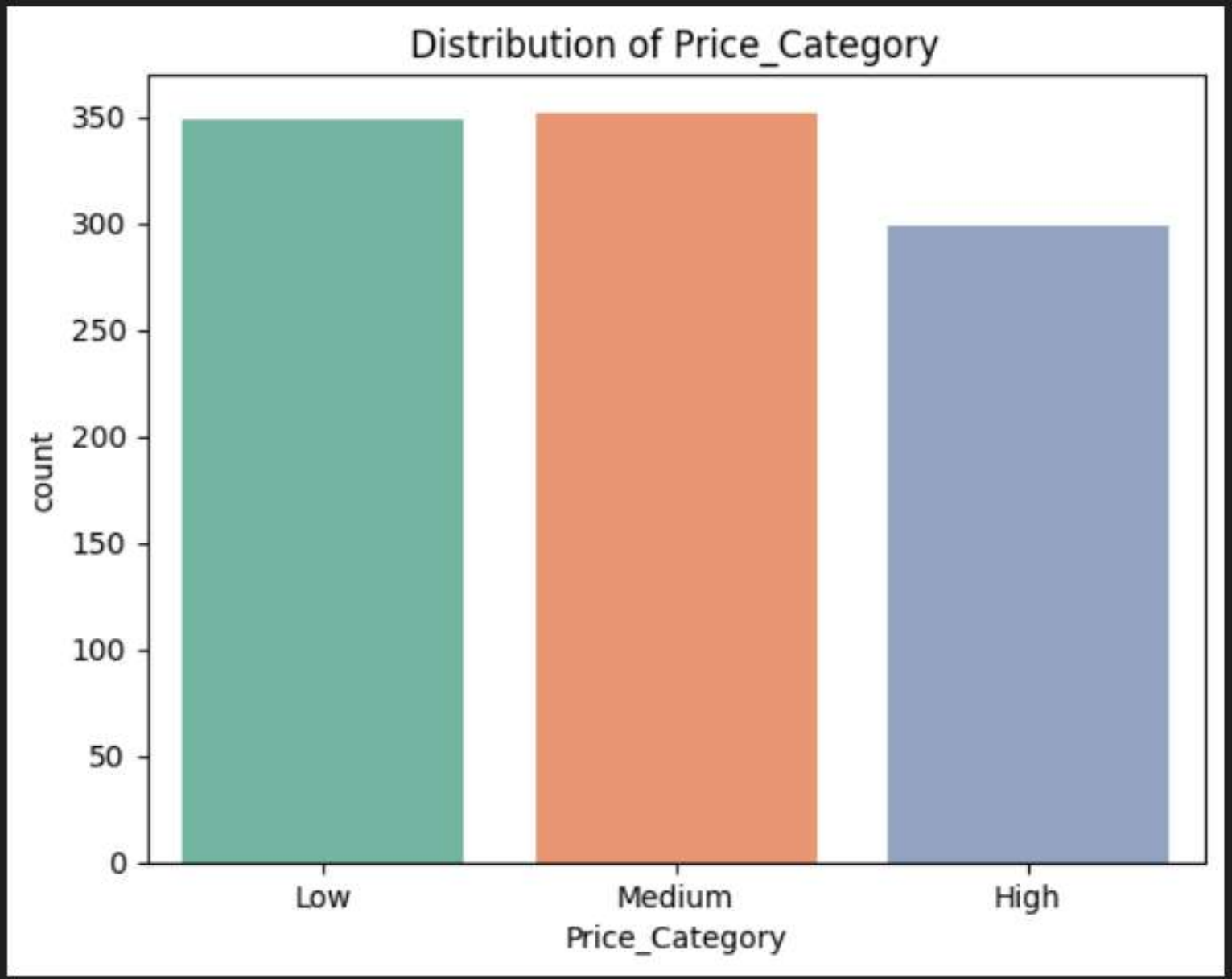
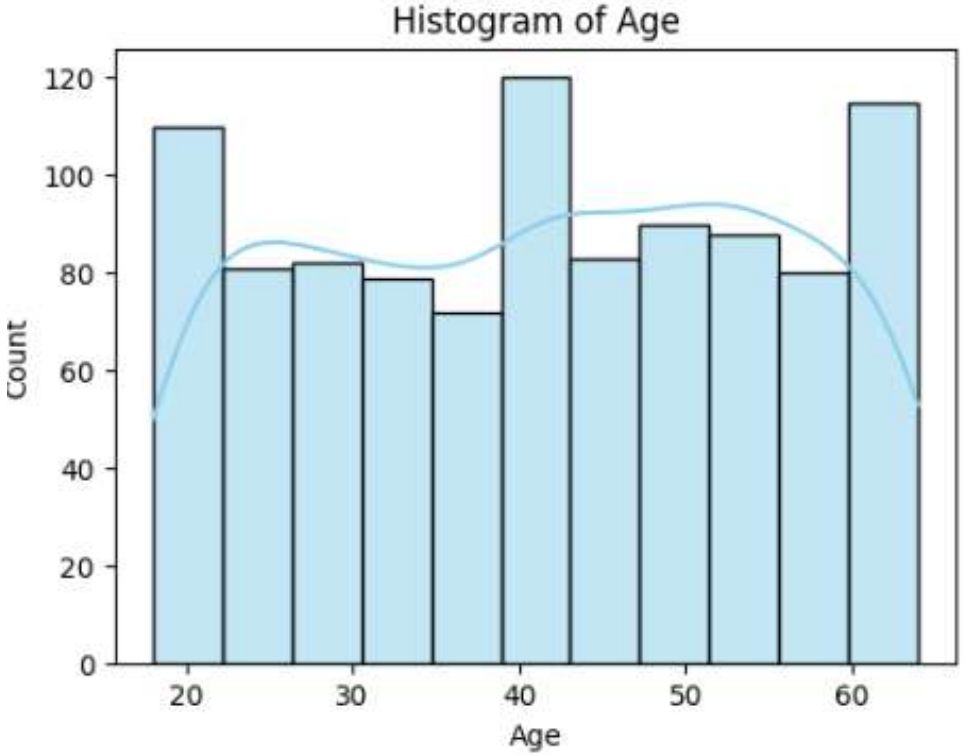
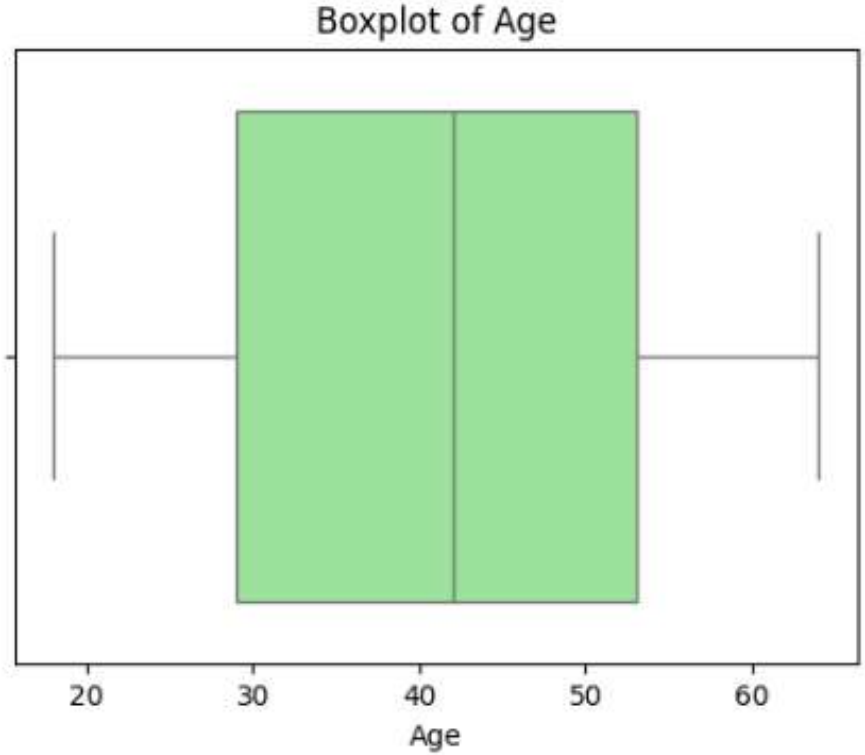
```
Dataset Shape: (1000, 9)

--- Head ---
   Transaction ID        Date Customer ID  Gender  Age Product Category  \
0               1  2023-11-24     CUST001    Male   34           Beauty
1               2  2023-02-27     CUST002  Female   26         Clothing
2               3  2023-01-13     CUST003    Male   50      Electronics
3               4  2023-05-21     CUST004    Male   37         Clothing
4               5  2023-05-06     CUST005    Male   30           Beauty

   Quantity  Price per Unit  Total Amount
0         3              50           150
1         2             500          1000
2         1              30            30
3         1             500           500
4         2              50           100

--- Tail ---
     Transaction ID        Date Customer ID  Gender  Age Product Category  \
995             996  2023-05-16     CUST996    Male   62         Clothing
996             997  2023-11-17     CUST997    Male   52           Beauty
997             998  2023-10-29     CUST998  Female   23           Beauty
998             999  2023-12-05     CUST999  Female   36      Electronics
999            1000  2023-04-12    CUST1000    Male   47      Electronics
...
25%               NaN      1.00          30.00         60.00
50%               NaN      3.00          50.00        135.00
75%               NaN      4.00         300.00        900.00
max               NaN      4.00         500.00      2,000.00
```

