Exam Part 1

7313 - Data Science Analytics 2021

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Business Rationale

BnS needs to understand drivers of online order size

Situation

- BnS is a drugstore seeking to harness value based on their CRM and POS data
- The store is operating online and offline
- By operating online,
  - BnS can **save rent and staff expenses**, +
  - but incurs **considerable additional expenses related to logistics** -
- Indeed, a **larger order size** typically leads to lower costs per order for BnS
- By understanding online order size drivers, BnS can adapt their business strategy to **grow their mean order size and outperform competitors**

Complications

- Having an online presence poses a business challenge for Buy N Large
- Online orders represent **fixed costs** in terms of preparation and sending
- While large orders make their online presence worthwhile, small orders can have a negative impact on the bottom line
- Not least, small online orders require **higher emissions and packaging material per order**, which drives up costs and exacerbates BnS's environmental footprint
- **Seasonal fluctuations** in online order size could lead to idle time
- **Gender preferences** and other socio-demographic factors could also play a role

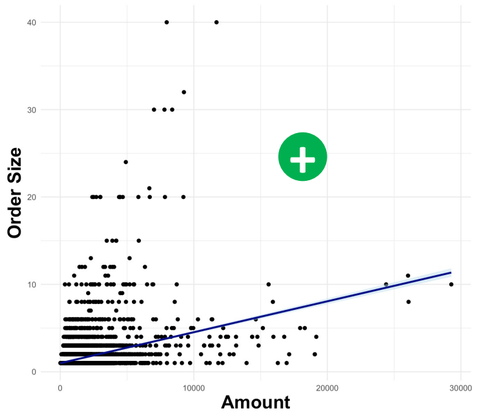
Solution

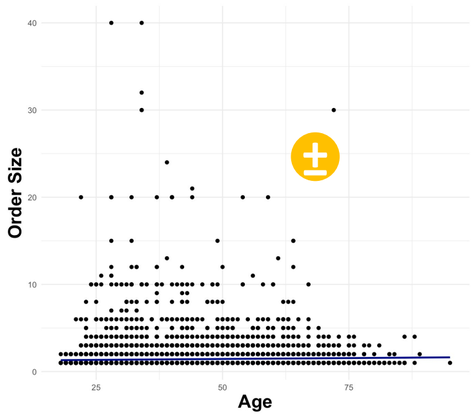
- Analyze data on a **transactions level** (customers can be uniquely assigned to each transaction) and then **fit and evaluate machine learning models** that help BnS to understand drivers of online order size
- Use the insights to **adapt current business practices**, for example, the product portfolio, seasonal campaigns, logistics, and marketing and minimize the impact on the company's triple bottom line
- Model specifics: Categorical Ordinal
  - Use the quantity per transaction of online purchases as the **target**
  - Use amount, month of purchase_date, age, m_status, gender, and city as the **predictors**
- Relevance for BnS's business units:
  - **Financial forecasting and budgeting**: amount and month
  - **Marketing**: month, m_status, gender, and city
  - **Logistics**: amount, month, and city

