

Straubing, August 24, 2022

Master's Thesis Topic

Predicting Holiday Effects on Retail Sales

For a retailer, ordering the right amount of product is a crucial task on the daily level – too much leads to spoilage/food waste whereas too little leads to out-of-stock-situations, lost sales, and dissatisfied customers. In particular, the days around holidays are of special interest and at the same time hard to forecast: customers behave differently (e.g., shop in advance or delayed, buy bigger baskets) compared to some standard week, and the changes in customer behavior even differs depending on the day of the week on which the public holiday occurs. Therefore, as a reference, retailers use historic sales during weeks where the day constellation was comparable (e.g., Christmas Eve falls on a Saturday in 2022, which has last happened six years ago in 2016). This leads to problems for articles that were not sold/stores that did not operate in the reference period.

The goal of this master's thesis is to find underlying patterns in customer shopping behavior that help to predict the holiday week's distribution (e.g., 30% of the week's customers buy one day before a holiday) – even for stores/articles that have never seen this holiday. This can lead to better forecasts and ultimately to reductions in stockouts and food waste. For this task, a real-world dataset will be provided. On this basis, an exploratory analysis should be performed to identify relevant features to explain differences in holidays and derive probabilities for each day's share of the week.

The specific tasks to be performed include:

- Exhaustive literature review concerning the state-of-the-art concerning the prediction of holiday effects on retail sales
- Data preparation/cleaning of non-holiday effects (second holiday/paycheck day with increased sales within the week, seasonality, external shocks (e.g., Corona pandemic))
- Exploring possibilities to derive holiday week distributions from the data

The thesis will be supervised by the Chair of Supply and Value Chain Management (Prof. Dr. Alexander Hübner). If you are interested, please send an email to alexander.huebner@tum.de.