itemname', data=dataset)
plt.xlabel('Quantity')
plt.ylabel('Price')
plt.title('Bar Plot of Categorical Column')
plt.xticks(rotation=45)
plt.show()
```



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