Chapter 9
Forecasting Sales and Return Products for Retail Corporations and Bridging Among Them

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ABSTRACT

The purpose of this study is to show how we can bridge sales and return forecasts for every product of a retail store by using the best model among several forecasting models. Managers can utilize this information to improve customer's satisfaction, inventory management, or re-define policy for after sales support for specific products. The authors investigate multi-product sales and return forecasting by choosing the best forecasting model. To this aim, some machine learning algorithms including ARIMA, Holt-Winters, STLF, bagged model, Timetk, and Prophet are utilized. For every product, the best forecasting model is chosen after comparing these models to generate sales and return forecasts. This information is used to classify every product as "profitable," "risky," and "neutral," The experiment has shown that 3% of the total products have been identified as "risky" items for the future. Managers can utilize this information to make some crucial decisions.

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1. INTRODUCTION

Supply Chain Management (SCM) is a very fast-growing and largely studied field of research that is gaining popularity and importance (Meherishi et al., 2019). According to Mentzer et al., (2001), a supply chain is a collection of some elements that are connected by flows of products, information, and/or services. Most organizations focus on cost optimization and maintaining ideal inventory levels to keep consumer's satisfaction particularly in SCM of fresh products. Accurate demand forecasts enable industries to predict demand and maintain the right amount of inventory.

Machine Learning (ML) is a subset of Artificial Intelligence (AI). It enables machines for learning from the past data, experiences, and patterns to have correct forecast. Generally, ML means extracting knowledge about future behaviour from the older data. ML approaches mostly fall into three broad categories depending on the nature of the learning system including Supervised, Unsupervised, and Reinforcement Learning (RL). During a supervised learning, a large amount of labelled input data and desired output are provided for learning in the algorithms. In contrast, an unsupervised learning system uses only "unlabelled" input data for learning. Generally, unsupervised algorithms work with raw data for finding hidden patterns and achieve the best result. Reinforcement Learning (RL) is another subcategory of machine learning. RL interacts with a dynamic environment and utilizes trial and error technique to obtain a human-level performance. Besides of the three-fold categorisation, there is another classification which is called semi-supervised learning. In these algorithms usually small amounts of labelled data and large unlabelled data are utilized together.

Deep Learning is a subfield of ML where algorithms are inspired by the human brain to solve complex problems, learn from large amounts of very diverse, unstructured and inter-connected data sets. These algorithmic approaches have various layers (deep) to enable learning. Deep architectures can be supervised or unsupervised. This biologically-inspired programming paradigm currently provides the best solutions to many real-life problems such as image and video processing, speech recognition, text analysis, natural language processing, and different types of classifiers. Deep learning techniques are novel and useful methods for obtaining accurate forecasts in SCM. However, diverse deep learning techniques perform differently on different types of problems, and some techniques perform better than the others.

In this study, the main aim is to predict the unit sales of thousands of items sold at different chain stores in Ecuador to avoid overstocking, minimize understocking, reduce waste and loss, and increase customer's satisfaction. In this case, good predictions are highly desirable to increase efficiency and determine the prices of products for customers. In this investigation, Corporación Favorita Grocery Sales Forecasting dataset is collected from Kaggle website for forecasting the product

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