ML assignment-1

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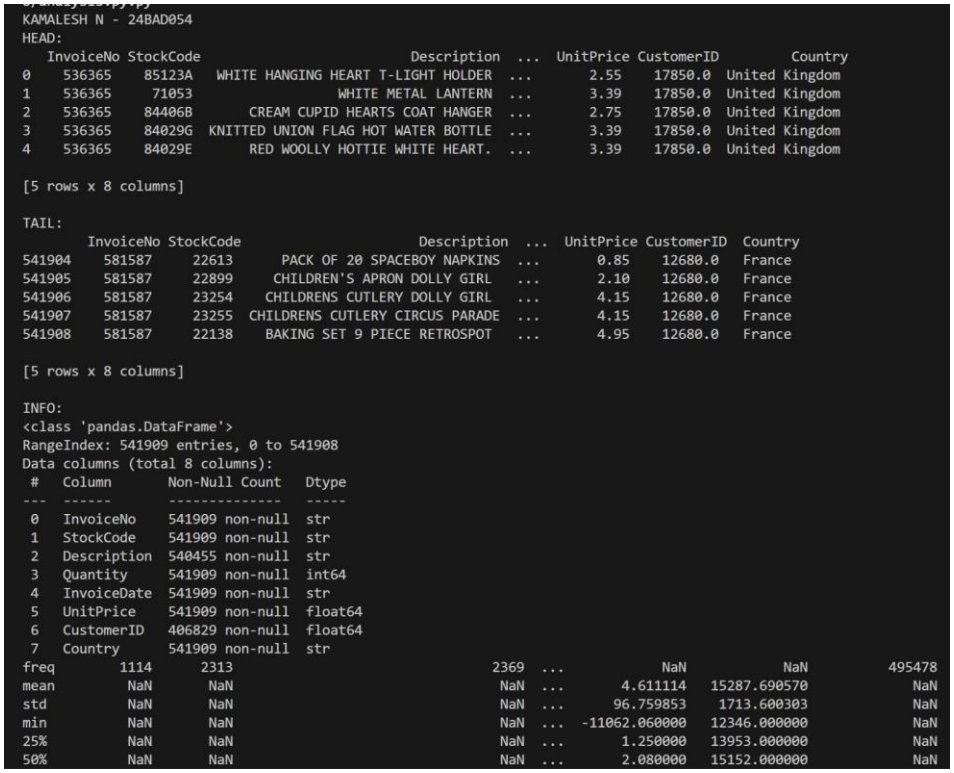
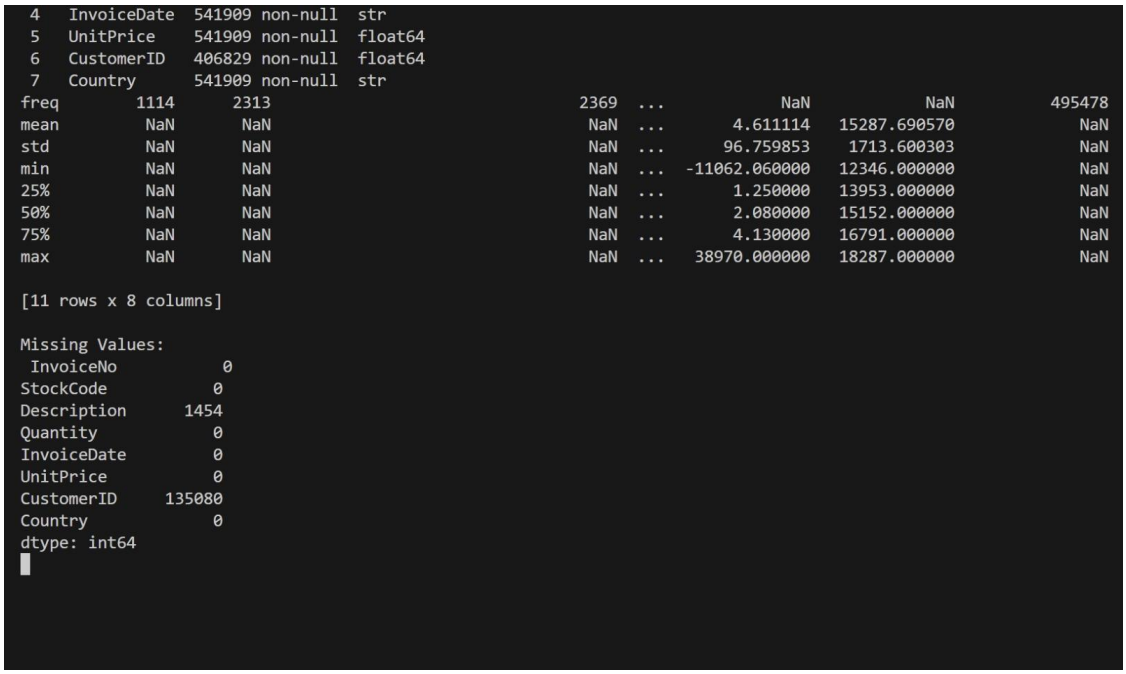
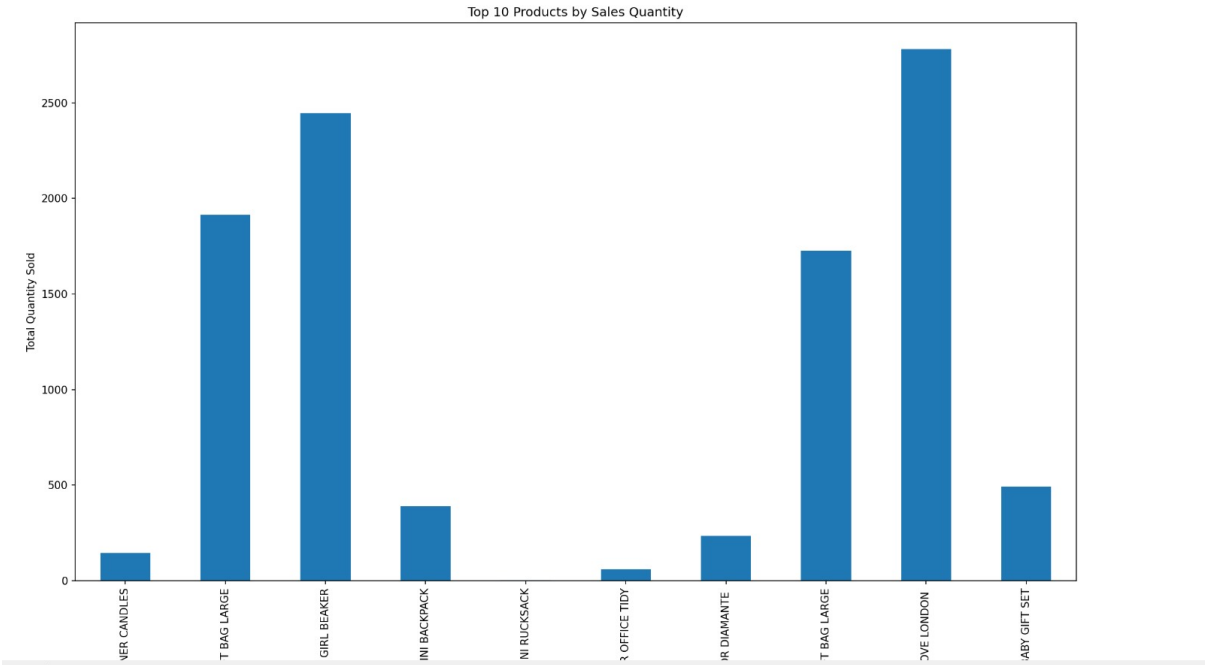
Scenario-1