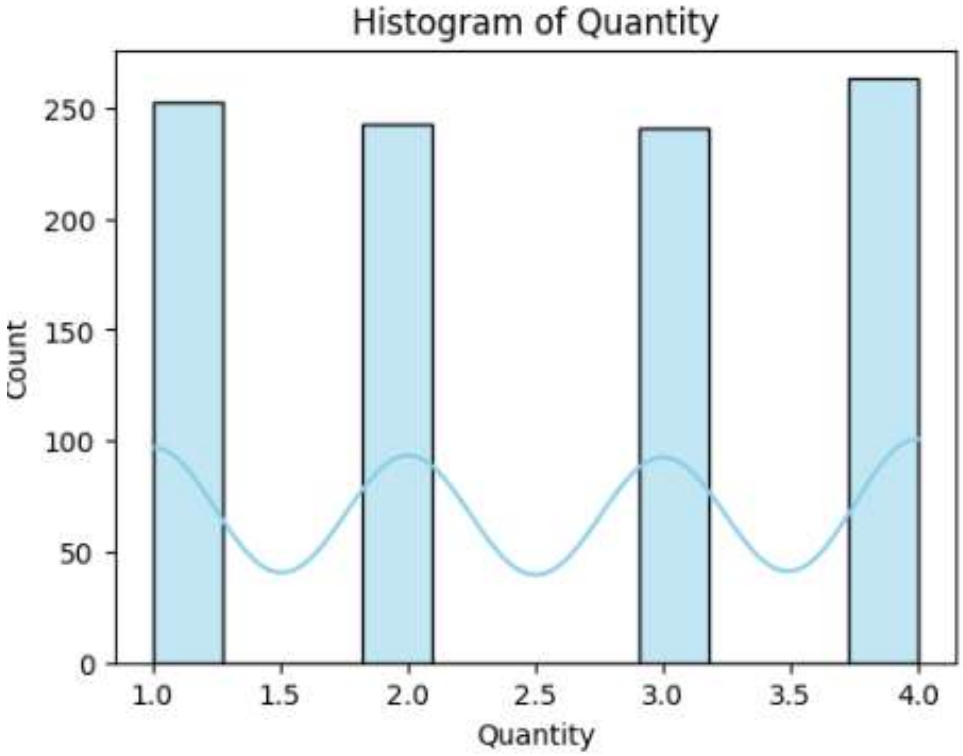
```
--- Price_Category Distribution ---
Price_Category
Medium    352
Low       349
High      299
Name: count, dtype: int64
```