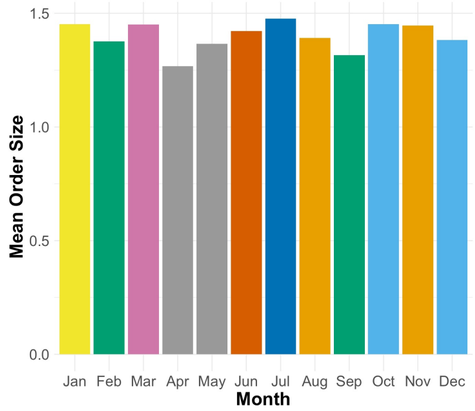
Data Overview

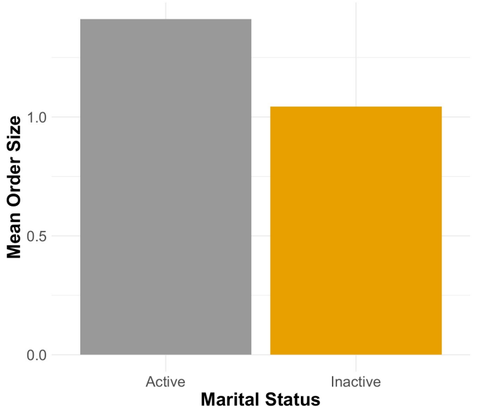
BnS provides a data set containing 22,289 different customers and 1,090,977 transactions, of which 17.28% are online

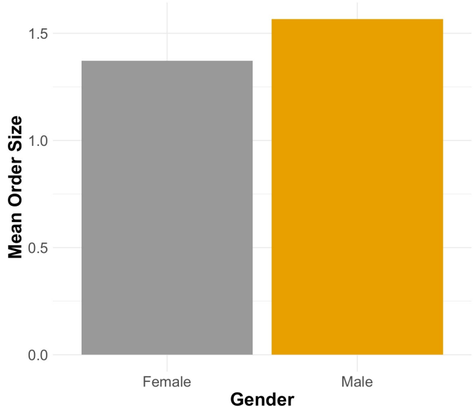
Preliminary results: feature comparison

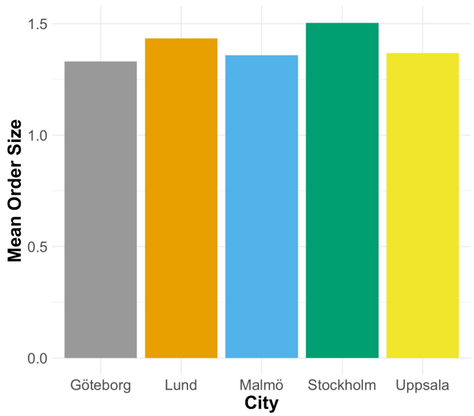












- After filtering out non-online purchases, the following plots show **isolated relationships** between target and predictors
- Importantly, in the final model the magnitude of the relationships and even the signs **may change** due to the covariances among the predictors
- Findings:
  - There is a considerable positive relationship between order size (quantity) and amount
  - There is no visibly significant relationship between order size and age
  - The mean order size seems to be high in the winter months and particularly so just before Christmas
  - Married people and males exhibit a higher mean order size than their counterparts
  - Mean order size is greatest in Stockholm

Recommendations

BnS should adjust its marketing strategies and logistical practices to have positive impact on its triple bottom line

Busines actions

- **Marketing**
  - Create incentives for female and unmarried customers to increase mean order size ☛ This can be done via **personalized marketing campaigns** and the required data is already there (email address, cookies etc.)
  - In this context, it could also be worthwhile to collect more socio-demographic information for even **better individualization**
  - Try to **smoothen seasonal fluctuations** in order size by adding appropriate **customer nudges** to the seasonal campaigns
  - Also run local campaigns to **smoothen spatial disparities** between cities
  - At the same time, **inform customers** with small order sizes about the negative environmental impact of a small order sizes
- **Logistics**
  - Adapt logistical set-up by **preparing for seasonal fluctuations** ☛ For example, aim to **reduce storage expenses** by ordering just the right amount of packaging material and providing at least a part of the warehouse staff with seasonal contracts
  - **Reallocate resources** to warehouses based on the city order size ranking
  - Also, analyze relationship between order size and return propensity

PPP impact

Profit

- More precise financial forecasts due to adjustments to seasonal patterns in order size and amount
- Higher profits via cost reduction in logistics and personnel in warehouse management

Planet

- Alleviate environmental impact via packaging waste reduction (package space is used more efficiently)
- Lower emissions through fewer deliveries per customer

People

- Increased customer satisfaction with optimized product offering
- Increase employee job security through seasonal contracts instead of seasonal lay-offs and hirings