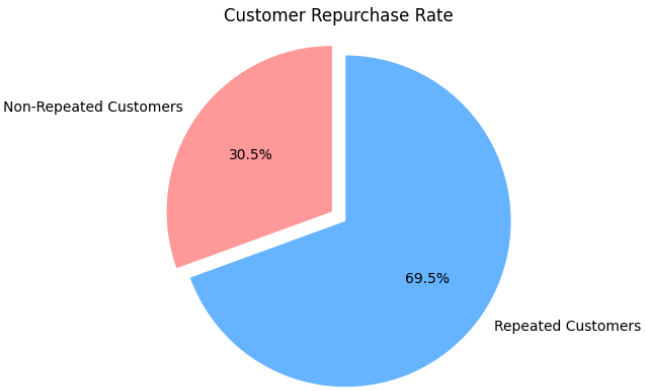
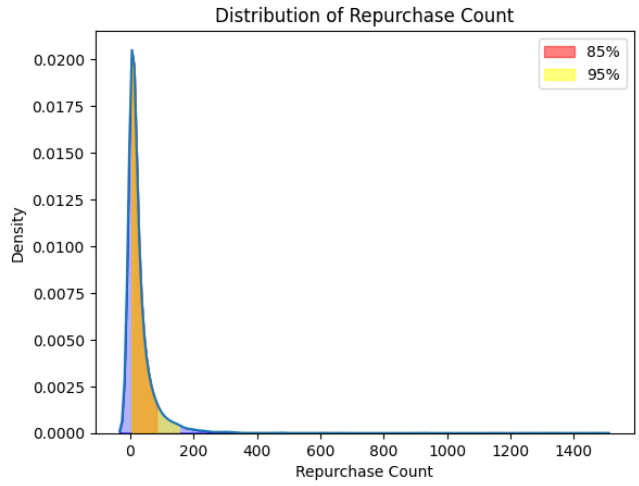
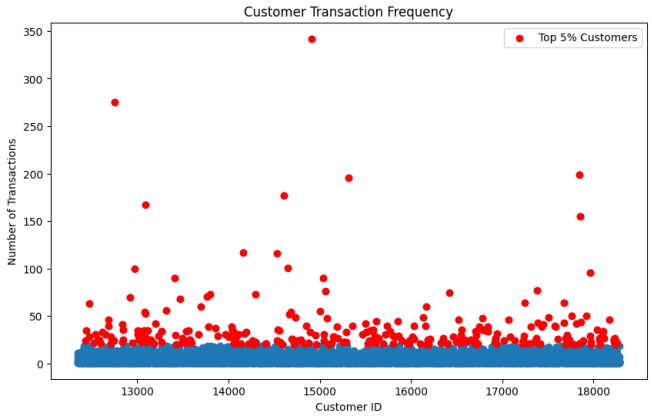
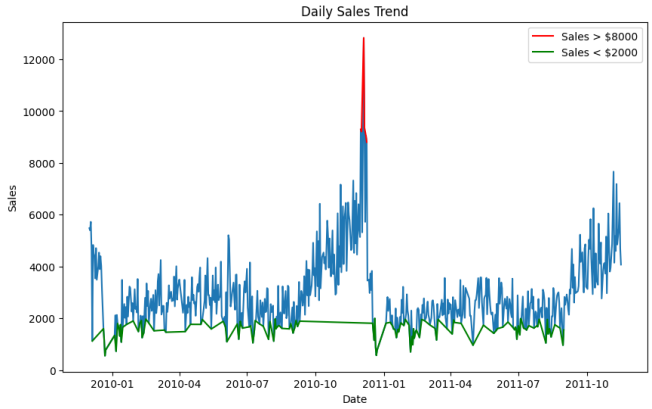
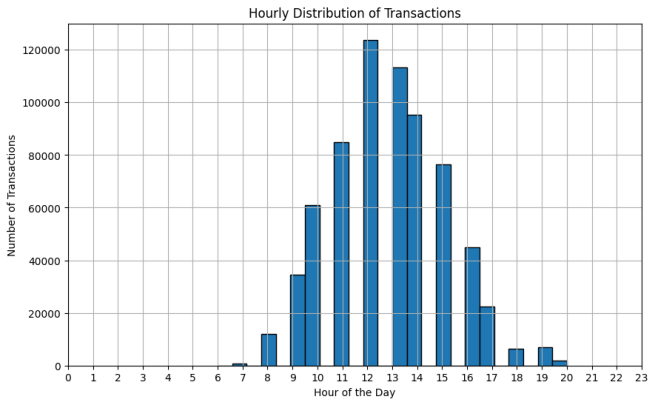
Q4. Recommendation and Business Analysis

