Orange Juice Wars

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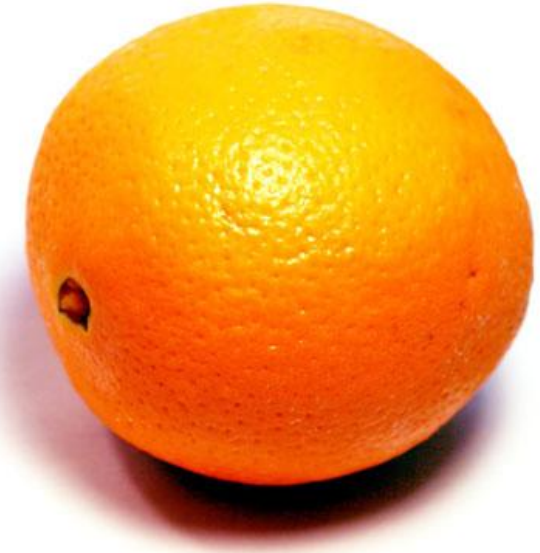
MKTG 6620
June 13, 2017



Objectives

- Understand what drivers impact a customer's purchase decision
- Build a predictive model that can be used for forecasting sales of each brand

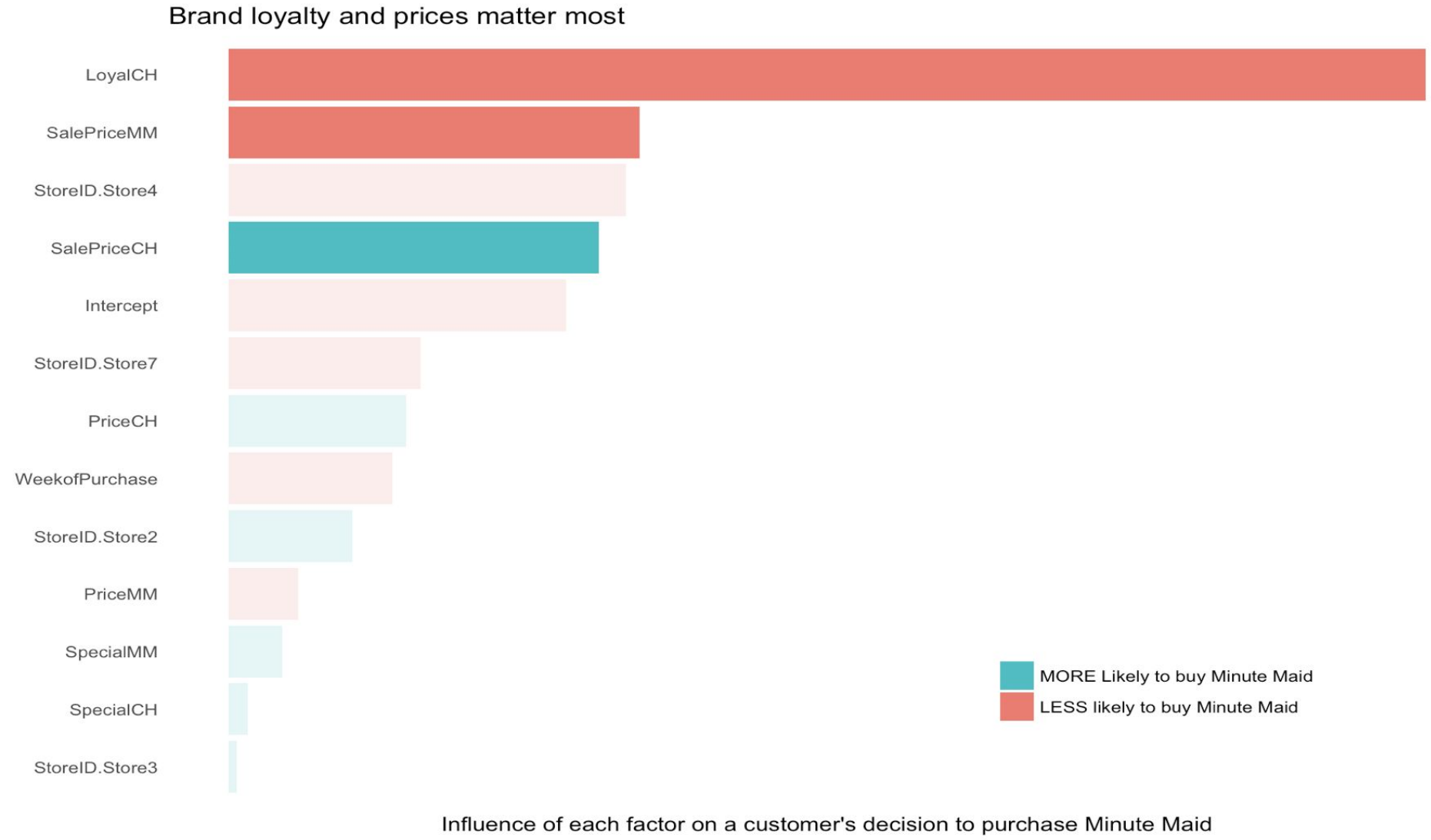
Problem Statement

- Minute Maid orange juice has a higher profit margin than Citrus Hill
- We wish to capitalize on this margin and increase sales of Minute Maid
- We know we can increase sales of Minute Maid by decreasing prices, but this erodes the margin
- How can we increase sales without decreasing the price of Minute Maid orange juice?

