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

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Source Title: International Journal of Agent Technologies and Systems (IJATS) (/journal/international-journal-agent-technologiessystems/1109) 9(1) Convright @ 2017

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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

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