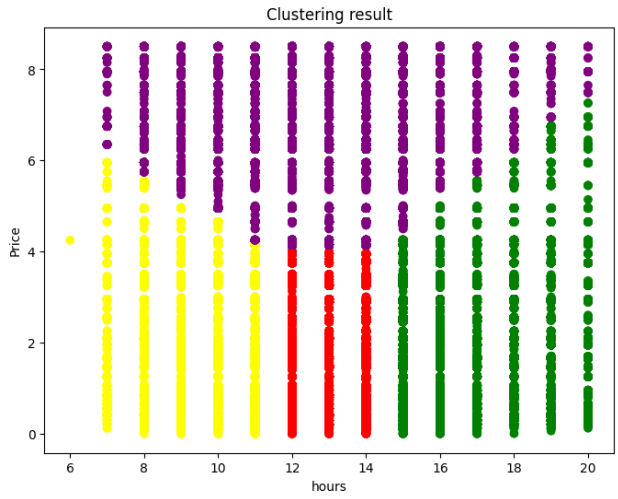
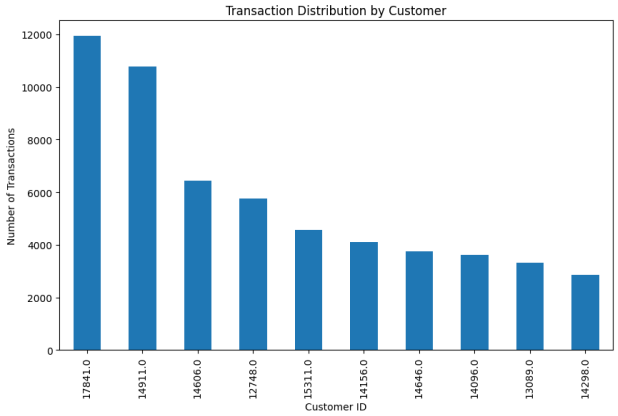
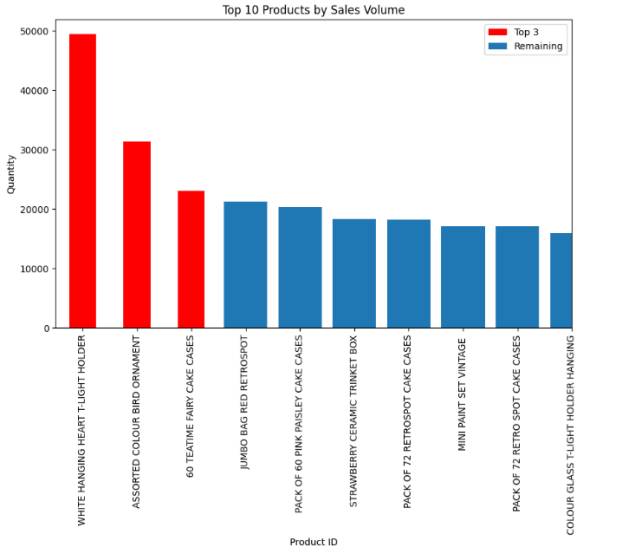
Preprocessing

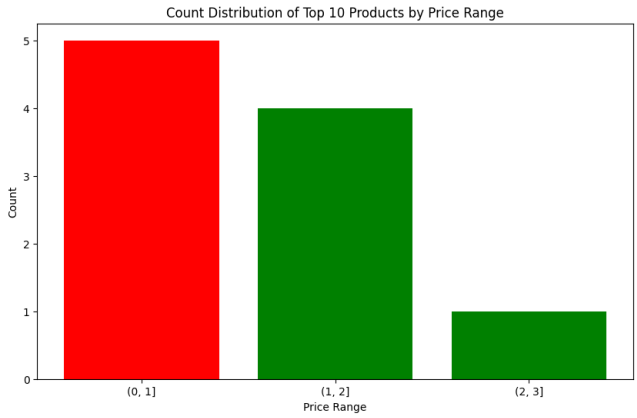
- Remove NAN
- delete negative values
- keep values below 95% and remove values above 95%

a. At least 8 pictures and at least 8 business insights

	1.cluster the customer by price and quantity. There are divirty type of customers.
	2. Approximately 70% of customers are expected to make repeat purchases at the retail store, indicating that they will return for additional purchases rather than making a one-time purchase.