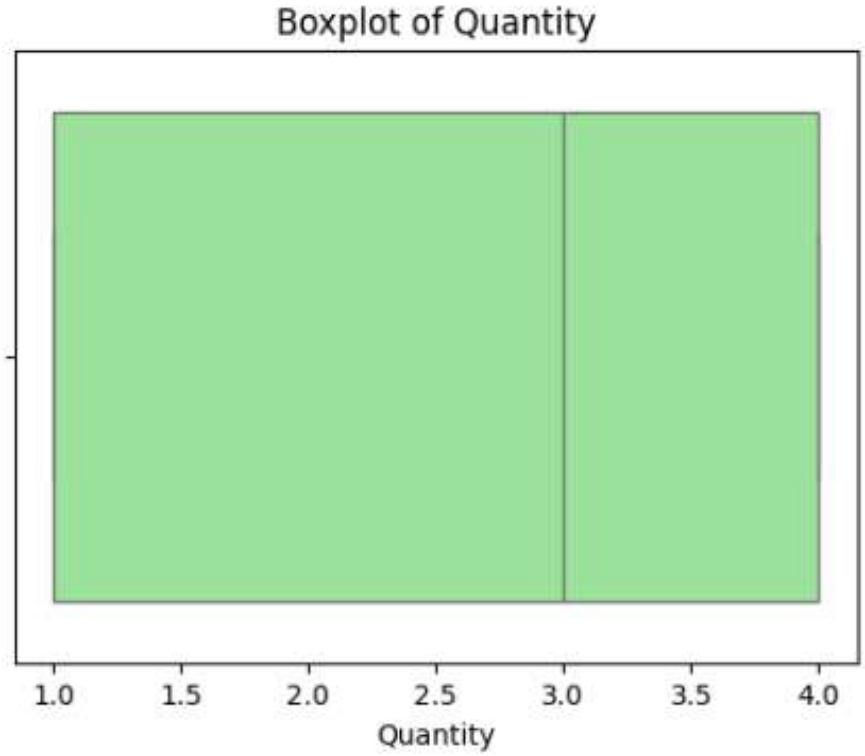


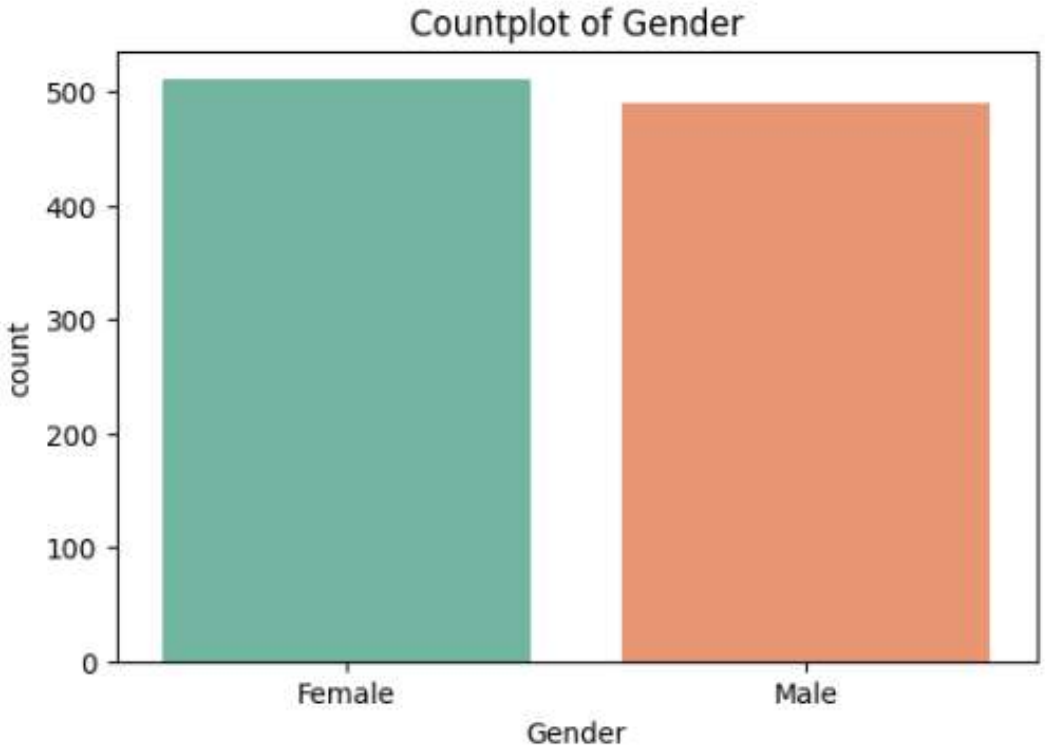
```
--- Updated DataFrame Head ---
   Transaction ID Customer ID  Gender  Age Product Category  Quantity  \
0               1     CUST001    Male   34           Beauty         3
1               2     CUST002  Female   26         Clothing         2
2               3     CUST003    Male   50      Electronics         1
3               4     CUST004    Male   37         Clothing         1
4               5     CUST005    Male   30           Beauty         2

   Price per Unit  Total Amount Price_Category  Year  Month  DayOfWeek  \
0              50           150         Medium  2023     11          4
1             500          1000           High  2023      2          0
2              30            30            Low  2023      1          4
3             500           500         Medium  2023      5          6
4              50           100         Medium  2023      5          5

   Quarter  Revenue_per_Unit  Is_Weekend
0        4             50.00           0
1        1            500.00           0
2        1             30.00           0
3        2            500.00           1
4        2             50.00           1
```