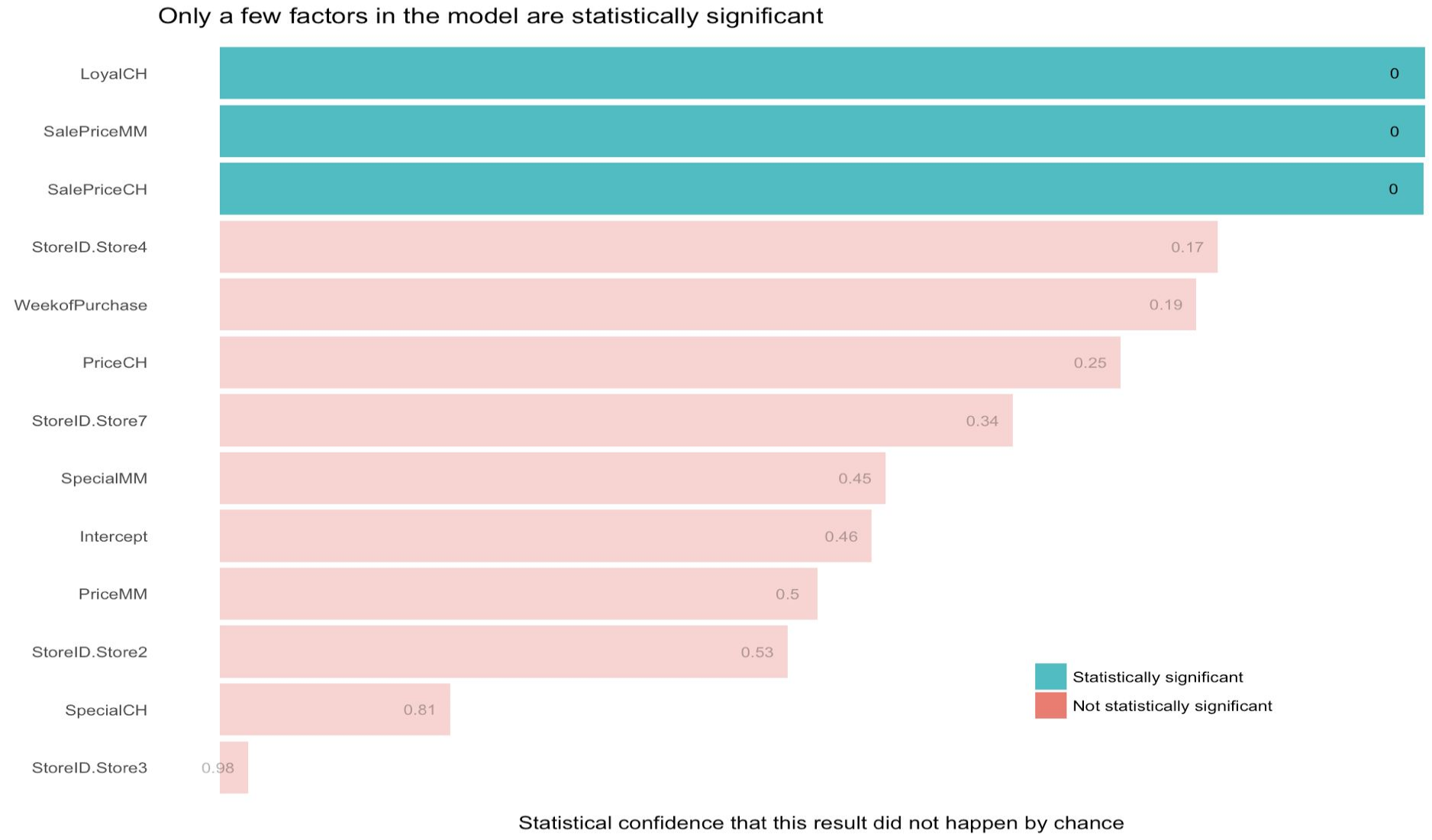
Executive Summary

- How do we increase sales of Minute Maid orange juice?
  - Erode the loyalty customers feel for Citrus Hill
  - Test the effect of increased prices on Citrus Hill
  - Collect more information to test for seasonality effects