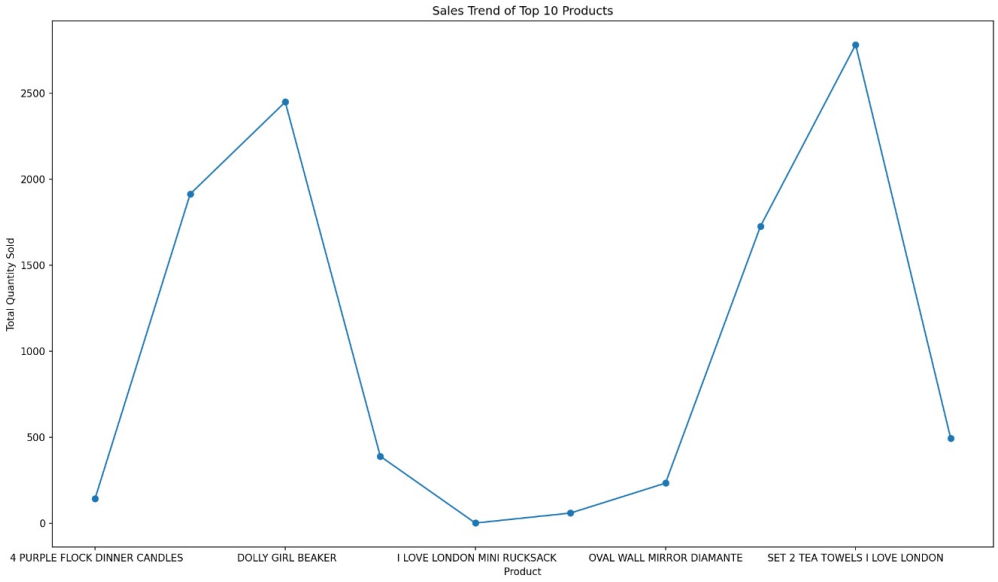


```
KAMALESH N - 24BAD054
HEAD:
   InvoiceNo StockCode                          Description  ...  UnitPrice CustomerID         Country
0     536365    85123A   WHITE HANGING HEART T-LIGHT HOLDER  ...       2.55    17850.0  United Kingdom
1     536365     71053                  WHITE METAL LANTERN  ...       3.39    17850.0  United Kingdom
2     536365    84406B       CREAM CUPID HEARTS COAT HANGER  ...       2.75    17850.0  United Kingdom
3     536365    84029G  KNITTED UNION FLAG HOT WATER BOTTLE  ...       3.39    17850.0  United Kingdom
4     536365    84029E       RED WOOLLY HOTTIE WHITE HEART.  ...       3.39    17850.0  United Kingdom

[5 rows x 8 columns]

TAIL:
        InvoiceNo StockCode                      Description  ...  UnitPrice CustomerID  Country
541904    581587     22613      PACK OF 20 SPACEBOY NAPKINS  ...       0.85    12680.0   France
541905    581587     22899     CHILDREN'S APRON DOLLY GIRL   ...       2.10    12680.0   France
541906    581587     23254    CHILDRENS CUTLERY DOLLY GIRL   ...       4.15    12680.0   France
541907    581587     23255  CHILDRENS CUTLERY CIRCUS PARADE  ...       4.15    12680.0   France
541908    581587     22138    BAKING SET 9 PIECE RETROSPOT   ...       4.95    12680.0   France

[5 rows x 8 columns]

INFO:
<class 'pandas.DataFrame'>
RangeIndex: 541909 entries, 0 to 541908
Data columns (total 8 columns):
 #   Column       Non-Null Count   Dtype
---  ------       --------------   -----
 0   InvoiceNo    541909 non-null  str
 1   StockCode    541909 non-null  str
 2   Description  540455 non-null  str
 3   Quantity     541909 non-null  int64
 4   InvoiceDate  541909 non-null  str
 5   UnitPrice    541909 non-null  float64
 6   CustomerID   406829 non-null  float64
 7   Country      541909 non-null  str
freq        1114      2313                            2369  ...          NaN          NaN         495478
mean         NaN       NaN                             NaN  ...     4.611114  15287.690570            NaN
std          NaN       NaN                             NaN  ...    96.759853   1713.600303            NaN
min          NaN       NaN                             NaN  ...  -11062.060000  12346.000000            NaN
25%          NaN       NaN                             NaN  ...     1.250000  13953.000000            NaN
50%          NaN       NaN                             NaN  ...     2.080000  15152.000000            NaN
```



```
 4   InvoiceDate  541909 non-null  str
 5   UnitPrice    541909 non-null  float64
 6   CustomerID   406829 non-null  float64
 7   Country      541909 non-null  str
freq        1114      2313                            2369  ...          NaN          NaN         495478
mean         NaN       NaN                             NaN  ...     4.611114  15287.690570            NaN
std          NaN       NaN                             NaN  ...    96.759853   1713.600303            NaN
min          NaN       NaN                             NaN  ...  -11062.060000  12346.000000            NaN
25%          NaN       NaN                             NaN  ...     1.250000  13953.000000            NaN
50%          NaN       NaN                             NaN  ...     2.080000  15152.000000            NaN
75%          NaN       NaN                             NaN  ...     4.130000  16791.000000            NaN
max          NaN       NaN                             NaN  ...    38970.000000  18287.000000            NaN

[11 rows x 8 columns]

Missing Values:
 InvoiceNo          0
StockCode           0
Description      1454
Quantity            0
InvoiceDate         0
UnitPrice           0
CustomerID     135080
Country             0
dtype: int64
```

