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Machine Intelligence – Project

Literature Survey

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How others have solved similar problems:

This paper [1] performs sales forecasting on with a focus on fashion and new product forecasting. This study also reviews different strategies to the predictive value of user-generated content and search queries.

This paper mainly performs retail price forecasts in the fashion industry and electronic market fields. However, our project expands the use case to many other fields such as gaming, health care, furniture and garden equipment, etc.

This paper [2] explores different machine learning techniques such as random forests and other regression methods for predicting the retail process for a Fashion Industry. They had collected data from a Swedish fashion retailer.

We will be using the similar machine learning models and other models and compare their accuracies. The model will predict retail prices for a wider variety of commodities.

The proposed study [3] is a result of ongoing project that aims to develop a generic framework and applicable techniques by applying sound machine learning algorithms to enhance right price purchase (not cheapest price) by customers on e-commerce platform.

There have been varied models used in today's world to determine dynamic pricing. Some are used to determine the prices for all kinds of products while some are specific in determining a particular cost.

This paper [4] establishes a short-term prediction model of weekly retail prices for eggs based on chaotic neural network with the weekly retail prices of eggs from January 2008 to December 2012 in China.

This research paper [5] constructs a sales prediction model for retail stores using the deep learning approach.

This paper [6] proposes an electricity retail pricing strategy that considers the optimal operation of an ESS (energy storage system) using a machine learning algorithm. An artificial neural network (ANN) is used to develop a practical model of the DR (demand response) scheduling of an ESS. This model is trained using historical data that include the electricity price and the corresponding optimal demand obtained from the building energy management system.

The proposed pricing strategy considering the ANN-based DR model is largely divided into three parts The first is a BEMS (building energy management system) to calculate the optimal DR schedules of the ESS (energy storage system), The second is the ANN-based DR model describing the relationship between the price and optimal load profile. The new price-optimal demand function reflects the price-based DR of ESS in an ANN-based, single-level decision-making structure. The last one is a DMS to determine the optimal retail prices considering the conditions of the distribution network and the optimal DR scheduling of the ESS.

The objective of this paper [7] is to develop the methodology used in current pricing decision support systems. In particular to develop the demand models used whilst also improving the overall price optimisation. The aim of the demand model is to understand the ceteris paribus effect that changing any of the variables would have. For example, the effect of changing price whilst keeping all the other factors in the demand model constant.

DLMs are a special case of a general state space model, being linear and Gaussian. The existing method of DLMs cannot be used directly to forecast sales since the movement of the estimated coefficients in the observation equation is unbounded. The problem here is that elasticity values must always

take the correct sign and their movement needs to be restrained, otherwise it will lead to incorrect optimal prices.

This paper [8] explores the prediction of retail price of smartphones.
The Multilayer feed forward neural network is used in the proposed system, which is used to classify the input data based on the contribution to the value of the product.
We will be using this machine learning algorithm to compare with other machine learning models. Our project will not be limited to smartphones.

This paper [9] applies two algorithms to predict Singapore housing market. It compares the artificial neural network (ANN) model, with autoregressive integrated moving average (ARIMA) model. The more superior model is used to predict the future condominium price index (CPI). The lower mean square error (MSE) of the ANN models showed the superiority of ANN over ARIMA.

While this paper does prediction of prices over Singapore housing market, our model deals with pricing of different commodities like gaming, health care, furniture and garden equipment, etc. We will also employ comparison of other models, like linear regression, decision trees and random forests. The more powerful model will be chosen based on the RMSE of each model.

References:

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[2] ‘Predictive Modelling of Campaigns to Quantify Performance in Fashion Retail Industry’ by Chandadevi Giri, Ulf Johansson & Tuwe Löfström

[3] ‘A Machine Learning Framework for Predicting Purchase by online customers based on Dynamic Pricing’ by Rajan Gupta & Chaitanya Patha

[4] ‘Prediction Model of Weekly Retail Price for Eggs Based on Chaotic Neural Network’ by Zhe-min LI, Li-guo CUI, Shi-wei XU, Ling-yun WENG, Xiao-xia DONG, Gan-qiong LI & Hai-peng YU

[5] ‘A Deep Learning Approach for the Prediction of Retail Store Sales’ by Yuta Kaneko & Katsutoshi Yada

[6] ‘Retail Electricity Pricing Strategy via an Artificial Neural Network-Based Demand Response Model of an Energy Storage System’ by Hyun-Kyeong Hwang, Ah-Yun Yoon, Hyun-Koo Kang & Seung-Il Moon

[7] ‘A New Approach to Demand Modelling and Optimisation in Pricing Decision Support Systems’ by David Fox & Xiao-Jun Zeng

[8] ‘Retail price analytics using back-propagation neural network and sentimental analysis’ by N. Kalaiselvi, K. R. Aravind, S. Balaguru & V. Vijayaragul

[9] ‘Housing price prediction using neural networks’ by Wan Teng Lim, Lipo Wang, Yaoli Wang & Qing Chang