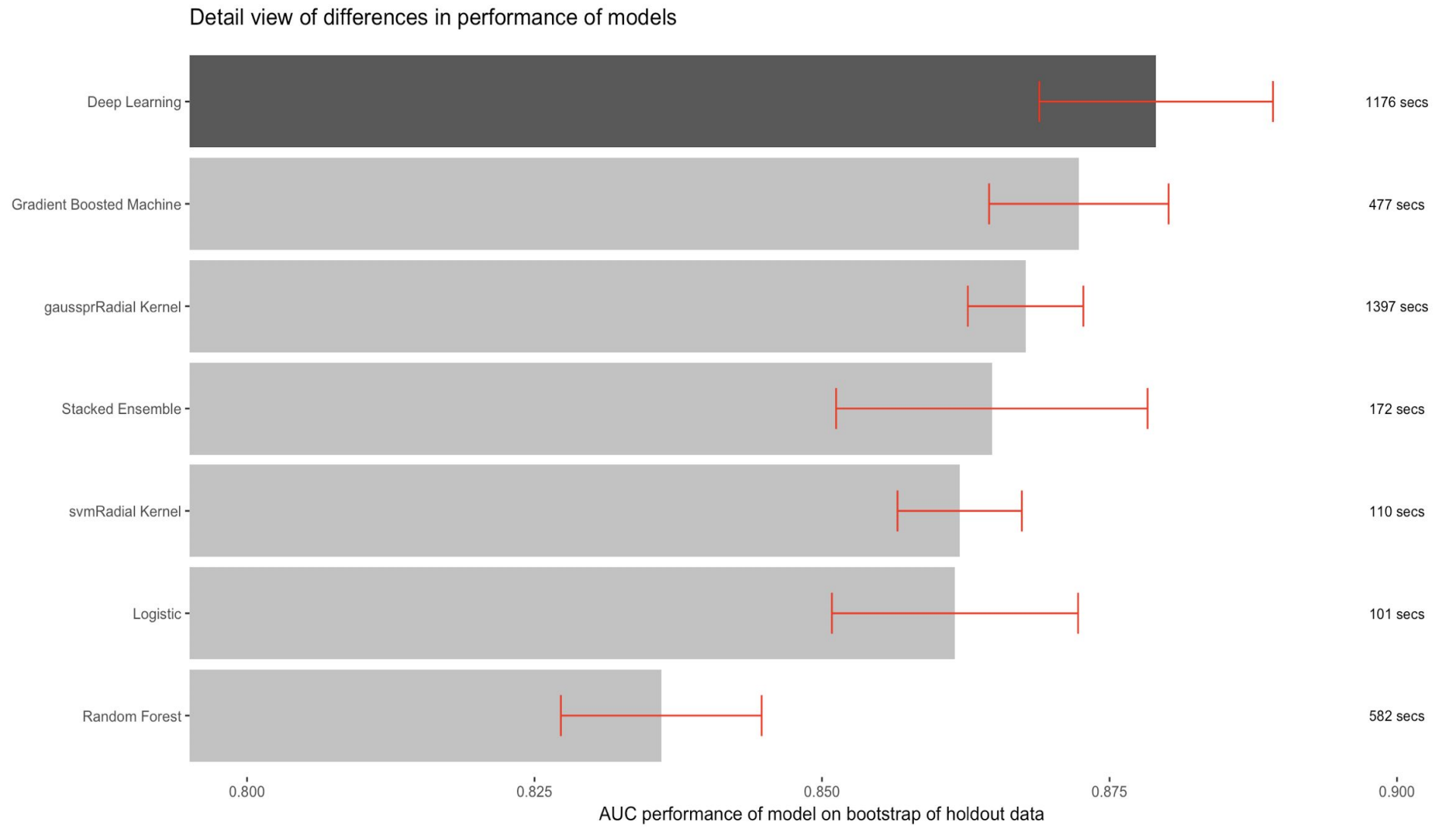
Noteworthy Drivers



Drivers Statistical Significance



Predictive Model



Methods – Data Prep

- Cleaning: Remove Duplicates (24/1070)
- Data Classes
  - Factors vs Numeric
  - Autocorrelation
- Variable Selection
  - Remove Linear Combinations
  - VIF analysis
- Feature engineering
  - Month vs Week

Methods – Model Selection

- Trained with 10-fold cross validation
- Point estimate and 95% confidence interval considered
- Best models visualized with performance metric, confidence interval, and runtime
- All models confirmed by bootstrapping the test data and confirming that expected performance aligns with real performance
- Mild overfitting present in most models