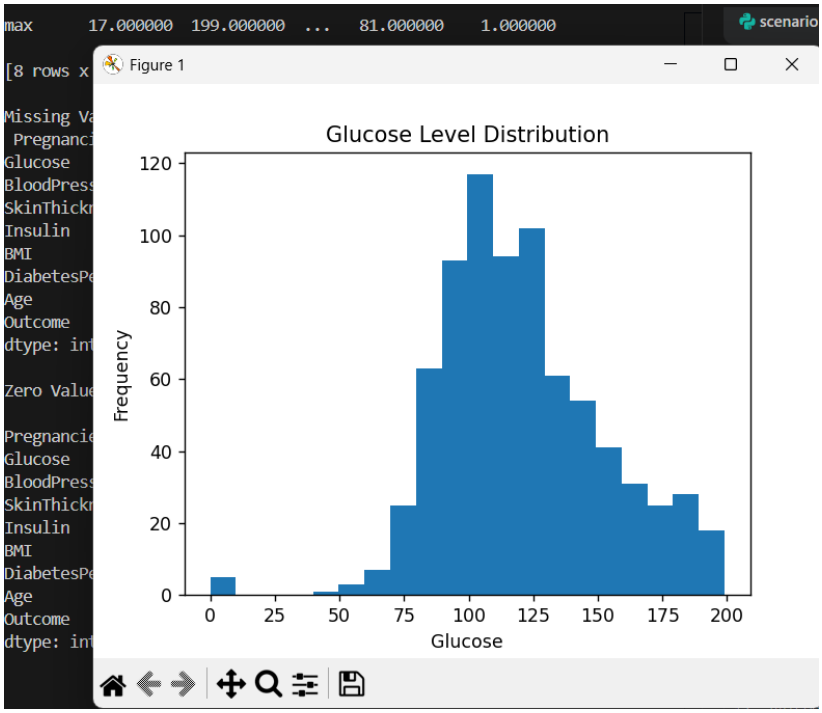

Top 10 Products by Sales Quantity
Total Quantity Sold
0
500
1000
1500
2000
2500
VER CANDLES
T BAG LARGE
GIRL BEAKER
INI BACKPACK
NI RUCKSACK
OFFICE TIDY
HR DIAMANTE
T BAG LARGE
OVE LONDON
ABY GIFT SET


Sales Trend of Top 10 Products
Total Quantity Sold
0
500
1000
1500
2000
2500
4 PURPLE FLOCK DINNER CANDLES
DOLLY GIRL BEAKER
I LOVE LONDON MINI RUCKSACK
OVAL WALL MIRROR DIAMANTE
SET 2 TEA TOWELS I LOVE LONDON
Product

Scenario-2

```
HEAD:
    Pregnancies  Glucose  ...  Age  Outcome
0             6      148  ...   50        1
1             1       85  ...   31        0
2             8      183  ...   32        1
3             1       89  ...   21        0
4             0      137  ...   33        1

[5 rows x 9 columns]

INFO:
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 768 entries, 0 to 767
Data columns (total 9 columns):
 #   Column                    Non-Null Count  Dtype
---  ------                    --------------  -----
 0   Pregnancies               768 non-null    int64
 1   Glucose                   768 non-null    int64
 2   BloodPressure             768 non-null    int64
 3   SkinThickness             768 non-null    int64
 4   Insulin                   768 non-null    int64
 5   BMI                       768 non-null    float64
 6   DiabetesPedigreeFunction  768 non-null    float64
 7   Age                       768 non-null    int64
 8   Outcome                   768 non-null    int64
dtypes: float64(2), int64(7)
memory usage: 54.1 KB

DESCRIBE:
       Pregnancies     Glucose  ...         Age     Outcome
count   768.000000  768.000000  ...  768.000000  768.000000
mean      3.845052  120.894531  ...   33.240885    0.348958
std       3.369578   31.972618  ...   11.760232    0.476951
min       0.000000    0.000000  ...   21.000000    0.000000
25%       1.000000   99.000000  ...   24.000000    0.000000
50%       3.000000  117.000000  ...   29.000000    0.000000
75%       6.000000  140.250000  ...   41.000000    1.000000
max      17.000000  199.000000  ...   81.000000    1.000000

[8 rows x 9 columns]
```

```
Problems  Output  Terminal  ...  Python

max      17.000000  199.000000  ...   81.000000    1.000000

[8 rows x 9 columns]

Missing Values:
 Pregnancies                 0
Glucose                     0
BloodPressure               0
SkinThickness               0
Insulin                     0
BMI                         0
DiabetesPedigreeFunction    0
Age                         0
Outcome                     0
dtype: int64

Zero Values (treated as missing):

Pregnancies                 111
Glucose                       5
BloodPressure                35
SkinThickness               227
Insulin                     374
BMI                          11
DiabetesPedigreeFunction      0
Age                           0
Outcome                     500
dtype: int64
```



