Cooperative Multi-Agent Joint Action Learning Algorithm (CMJAL) for Decision Making in Retail Shop Application

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Abstract

This article gives a novel approach to cooperative decision-making algorithms by Joint Action learning for the retail shop application. Accordingly, this approach presents three retailer stores in the retail marketplace. Retailers can help to each other and can obtain profit from cooperation knowledge through learning their own strategies that just stand for their aims and benefit. The vendors are the knowledgeable agents to employ cooperative learning to train in the circumstances. Assuming a significant hypothesis on the vendor's stock policy, restock period, and arrival process of the consumers, the approach was formed as a Markov model. The proposed algorithms learn dynamic consumer performance. Moreover, the article illustrates the results of cooperative reinforcement learning algorithms by joint action learning of three shop agents for the period of one-year sale duration. Two approaches have been compared in the article, i.e. multi-agent Q Learning and joint action learning.

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1. Introduction

The retail store sale the household items in order to gains their profit. Retailers are mostly interested in selling their products. The revenue can be increased by accepting certain steps related to the market. Accordingly, the aim of predicting the sales business is to collect data from various shops and analyzing them by machine learning algorithms (Vidhate & Kulkarni, 2017) which is explained here through an example of retail shops. Most of the time retailers are not able to satisfy the consumer's requests because they are not an able estimate of the market in that perspective. There are lots of occurrences where the speed of sale or shopping is more. But, sometimes it may be less due to the insufficiency of the items available in the shops. The record of buying of each item is maintained in each shop and department. By examining these facts, the sales of the items are predicted that helps to understand the profit and loss equation throughout the year (Raju Chinthalapati, Yadati, & Karumanchi, 2006).

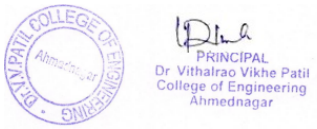
In Christmas celebration, the sales are more in shops like clothing, footwear, jewelry as compared to the other seasons. Throughout summer the purchase of cotton clothing is more whereas in winter the purchase of sweaters is more. The purchase of items alters as indicated by the season. By examining these past records of purchase, the sales can be forecasted for the future (Vidhate & Kulkarni, 2016). That discovers the result to predict the highest revenue in the industry of retail shop market. Consequently, the retailers monitor the behavior of consumers and attract them by offering several beautiful schemes. In order, consumers will be back to the shop and pay for more time and money. Normally, the major target of retail shop market is to acquire the highest revenue by significant knowledge (Zahra Abbasi & Mohammad Ali Abbasi, 2012).

The market forecasting in the retail has many challenges including the difficulty in estimating the market condition. Retailers disregard the seasonal changes. Moreover, the human resources are insufficient as and when required. The retailers experience the complexity of storage management system. As a result, the retailers sometimes are not able to concentrate on the competition or cooperation in the market. Retailers come up with new strategies in order to encourage and execute the target plan. The strategies are based on achieving the highest revenue (Vidhate & Kulkarni, 2017a).

Generally, the income from the sale of a specific product is kept as a record and studied in order to forecast the maximum potential of the quantity of sales for that given period under the uncertain environment. The market sale is thoroughly a reflection of the customer's behavior, their cooperation, facilities and their support. These things will be able to predict the future of a particular shop as far as the sales are concerned. The scheduling of shop and inventory is significant and is organized at the individual shop level. Buying and selling of goods, managing the store and space of the shop is the major work in the scheduling. By monitoring the past history of the shop, one can easily come up with a cost-effective scheme and ideas. The fundamental information presented of the existing shop is extremely useful in the forecasting the sales.

In this paper, the proposed system is studied and developed considering the wedding period situation. The wedding mostly involves right from choosing a venue, invitation cards, decoration, finalizing the caterers, buying clothes, gifts, jewelry and additional items for bride and groom. Moreover, all the above-mentioned things under wedding are interrelated with each other i.e. if the consumer is going to buy clothes, surely, he is going to purchase other related items like jewelry, footwear, etc. Consequently, all the retailers which are interrelated with these different items can come together to fulfill consumer demands (Vidhate & Kulkarni, 2017b). In addition to this, the retailer also announces few attractive schemes which may include a special festival offer, discount on some items, as well as 'Buy one Get one free' in order to attract the customers. Under this scenario, they can easily predict and manage their stock level. As a result, this surely leads to increase in sale leading towards more profit for retailers (Ju Jiang & Mohamed S. Kamel, 2006). It would be time and cost saving for customers if they purchase all items from a single place.

The specific contributions of this paper are as follows.



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