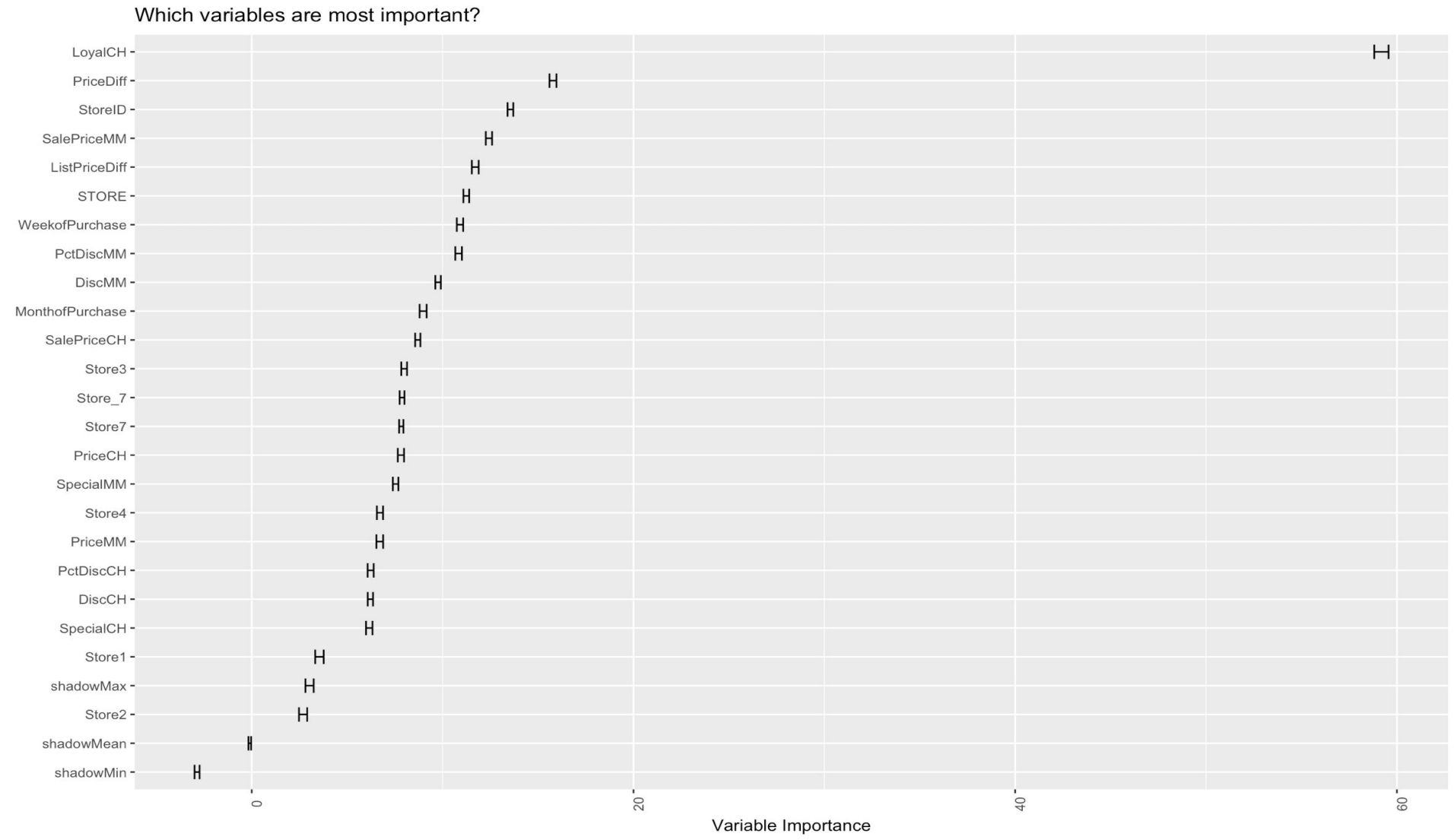
Methods – Model Selection

- Deep Learning
  - Best performance
  - Long runtime, large confidence interval
  - More accurate with retraining on more data
- Support Vector Machine
  - Similar performance and runtime, smaller ci
- Logistic Regression
  - Lower performance, but very short runtime

Methods – Variable Importance

- Coefficients of logistic regression show how important each driver is
- Compare oranges to oranges: standardize
- What about linear combinations?
- Boruta analysis
- Used as supplemental information
  - More prone to misinterpretation

Methods – Variable Importance



Recommendation - Loyalty

- CH loyalty reduces MM purchases.
- Orange juice is a utilitarian product.
- Consumers expending little cognitive effort on OJ decision; relying on Heuristics:
  - Habit: “I bought CH last time”
  - Price: “CH is cheaper”
  - Affect-referral: “I feel good about serving CH to my family”
  - Surrogate indicators: “It is made by P&G”