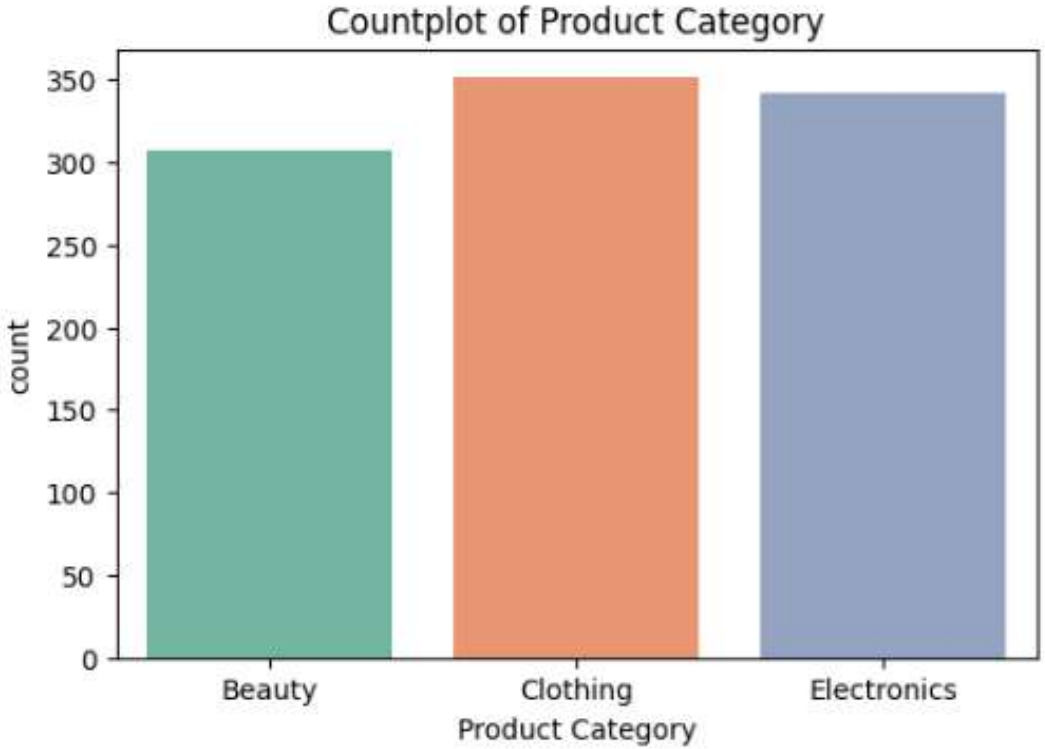

Histogram of Age
Count
Age
0
20
40
60
80
100
120
20
30
40
50
60

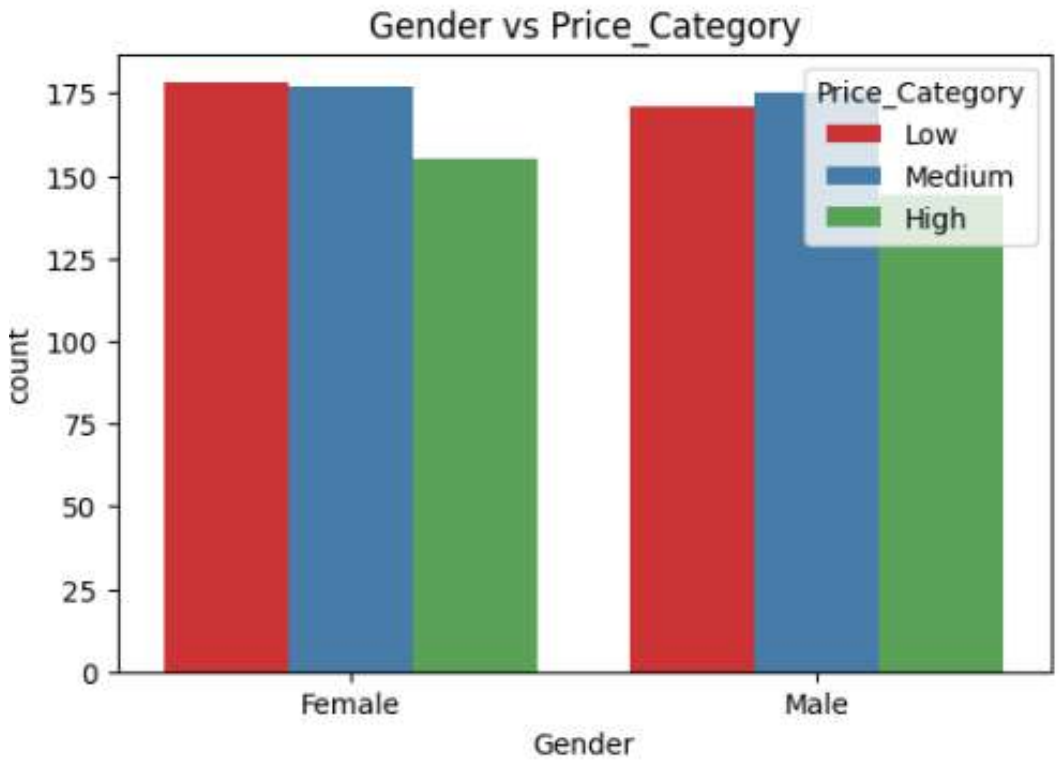

Boxplot of Age
Age
20
30
40
50
60


Histogram of Quantity
Count
Quantity
0
50
100
150
200
250
1.0
1.5
2.0
2.5
3.0
3.5
4.0

