

Some sample screenshots on how my program was run on my machine and showing the results that I got from my machine, and how the results match with the graphs/tables that are included in the paper

Product Bundling at a Time-based Sales Promotion Recommendation System

By considering the purchase behavior of these three customer clusters, we determine the segments of the product bundling in this market. Based on association rules and diagrams, we use useful information to find out a preference ranking of product bundling in these three clusters (Table 3-5).

(1) Product bundling of recommendation systems for sales promotion on bread

In this study, cluster analysis results show that the top three purchased product bundling in these three clusters respectively. For example, cluster 1 is the bundling of mineral water with pineapple juice; milk with pineapple juice; and milk with chocolate bread. Cluster 2 is the bundling of mineral water with chocolate bread; green tea with chocolate bread; and mixed fruit juices with pure water. Cluster 3 is the bundling of latte with dorayaki; latte with pineapple juice; and latte with cocoa croissant.

Table 3 Cluster 1 customer preferences for bread product bundling

Cluster1 Bread AM 6:00~10:59	Links	Field 1	Field 2
	71	Mineral water	Pineapple bread
	68	Milk	Pineapple bread
	64	Milk	Chocolate bread
	60	Mineral water	Chocolate bread
	59	Pure water	Pineapple bread
	57	Pure water	Chocolate bread
	57	Soymilk	Pineapple bread
	57	Mineral water	Dorayaki
	56	Milk	Dorayaki
	56	Milk	Cocoa croissants

Table 4 Cluster 2 customer preferences for bread product bundling

Cluster2 Bread AM 6:00~10:59	Links	Field 1	Field 2
	40	Pure water	Chocolate bread
	39	Green Tea	Chocolate bread
	39	Integrated juice	Pure water
	39	Chocolate bread	Cocoa croissants
	38	Green Tea	Milk
	38	Pure water	Bean milk
	37	Green Tea	Cocoa croissants
	36	Green Tea	Souffles
	36	Integrated juice	Grapefruit flavor
	36	Green Tea	Deep-sea water

Based on product associations the in the first three product bundling preferences

with other product, we recommend certain products for conditional sales in promotion

sales. In Table 6, this study sets up minimum support as 5%, minimum confidence as 60% and selects four rules which have lift value is larger than 1. Thus, the bread product recommendation is chocolate toasts with discount for sale promotion. On the other hand, customers who are accustomed to purchasing pineapple juice can also buy apple cider by half price discount for second items as a rule of recommendation. Customers who buy milk can buy grape juice by promotion with coupons. In addition, customers who purchase mineral water can be encouraged to buy vanilla latte using half price discounts (Table 6- 8).

Table 6 Cluster 1 bread product recommendation

(min sup=5% ; min conf=60%)						
Rule	Sup	Conf	Lift	Cons	Antecedent	
R1	11.336	89.286	2.141	Chocolate bread	Chocolate toast	Discount
R2	5.668	78.571	1.866	Bo luo	Half price for the same second purchase	Cider
R3	6.478	93.75	1.666	Milk	Grape juice	Coupons
R4	6.478	87.5	1.578	Mineral water	Grape thick toast	Discount

Table7 Cluster 2 bread product recommendation

(min sup=5% ; min conf=60%)						
Rule	Sup	Conf	Lift	Cons	Antecedent	
R1	9.74	86.667	2.053	Integrated fruit juice	Mizuho toast	Discount
R2	5.195	100	2.026	Pure water	Fruit vinegar	Discount
R3	5.195	87.5	1.982	Chocolate bread	limited	Cranberry juice
R4	6.494	100	1.638	Green tea	Lottery	Dorayaki

Table8 Cluster 3 bread product recommendation

(min sup=5% ; min conf=60%)						
Rule	Sup	Conf	Lift	Cons	Antecedent	
R1	5.288	90.909	2.394	Bo luo	Lemon tea	Half price for the same second purchase
R2	5.288	72.727	2.161	Cocoa croissants	Point activities	Cranberry juice
R3	7.212	73.333	2.089	Dorayaki	Butter pudding	Discount