

Comparison of association rule mining performances: market basket analysis of a mini-supermarket

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Market Basket Analysis discovers consumer purchasing patterns by identifying important and interesting association rules among the products bought in a shopping basket. This field of study is not only useful in the decision-making process, but also to increase the sales and profit of an organization. Association rule mining is one of the prime data mining techniques. Among the algorithms studied under association rule mining, 'Apriori', 'ECLAT' and 'FP-Growth' are key algorithms applied in diversified fields. Although an enormous number of studies have been conducted in association rule mining in market basket analysis, it is still a budding area in Sri Lanka, especially in the field of retailing of small and medium enterprises. The research is based on grocery transaction data obtained from a local mini-supermarket during a four-month time period, to discover important information and interesting relationships to aid decision making to enhance performance and to gain a competitive advantage. The goals of the study are: to identify frequently consumed items and to generate association rules to understand the purchasing patterns of the customer to make recommendations for cross-selling and up-selling of products using the dataset; to use three algorithms of association rule mining and compare their performance using different datasets with varying characteristics of inputs which reflect the small and medium retail industry. The findings listed the most frequently purchased items and brands along with the items that were bought together most of the time, leading to many recommendations and planning strategies. In addition to these findings, the performance evaluation of the association rule mining algorithm findings showed that the 'Apriori' performs best in terms of execution time, even with a higher number of candidate generation at low minimum support values, compared to the other two algorithms 'ECLAT' and 'FP-Growth'.

Keywords: Apriori algorithm, association rule mining, ECLAT algorithm, FP-growth algorithm, small and medium enterprises

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