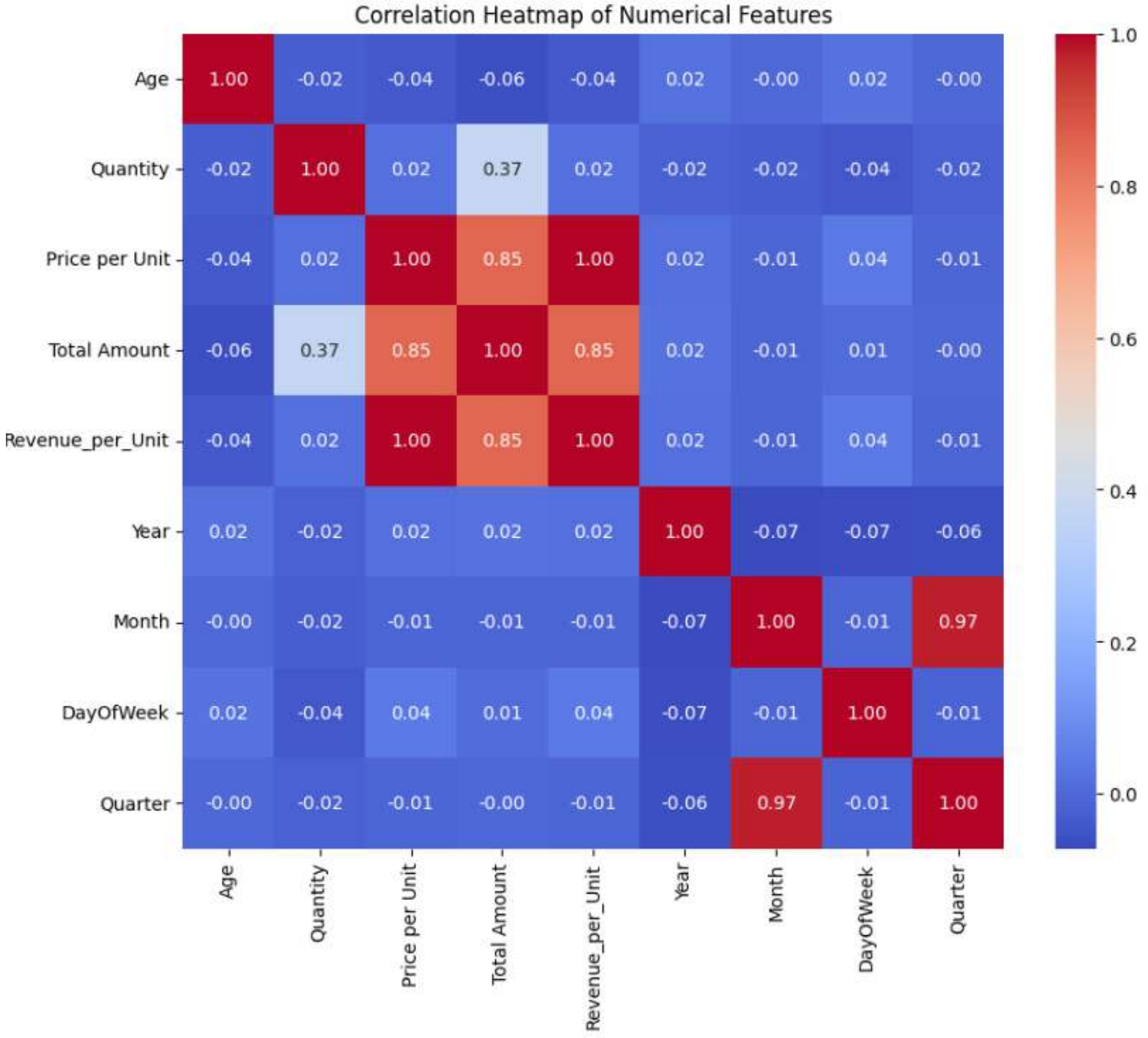

Boxplot of Quantity
Quantity
1.0
1.5
2.0
2.5
3.0
3.5
4.0


Countplot of Gender
count
500
400
300
200
100
0
Female
Male
Gender

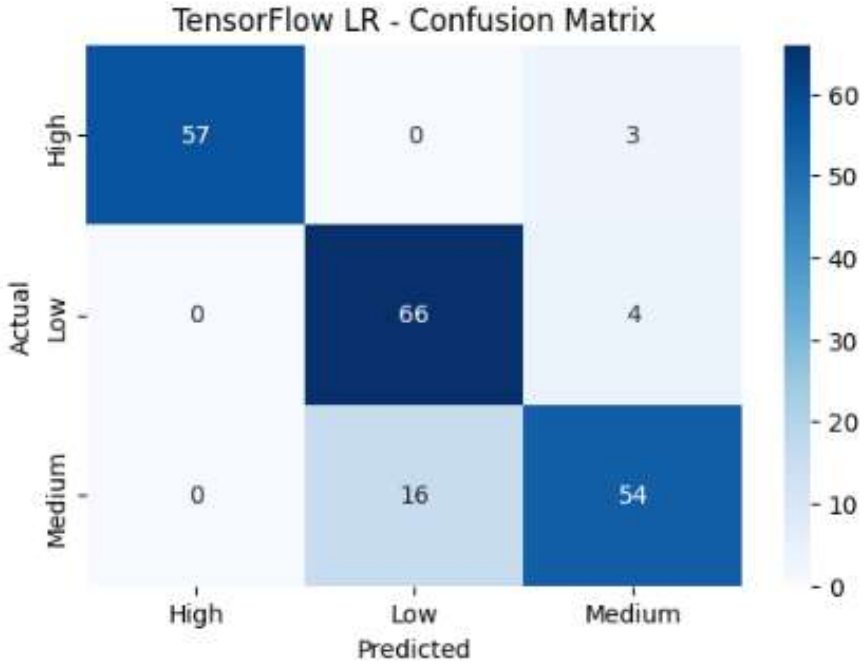

Countplot of Product Category
count
350
300
250
200
150
100
50
0
Beauty
Clothing
Electronics
Product Category


Gender vs Price_Category
Price_Category
Low
Medium
High
count
175
150
125
100
75
50
25
0
Female
Male
Gender

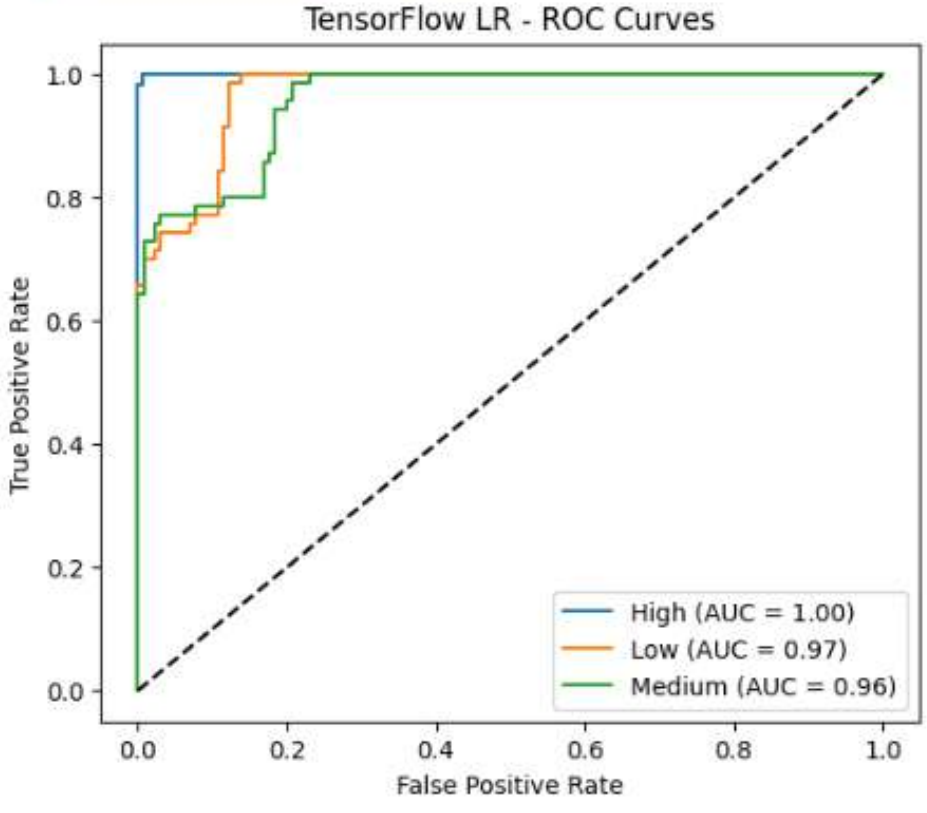

Product Category vs Price_Category
Price_Category
Low
Medium
High
count
120
100
80
60
40
20
0
Beauty
Clothing
Electronics
Product Category