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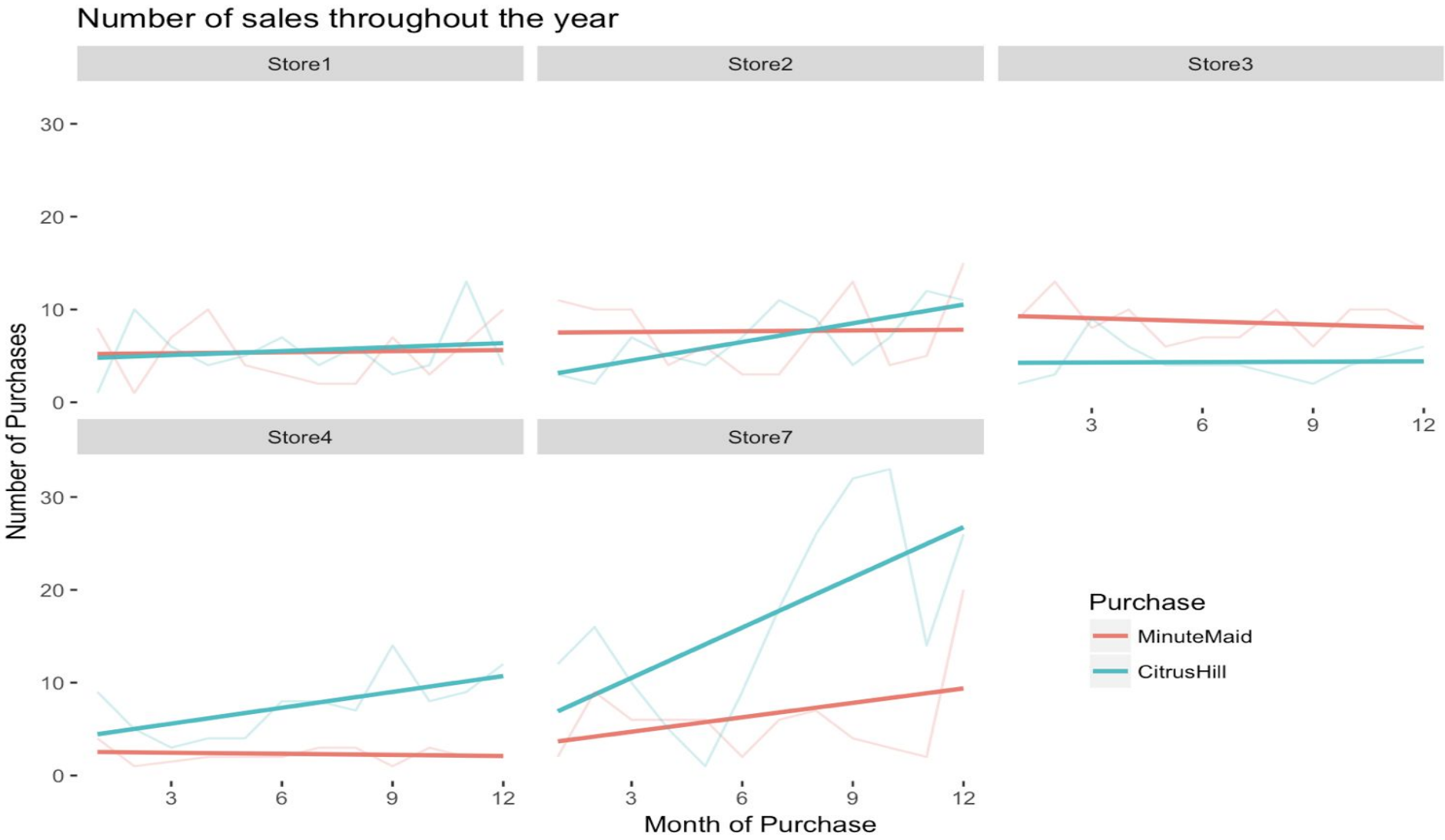
Recommendation - Loyalty

- Erode brand loyalty to CH.
  - In-store sampling; coupon to purchase MM.
    - Move to awareness set/consideration set.
  - Customized promotions for CH buyers
    - Checkout or in-store smartphone MM coupons.
      - Move from consideration to alternative purchased.
  - POS cooler with MM
    - Influence stimulus based consideration.

Recommendation - Data

- Seasonality:
  - Variation during the year
  - Different purchasing pattern by store.
- Gather additional data
  - Assess overall seasonality
- Store-specific seasonality
  - Impact on CH/MM purchasing decision
  - Promotions to encourage MM purchase