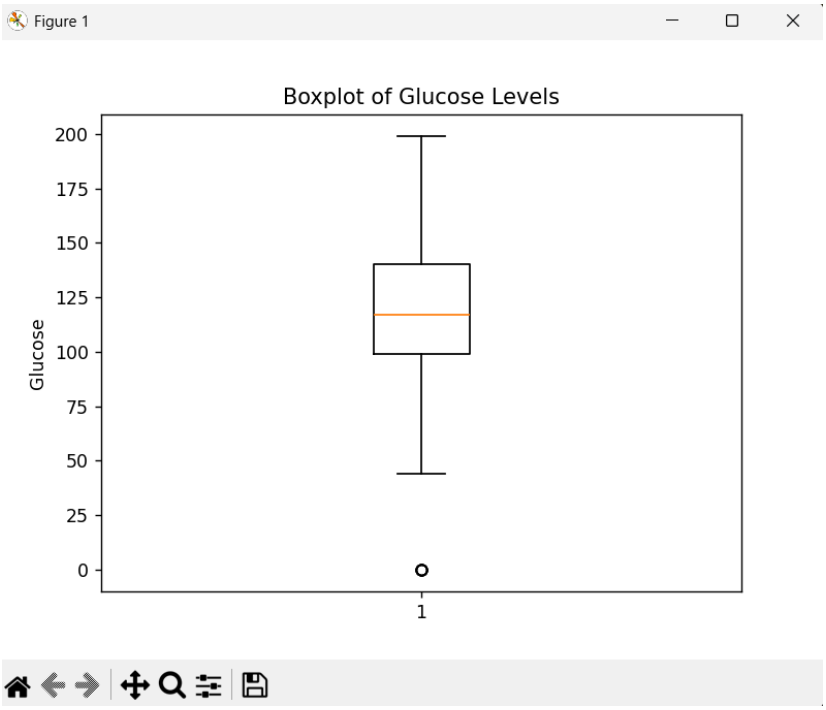


Figure 1
Boxplot of Glucose Levels
Glucose
200
175
150
125
100
75
50
25
0
1

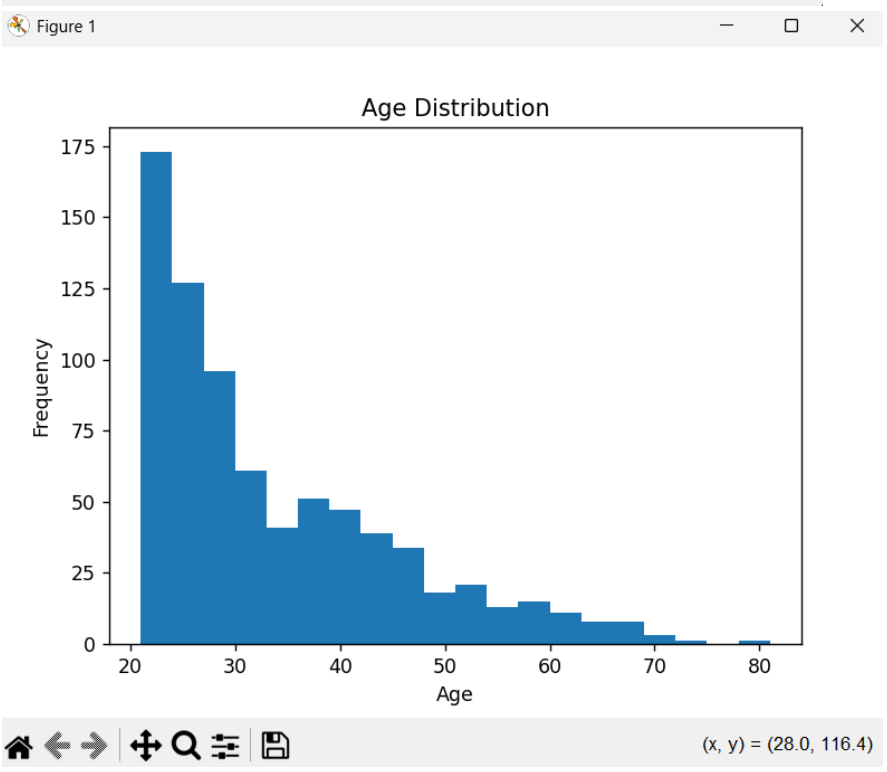


Figure 1
Age Distribution
Frequency
175
150
125
100
75
50
25
0
20
30
40
50
60
70
80
Age
(x, y) = (28.0, 116.4)