Correlation Heatmap of Numerical Features
Age 1.00 -0.02 -0.04 -0.06 -0.04 0.02 -0.00 0.02 -0.00
Quantity -0.02 1.00 0.02 0.37 0.02 -0.02 -0.02 -0.04 -0.02
Price per Unit -0.04 0.02 1.00 0.85 1.00 0.02 -0.01 0.04 -0.01
Total Amount -0.06 0.37 0.85 1.00 0.85 0.02 -0.01 0.01 -0.00
Revenue_per_Unit -0.04 0.02 1.00 0.85 1.00 0.02 -0.01 0.04 -0.01
Year 0.02 -0.02 0.02 0.02 0.02 1.00 -0.07 -0.07 -0.06
Month -0.00 -0.02 -0.01 -0.01 -0.01 -0.07 1.00 -0.01 0.97
DayOfWeek 0.02 -0.04 0.04 0.01 0.04 -0.07 -0.01 1.00 -0.01
Quarter -0.00 -0.02 -0.01 -0.00 -0.01 -0.06 0.97 -0.01 1.00
Age
Quantity
Price per Unit
Total Amount
Revenue_per_Unit
Year
Month
DayOfWeek
Quarter
1.0
0.8
0.6
0.4
0.2
0.0

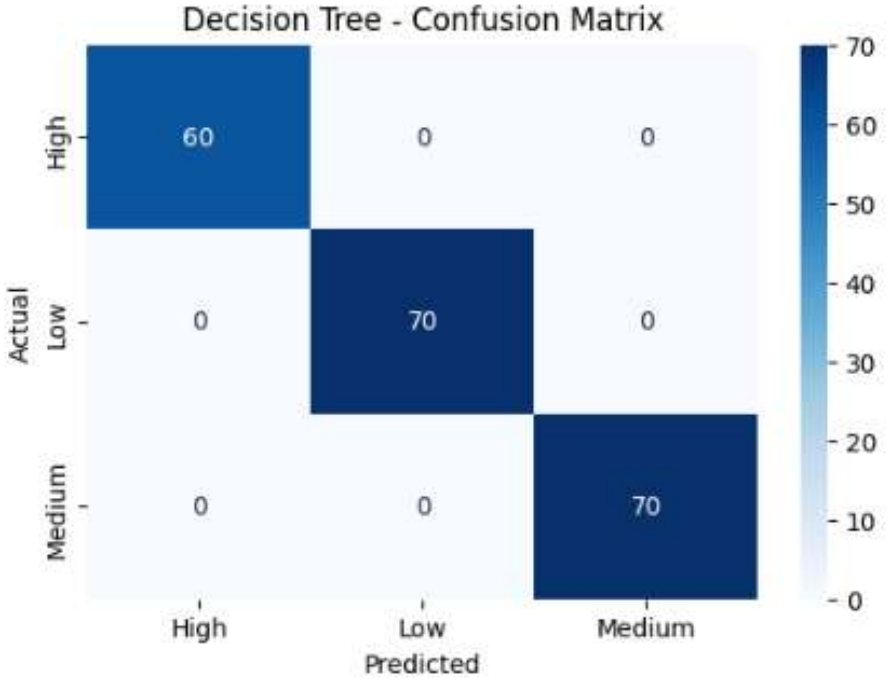
```
--- Evaluating TensorFlow LR ---
```

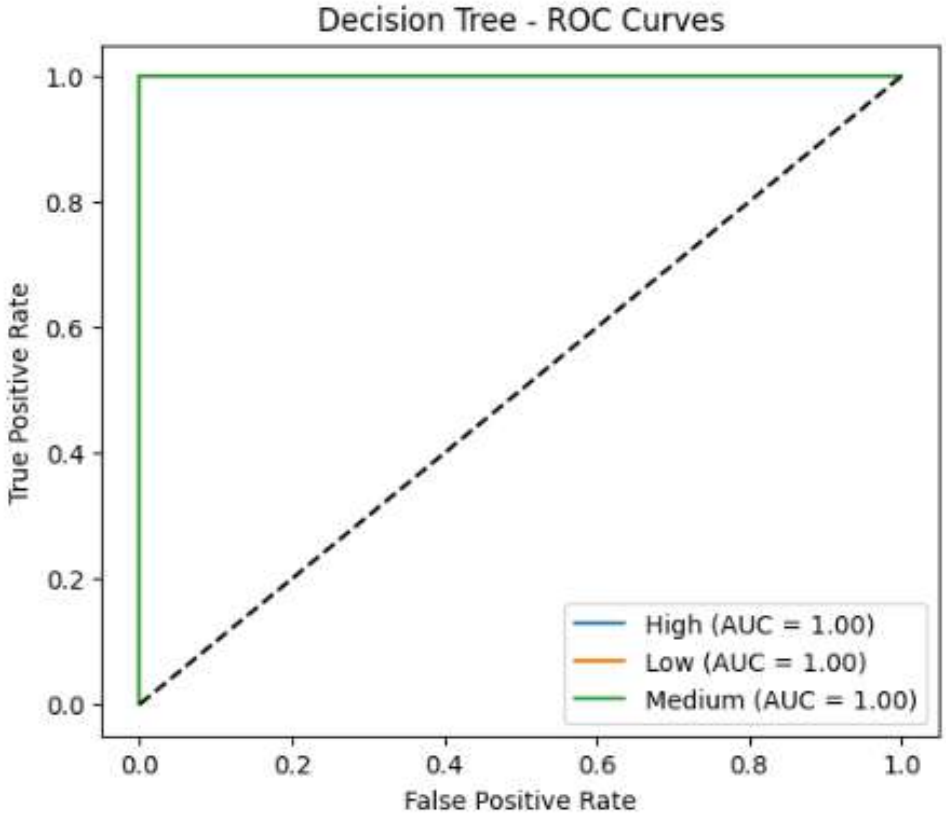



```
7/7 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step
```