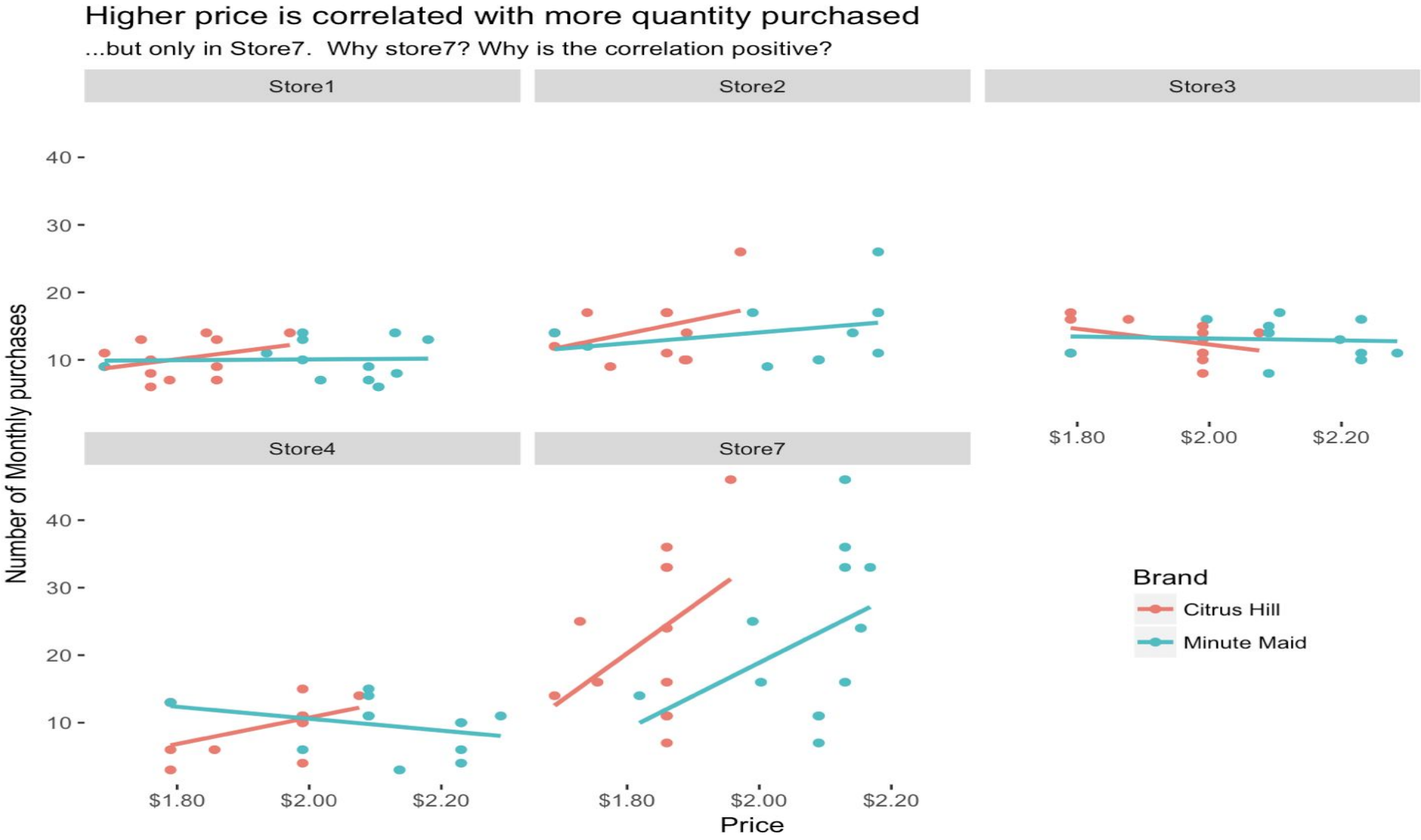
Recommendation - Data



Recommendation - Pricing

- Additional pricing analysis
  - CH is never more expensive than MM
    - Potential to raise price and move purchasing to higher margin MM
    - Test price elasticity of both CH and MM
  - Consider store specific pricing
    - Seasonality
    - Elasticity
    - Shiny App

Recommendation - Pricing



Conclusion

- Best-performing model was a deep learning model, but consider runtime and interpretability
  - Potential seasonality
  - CH loyalty negative factor
  - Price of CH and MM important drivers
- Three recommendations
  - Erode Citrus Hill loyalty
  - Evaluate pricing strategy for both CH and MM
  - Check for seasonality.

Citrus Hill Postscript

- P&G introduced Citrus Hill in the fall of 1982 and waged a heated battle with rival juice makers with its heavily promoted brand.
- In 1992, P&G announced the closure of its Citrus Hill orange juice division.
- According to the CEO, Citrus Hill was unable to gain on its two main rivals, Seagram Co. Ltd.'s Tropicana and Coca-Cola Co.'s Minute Maid.
- Citrus Hill was unable to become a market leader since it didn’t have a competitive advantage.