Master Thesis Project
Order Behaviour Forecast through the Lens of Customer Characteristics

Roderik Verbruggen, Delft Center for Systems and Control, TU Delft
r.b.verbruggen@student.tudelft.nl
Peyman Mohajerin Esfahani, Delft Center for Systems and Control, TU Delft
P.MohajerinEsfahani@tudelft.nl

Context

The online food and grocery market has been growing rapidly over the past years, as people are looking to make more use of convenient ways of shopping and save time. In order to keep up with the massive increase in demand, improving decision-making-processes and optimizing supply-chains are of vital importance for profitable businesses. Future planning has great impact on overall organizational performance and is one of the key factors for success. In Picnic, a fast growing data-driven online grocery shop, accurate demand forecasting is crucial in sectors like recruitment, personnel planning, logistic planning, inventory management, maintenance and advertising campaigns and is used to ensure smooth operations along with minimizing waste and costs.

With the emerge of big data and exploration of various machine learning models, the possibilities are rising regarding the design of predictive models. Models that do not necessarily need to be solely based on historical numbers of the to be predicted value, like for example, most of the classical time-series models do. In this project it is investigated whether the information that Picnic acquires about customer order behaviour can be exploited in a way that it improves forecasting accuracy. Under the assumption that most of the people tend to live in routines and grocery shopping is a habit activity, behavioral order patterns are identified through the process of data-mining and transformed into features that have predictive value whether a customer will place an order or not. As the daily operation currently involves many challenges and is an area where still a lot of value can be achieved, the focus will mainly lie on the short-term demand.

Project tasks

This master thesis project is aimed at developing a model that incorporates customer specific information in order to improve demand forecasting accuracy on the short-term. Two main approaches will be considered. Steps to be taken are:

1. Data mining, exploration and feature engineering

2. Approach 1: Building a classifier that predicts for each individual customer the chance of placing an order on a specific day

3. Approach 2: Perform customer segmentation based on customer characteristics and order behaviour using a clustering algorithm, followed by fitting a prediction model on each cluster

4. Model comparison and evaluation

This master thesis project is done in corporation with Picnic, department of Growth.