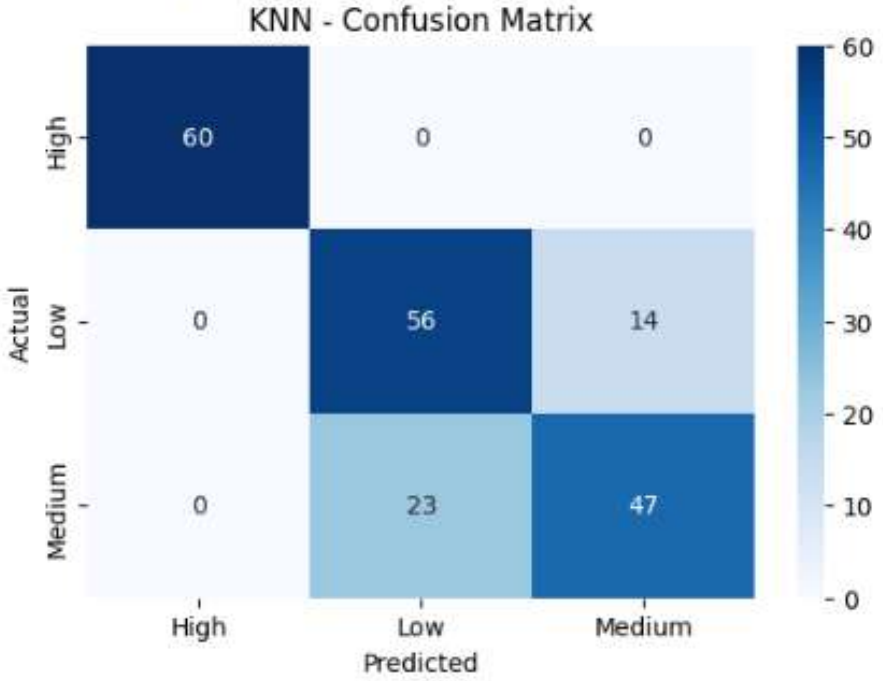


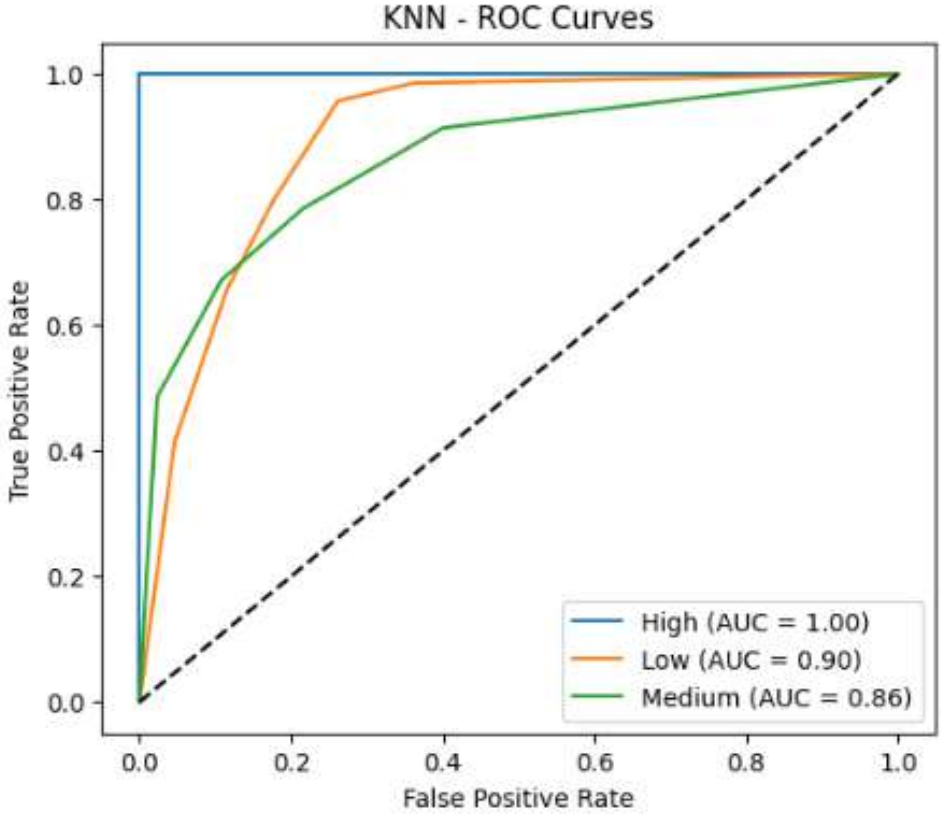
```
--- Evaluating Decision Tree ---
```





```
--- Evaluating KNN ---
```





--- Model Performance Summary ---

	Accuracy	F1_macro	ROC_AUC_macro
TensorFlow LR	0.89	0.89	0.98
Decision Tree	1.00	1.00	1.00
KNN	0.81	0.82	0.92

--- Comprehensive Model Metrics ---

	Accuracy	Precision	Recall	F1-Score	Log Loss
TensorFlow LR	0.89	0.89	0.89	0.88	0.20
Decision Tree	1.00	1.00	1.00	1.00	NaN
KNN	0.81	0.82	0.81	0.81	NaN


Model Loss / Error Comparison
Loss / Error
0.200
0.175
0.150
0.125
0.100
0.075
0.050
0.025
0.000
0.20
0.00
0.19
Logistic Regression
Decision Tree
KNN