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Price Optimization In E-Commerce Using Machine Learning Methodologies

Introduction

In the last few years, E-commerce has had massive growth because of the technological improvement and widely publication of social media and internet users, and that growth appears in change on retails e-commerce sales from 1.3 trillion U.S dollars worldwide in 2014 to 4.9 trillion U.S dollars worldwide on 2021 and its forecast to grow over 50% within the next four years [1].

The pricing depends on many factors like operating costs, special events/holidays, competition, season, macroeconomic variables, warehouse information, and weather [2].

Problem Statement

One of the biggest problems that the retailer faces is to balance between product pricing and inventory replenishment regarding maximizing the revenue.

Objectives

Build AI solution to help sellers to maximize retail revenue in online stores using price optimization techniques specified for semi-luxury products.

Background & Literature Review

In the case of high-end priced products, the demand is high-variant, seasonal, and sensitive. Decisions that should be made to optimize price and revenue for retail products are very tricky ones. A random forest algorithm works with a bootstrapping to predict demand on offline stores' products. The output of the demand predictor is fed to the price optimizer

system. The price optimizer uses branch-and-bound and branch-and-cut methods, followed by root node analysis. This system has not experimented with online products before [3].

In [5], a model that consists of Bayesian inference and bootstrap-based confidence estimation with kernel regression is used to predict the optimal price of two products in an e-commerce shop. The model isn't tried with the high price products or frequently sold products.

In [4], deep reinforcement learning (DRL) is used for fresh food expiration prediction. We will use the technique used in expiration prediction to replenish the inventory to keep up with the state-of-art product.

Methodology

Applying price optimization in an online retail environment for semi-luxury products using different machine-learning techniques. Experiment with each proposed model in [3] and [5] to predict the optimal price and use the appropriate metrics to compare and choose the best model.

References

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