

# Consumer Behaviour in Retail: Next Logical Purchase using Deep Neural Network

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## Abstract

Predicting consumer purchase pattern is one of the most challenging problems for large scale retail firms. Retailers spend a lot of money and resources to ensure smooth and delightful shopping experience. This includes recommending relevant items to consumers and maintaining right inventory. The later helps minimise the instances of Out of stock and Excess Inventory. Consumer purchase prediction problem has generally been addressed by ML researchers in conventional manner either through recommender systems or traditional ML approaches. To our knowledge none of the models have generalized well enough in predicting the consumer purchase pattern. In this paper we present our study of consumer purchase behaviour at the intersection of consumer, item and time using e-commerce retail data. For each of the relevant consumer-item combination, we create a sequential time-series data. We then build generalised non-linear model to predict propensity of consumer to purchase the item for given time horizon. We demonstrate robust performance by experimenting with different neural network architectures, ML models and their combination. We showcase the benefits that neural network architectures like Multi-Layered Perceptron, Long Short Term Memory and Convolution Neural Network bring over ML models like Xgboost and RandomForest.