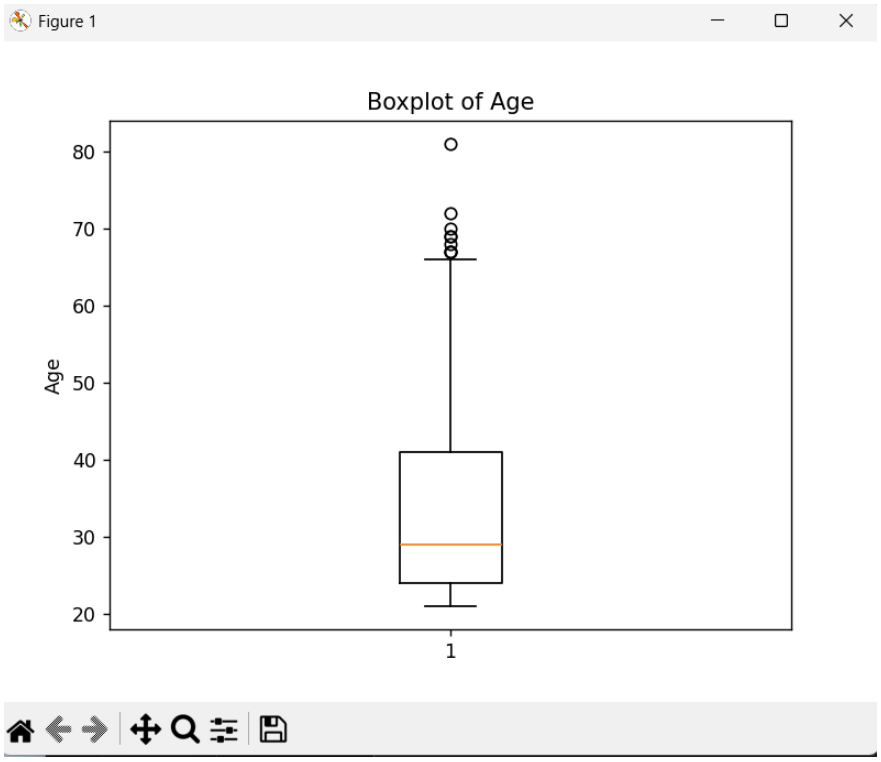


Figure 1
Boxplot of Age
Age
80
70
60
50
40
30
20
1

Scenario-3

```
PS C:\Users\kamal\Downloads> & C:/Users/kamal/AppData/Local/Programs/Pyt
hon/Python312/python.exe c:/Users/kamal/Downloads/scenario-3.py
COLUMNS:
 Index(['price', 'area', 'bedrooms', 'bathrooms', 'stories', 'mainroad',
       'guestroom', 'basement', 'hotwaterheating', 'airconditioning',
       'parking', 'prefarea', 'furnishingstatus'],
      dtype='object')

HEAD:
      price  area  bedrooms  ...  parking  prefarea furnishingstatus
0  13300000  7420         4  ...        2       yes        furnished
1  12250000  8960         4  ...        3        no        furnished
2  12250000  9960         3  ...        2       yes   semi-furnished
3  12215000  7500         4  ...        3       yes        furnished
4  11410000  7420         4  ...        2        no        furnished

[5 rows x 13 columns]

INFO:
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 545 entries, 0 to 544
Data columns (total 13 columns):
 #   Column            Non-Null Count  Dtype
---  ------            --------------  -----
 0   price             545 non-null    int64
 1   area              545 non-null    int64
 2   bedrooms          545 non-null    int64
 3   bathrooms         545 non-null    int64
 4   stories           545 non-null    int64
 5   mainroad          545 non-null    object
 6   guestroom         545 non-null    object
 7   basement          545 non-null    object
 8   hotwaterheating   545 non-null    object
 9   airconditioning   545 non-null    object
 10  parking           545 non-null    int64
 11  prefarea          545 non-null    object
 12  furnishingstatus  545 non-null    object
dtypes: int64(6), object(7)
memory usage: 55.5+ KB
```

```
DESCRIBE:
              price          area  ...     stories     parking
count  5.450000e+02    545.000000  ...  545.000000  545.000000
mean   4.766729e+06   5150.541284  ...    1.805505    0.693578
std    1.870440e+06   2170.141023  ...    0.867492    0.861586
min    1.750000e+06   1650.000000  ...    1.000000    0.000000
25%    3.430000e+06   3600.000000  ...    1.000000    0.000000
50%    4.340000e+06   4600.000000  ...    2.000000    0.000000
75%    5.740000e+06   6360.000000  ...    2.000000    1.000000
max    1.330000e+07  16200.000000  ...    4.000000    3.000000

[8 rows x 6 columns]

Missing Values per Column:
 Series([], dtype: int64)
```

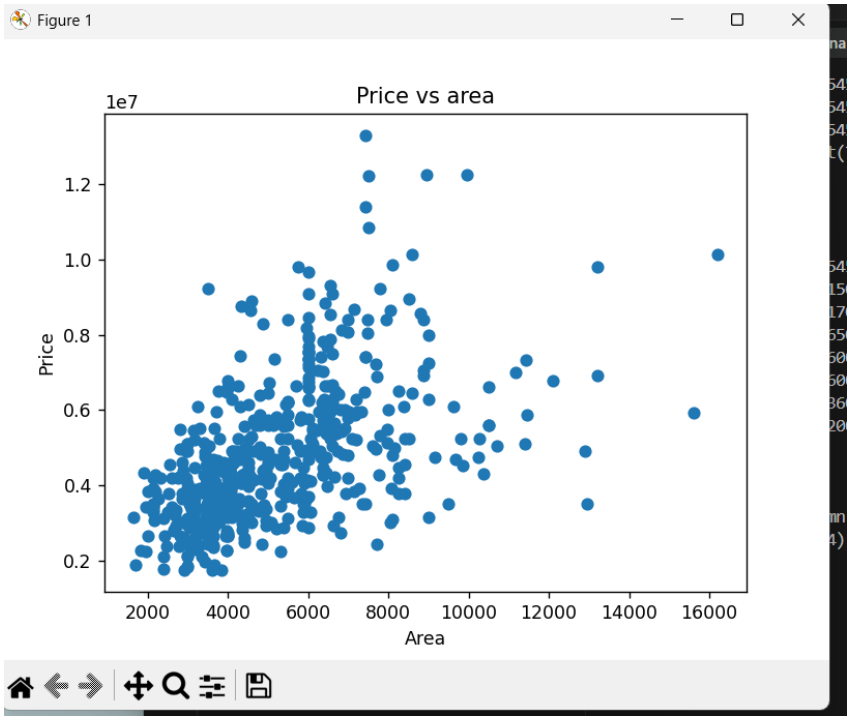


Figure 1
Price vs area
1e7
1.2
1.0
0.8
0.6
0.4
0.2
Price
2000
4000
6000
8000
10000
12000
14000
16000
Area

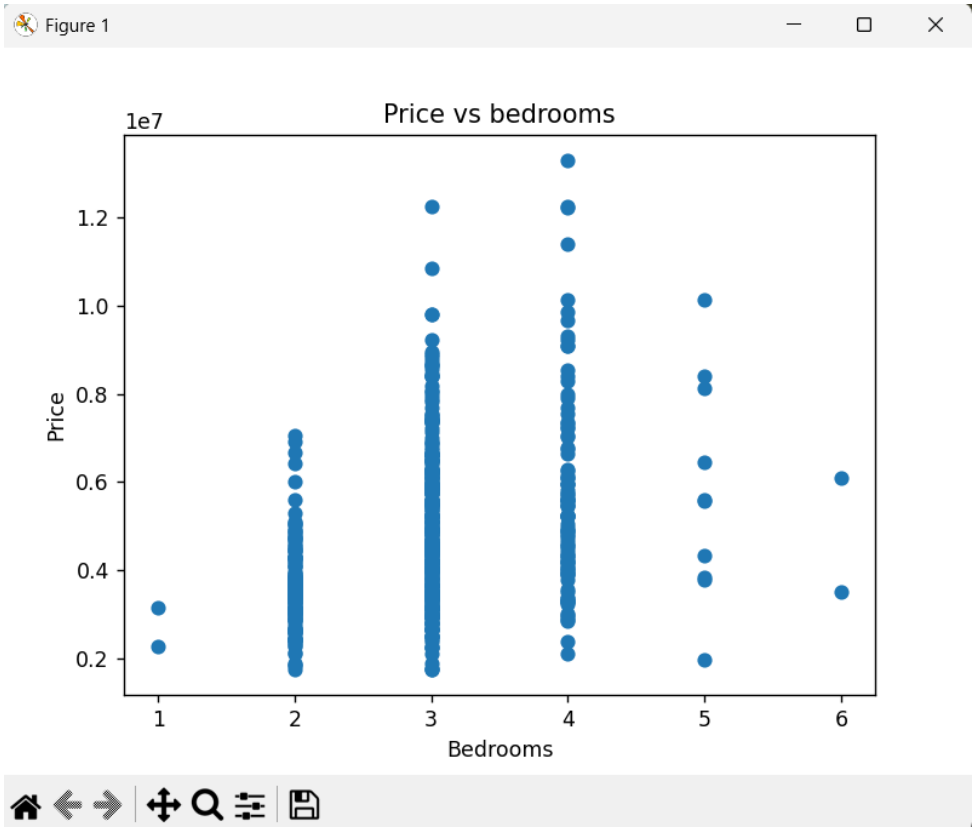


Figure 1
Price vs bedrooms
1e7
1.2
1.0
0.8
0.6
0.4
0.2
Price
1
2
3
4
5
6
Bedrooms