	3.Within the group of customers who make repeat purchases, approximately 95% of them are expected to make more than 150 purchases.
	4. The top 5 most loyal customers are primarily engaged in small quantity transactions.
	5.There was a peak in transactions at the end of 2010, followed by continued fluctuations in transaction activity.
	6. People tend to concentrate their purchases during the midday hours, and the distribution of these purchase times follows a normal distribution pattern.

	7. To cluster users based on different time periods and offer corresponding pricing for products during those time periods, such as offering significant discounts on fruits in the evening
	8. The top 10 customers with the highest purchase volume are considered loyal customers.
	9. Increasing the inventory quantity of the best-selling products can help improve sales performance.



10. Upon analyzing the price distribution of the top 10 products in the sales ranking, it is observed that a significant portion consists of lower-priced items, accounting for approximately half of the products.

b. The algorithm details, process, and results of association rule analysis, along with providing no fewer than 5 sales/recommendation suggestions.

Find The transaction count is 32,098, the number of product categories is 4,366, and the number of customers is 5,611.

Steps:

I converts product combinations into **one-hot encoded format** and uses the Apriori algorithm to find frequent itemsets. Then, based on the frequent itemsets, it calculates the confidence, support, and lift of association rules. Finally, the rules are sorted based on confidence, lift, and support to identify high-quality association rules.

Suggestions:

Most confident

1.item (22697) and (22699) should put together

2.item (21231) and (21232) should put together

3. item (21699) and (21697) should put together

4.item (21733) and (85123A) should put together

5.item (85099F) and (85099B) should put together

	antecedents	consequents	antecedent support	consequent support	support	confidence	lift	leverage	conviction	zhangs_metric
62	(22697)	(22699)	0.027136	0.030376	0.021466	0.791045	26.042005	0.020641	4.640345	0.988422
1	(21231)	(21232)	0.032463	0.052215	0.023896	0.736084	14.097159	0.022201	3.591243	0.960236
63	(22699)	(22697)	0.030376	0.027136	0.021466	0.706667	26.042005	0.020641	3.316583	0.991725
5	(21733)	(85123A)	0.046888	0.138856	0.032370	0.690365	4.971808	0.025859	2.781162	0.838166
13	(85099F)	(85099B)	0.040439	0.082310	0.024394	0.603236	7.328789	0.021066	2.312934	0.899944

sorted_rules_by_lift

1.some one buy item (22699) could have more chance to buy (22697)

2. some one buy item (22697) could have more chance to buy(22699)

3. some one buy item (21231) could have more chance to buy (21232)

4. some one buy item (82482) could have more chance to buy (82494L)

5. some one buy item(82494L) could have more chance to buy (82482)

63	(22699)	(22697)	0.030376	0.027136	0.021466	0.706667	26.042005	0.020641	3.316583	0.991725
62	(22697)	(22699)	0.027136	0.030376	0.021466	0.791045	26.042005	0.020641	4.640345	0.988422
1	(21231)	(21232)	0.032463	0.052215	0.023896	0.736084	14.097159	0.022201	3.591243	0.960236
47	(82482)	(82494L)	0.048632	0.051312	0.028787	0.591928	11.535952	0.026291	2.324808	0.960002
46	(82494L)	(82482)	0.051312	0.048632	0.028787	0.561020	11.535952	0.026291	2.167223	0.962713

sorted_rules_by_support:

1. The items (85123A) and (21733) are frequently purchased together.

2. The items (21733) and (85123A) are frequently purchased together.

3. The items (22384) and (20725) are frequently purchased together.

4. The items (20725) and (22384) are frequently purchased together.

5. The items (82482) and (82494L) are frequently purchased together.

4	(85123A)	(21733)	0.138856	0.046888	0.032370	0.233116	4.971808	0.025859	1.242838	0.927680
5	(21733)	(85123A)	0.046888	0.138856	0.032370	0.690365	4.971808	0.025859	2.781162	0.838166
29	(22384)	(20725)	0.053212	0.071936	0.028818	0.541569	7.528490	0.024990	2.024436	0.915909
28	(20725)	(22384)	0.071936	0.053212	0.028818	0.400606	7.528490	0.024990	1.579576	0.934387
47	(82482)	(82494L)	0.048632	0.051312	0.028787	0.591928	11.535952	0.026291	2.324808	0.960002

Reference

[1]https://zhuanlan.zhihu.com/p/440147093 关联规则