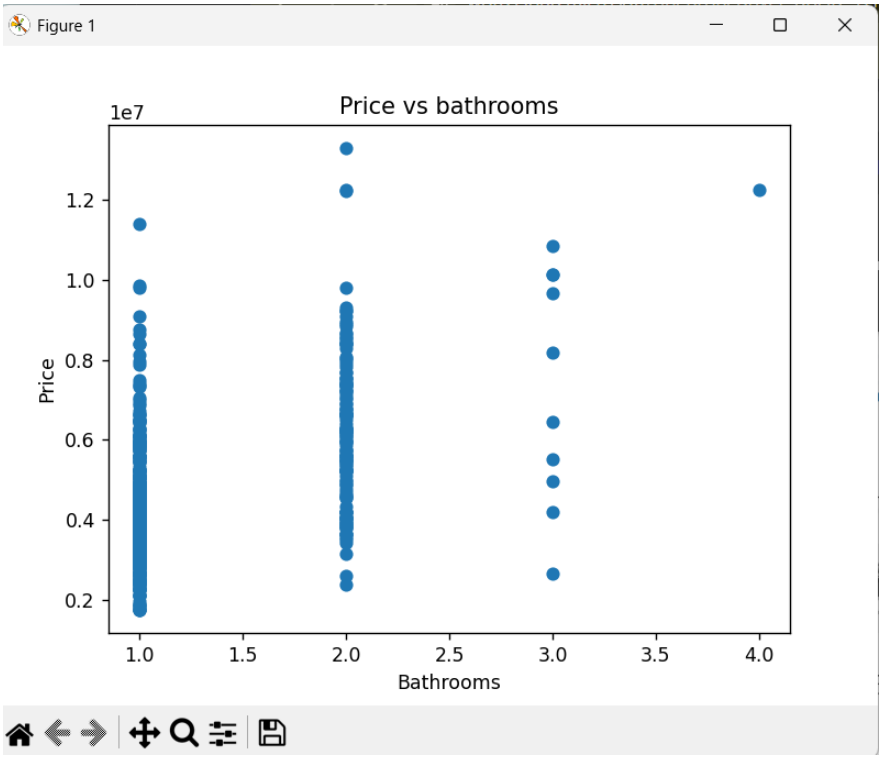


Figure 1
Price vs bathrooms
1e7
1.2
1.0
0.8
0.6
0.4
0.2
Price
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Bathrooms

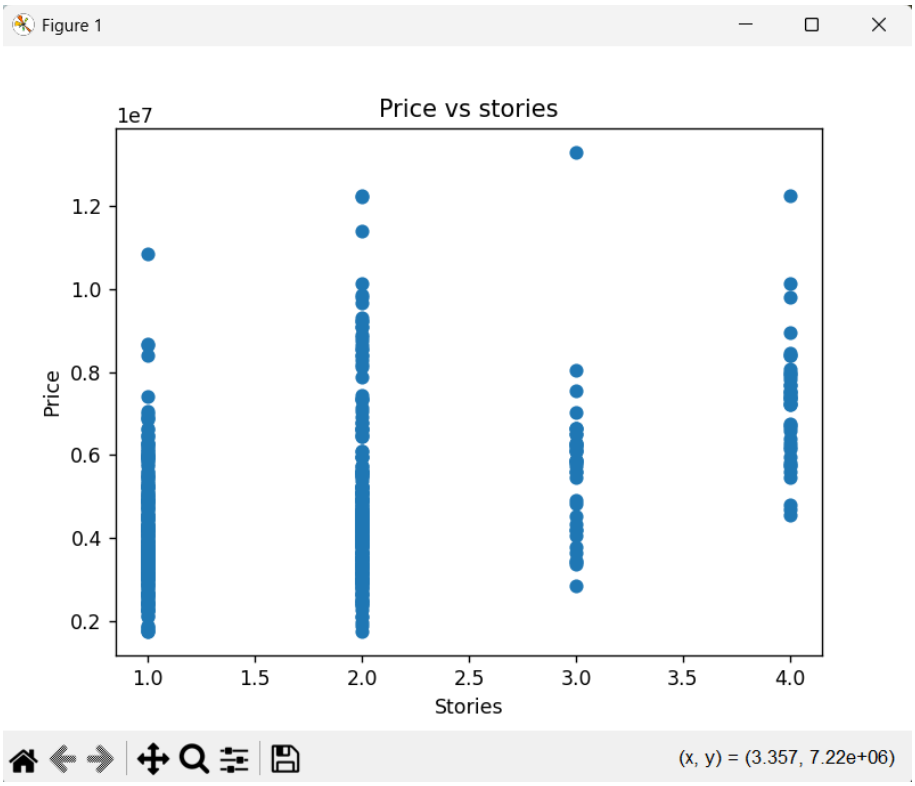


Figure 1
Price vs stories
1e7
1.2
1.0
0.8
0.6
0.4
0.2
Price
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Stories
(x, y) = (3.357, 7.22e+06)

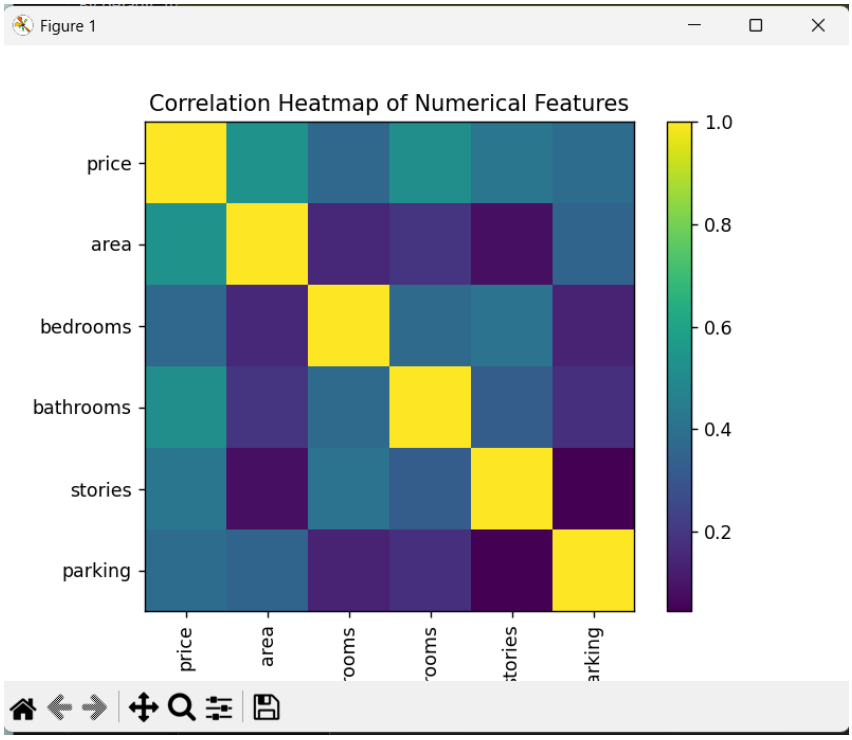


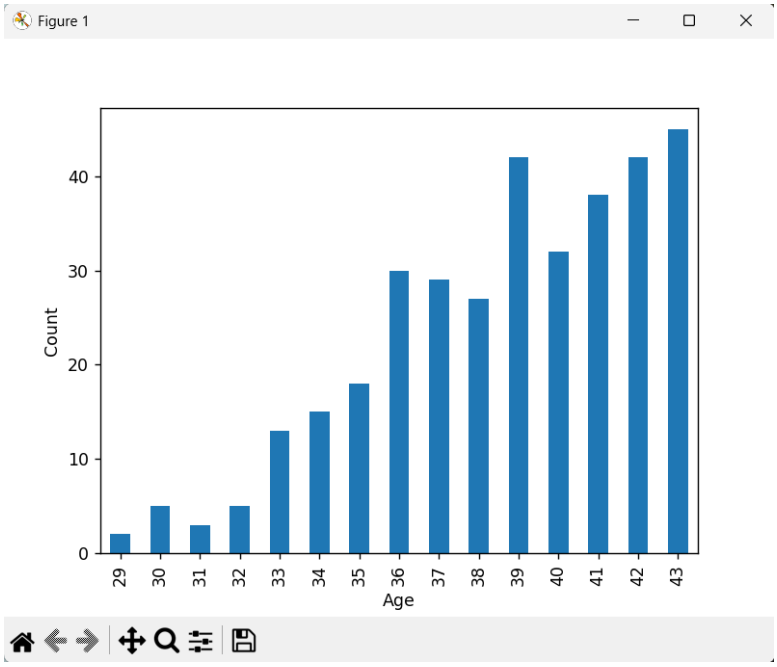
Figure 1
Correlation Heatmap of Numerical Features
price
area
bedrooms
bathrooms
stories
parking
1.0
0.8
0.6
0.4
0.2

Scenario-4

```
PS C:\Users\kamal\Downloads> & C:/Users/kamal/AppData/Local/Programs/Pyt
hon/Python312/python.exe c:/Users/kamal/Downloads/scenario-4.py
     ID  Year_Birth   Education  ... Z_CostContact  Z_Revenue  Response
0  5524        1957  Graduation  ...             3         11         1
1  2174        1954  Graduation  ...             3         11         0
2  4141        1965  Graduation  ...             3         11         0
3  6182        1984  Graduation  ...             3         11         0
4  5324        1981         PhD  ...             3         11         0

[5 rows x 29 columns]
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2240 entries, 0 to 2239
Data columns (total 29 columns):
 #   Column               Non-Null Count  Dtype
---  ------               --------------  -----
 0   ID                   2240 non-null   int64
 1   Year_Birth           2240 non-null   int64
 2   Education            2240 non-null   object
 3   Marital_Status       2240 non-null   object
 4   Income               2216 non-null   float64
 5   Kidhome              2240 non-null   int64
 6   Teenhome             2240 non-null   int64
 7   Dt_Customer          2240 non-null   object
 8   Recency              2240 non-null   int64
 9   MntWines             2240 non-null   int64
 10  MntFruits            2240 non-null   int64
 11  MntMeatProducts      2240 non-null   int64
 12  MntFishProducts      2240 non-null   int64
 13  MntSweetProducts     2240 non-null   int64
 14  MntGoldProds         2240 non-null   int64
 15  NumDealsPurchases    2240 non-null   int64
 16  NumWebPurchases      2240 non-null   int64
 17  NumCatalogPurchases  2240 non-null   int64
 18  NumStorePurchases    2240 non-null   int64
 19  NumWebVisitsMonth    2240 non-null   int64
 20  AcceptedCmp3         2240 non-null   int64
 21  AcceptedCmp4         2240 non-null   int64
 22  AcceptedCmp5         2240 non-null   int64
```

```
 9   MntWines             2240 non-null   int64
 10  MntFruits            2240 non-null   int64
 11  MntMeatProducts      2240 non-null   int64
 12  MntFishProducts      2240 non-null   int64
 13  MntSweetProducts     2240 non-null   int64
 14  MntGoldProds         2240 non-null   int64
 15  NumDealsPurchases    2240 non-null   int64
 16  NumWebPurchases      2240 non-null   int64
 17  NumCatalogPurchases  2240 non-null   int64
 18  NumStorePurchases    2240 non-null   int64
 19  NumWebVisitsMonth    2240 non-null   int64
 20  AcceptedCmp3         2240 non-null   int64
 21  AcceptedCmp4         2240 non-null   int64
 22  AcceptedCmp5         2240 non-null   int64
 23  AcceptedCmp1         2240 non-null   int64
 24  AcceptedCmp2         2240 non-null   int64
 25  Complain             2240 non-null   int64
 26  Z_CostContact        2240 non-null   int64
 27  Z_Revenue            2240 non-null   int64
 28  Response             2240 non-null   int64
dtypes: float64(1), int64(25), object(3)
memory usage: 507.6+ KB
                ID   Year_Birth  ...  Z_Revenue     Response
count   2240.000000  2240.000000  ...     2240.0  2240.000000
mean    5592.159821  1968.805804  ...       11.0     0.149107
std     3246.662198    11.984069  ...        0.0     0.356274
min        0.000000  1893.000000  ...       11.0     0.000000
25%     2828.250000  1959.000000  ...       11.0     0.000000
50%     5458.500000  1970.000000  ...       11.0     0.000000
75%     8427.750000  1977.000000  ...       11.0     0.000000
max    11191.000000  1996.000000  ...       11.0     1.000000

[8 rows x 26 columns]
```

```
memory usage: 507.6+ KB
                ID   Year_Birth  ...  Z_Revenue     Response
count   2240.000000  2240.000000  ...     2240.0  2240.000000
mean    5592.159821  1968.805804  ...       11.0     0.149107
std     3246.662198    11.984069  ...        0.0     0.356274
min        0.000000  1893.000000  ...       11.0     0.000000
25%     2828.250000  1959.000000  ...       11.0     0.000000
50%     5458.500000  1970.000000  ...       11.0     0.000000
75%     8427.750000  1977.000000  ...       11.0     0.000000
max    11191.000000  1996.000000  ...       11.0     1.000000

[8 rows x 26 columns]
ID                     0
Year_Birth             0
Education              0
Marital_Status         0
Income                24
Kidhome                0
Teenhome               0
Dt_Customer            0
Recency                0
MntWines               0
MntFruits              0
MntMeatProducts        0
MntFishProducts        0
MntSweetProducts       0
MntGoldProds           0
NumDealsPurchases      0
NumWebPurchases        0
NumCatalogPurchases    0
NumStorePurchases      0
NumWebVisitsMonth      0
AcceptedCmp3           0
AcceptedCmp4           0
AcceptedCmp5           0
AcceptedCmp1           0
AcceptedCmp2           0
```



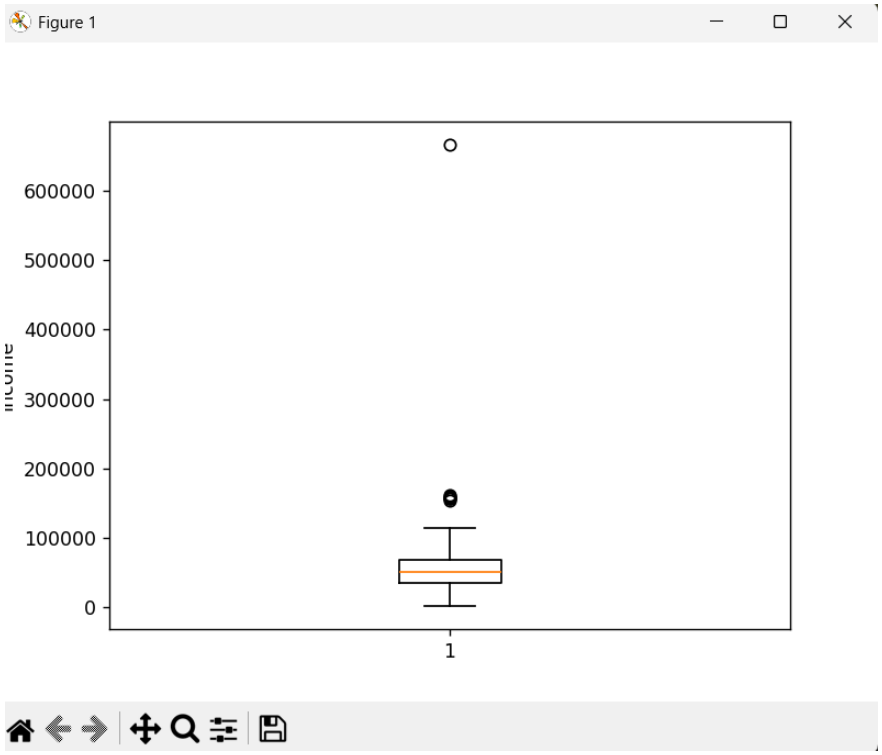


Figure 1
600000
500000
400000
300000
200000
100000
0
1

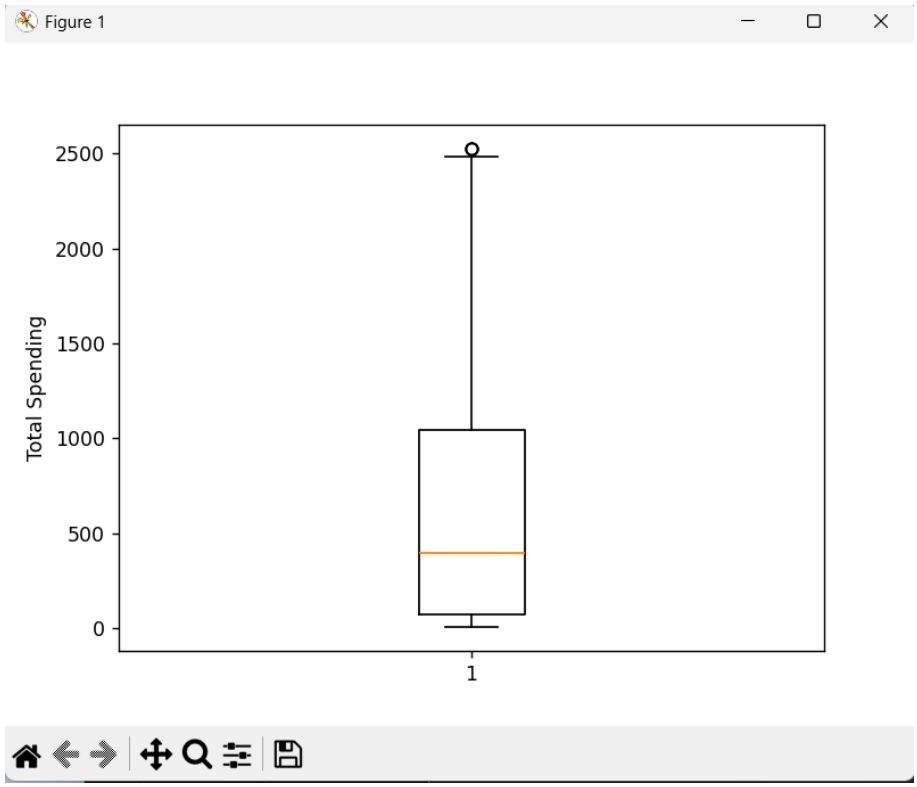


Figure 1
2500
2000
1500
1000
500
0
Total Spending
1