

From Unstructured Text Data To Interpretable Financial Prescriptions: An Optimization Approach



Pengcheng(Pace) Han¹; Tiantian Ye¹; Dimitris Bertsimas²; Ryan Cory – Wright³; Nadine Kawkabani⁴; Brian Shaw⁴; Brendan Mannix⁴
¹MIT MBAn 2019; ²Faculty Advisor, MIT; ³PhD Student – mentor, MIT; ⁴Mentor, MFS Investment Management, Boston, US

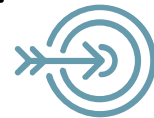
ABSTRACT



For over 90 years, MFS has maintained its leading position in the financial services marketplace by being a customer centric company. To maintain its competitive position, MFS has enacted a policy where sales staff regularly interact with their clients on a personal basis, by regularly emailing, calling and meeting their clients. After each of these interactions, the data generated is recorded in MFS's internal system. In the age of big data, how to utilize those data to help MFS expand its market share becomes a new challenge MFS faces. In this project, we assist MFS in extracting valuable information from unstructured data on activities with one of the 300+ partner financial advising companies of MFS. This allows MFS to understand the influence of different activities on client relationships, and manage sales activities in a more efficient manner.



Which Advisor



What Format

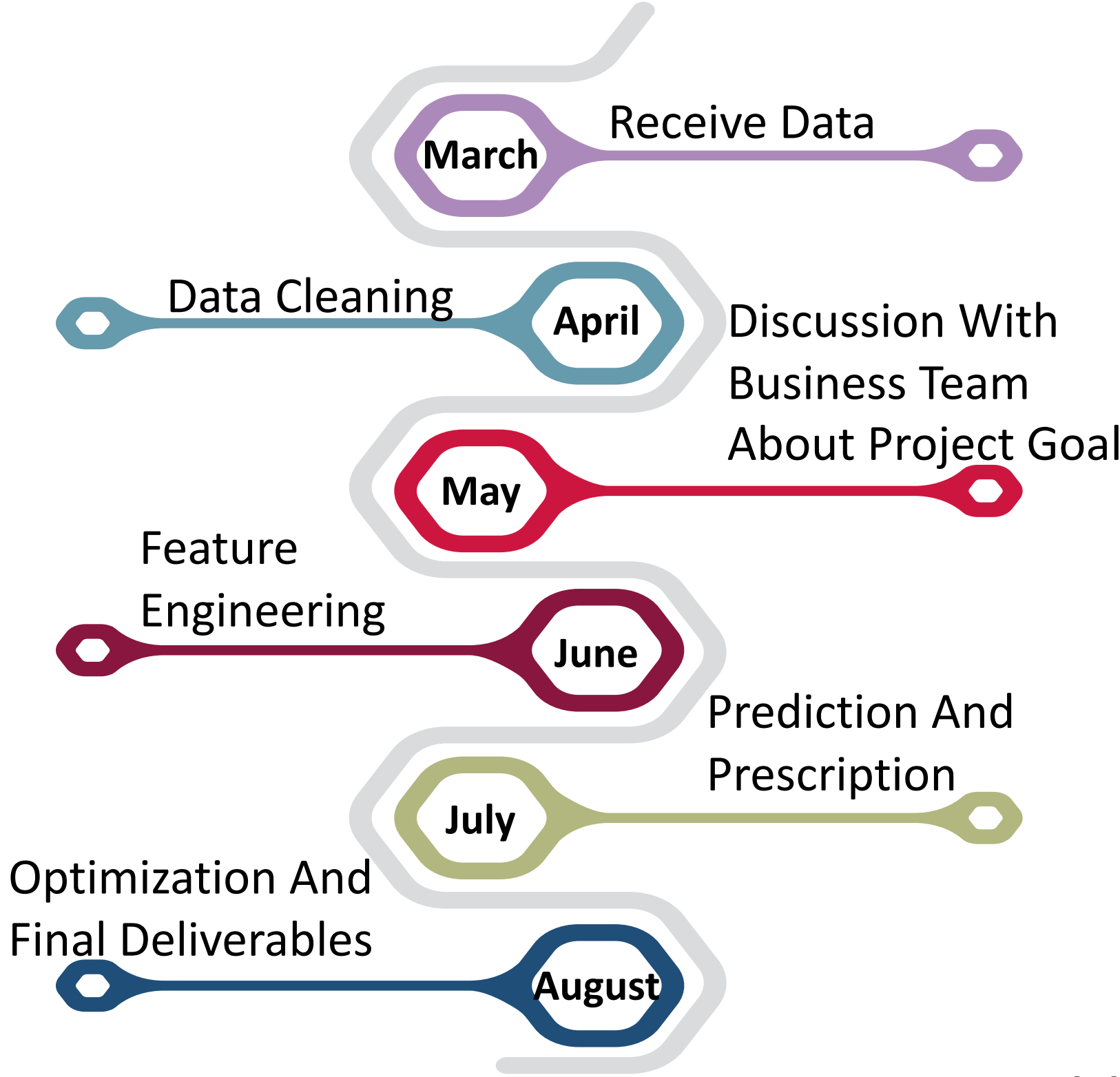


What Content

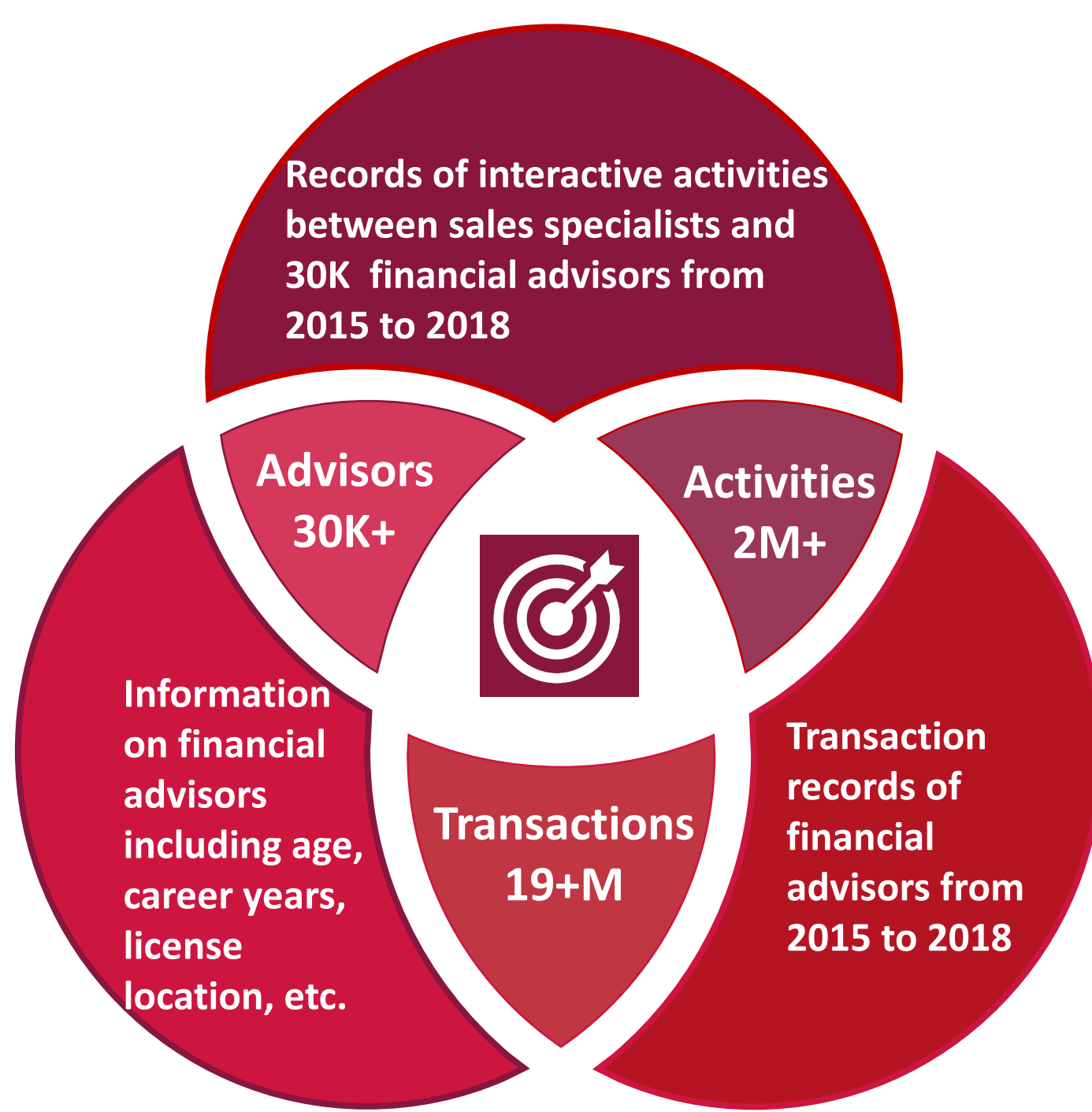


How Frequent

TIMELINE



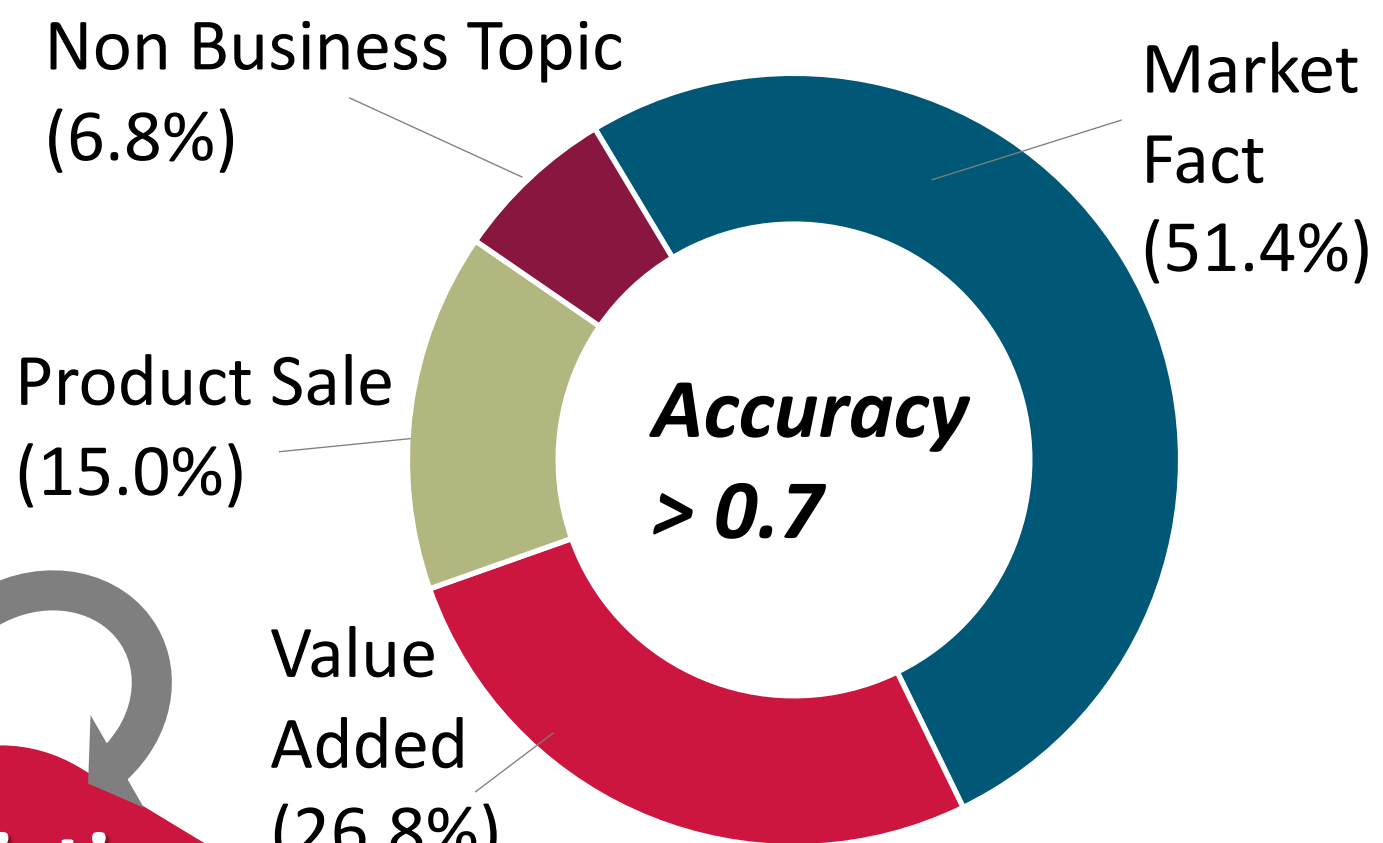
DATA SETS



Identified 173 Keywords And Phrases

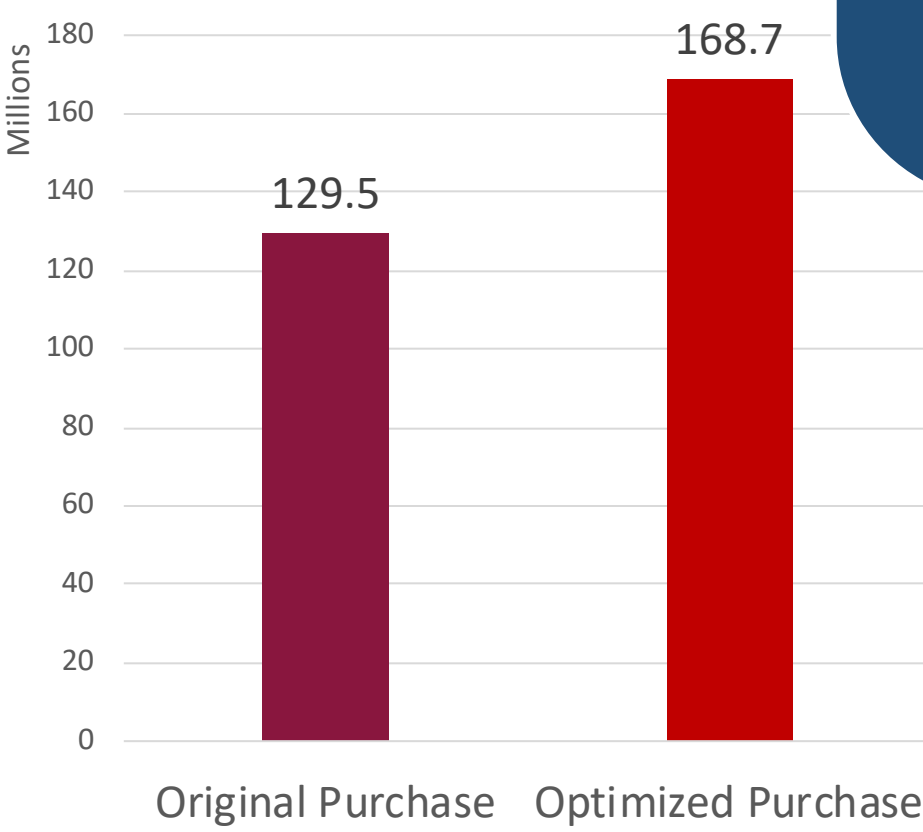


Activities Categorized Into 4 Types Based On Content



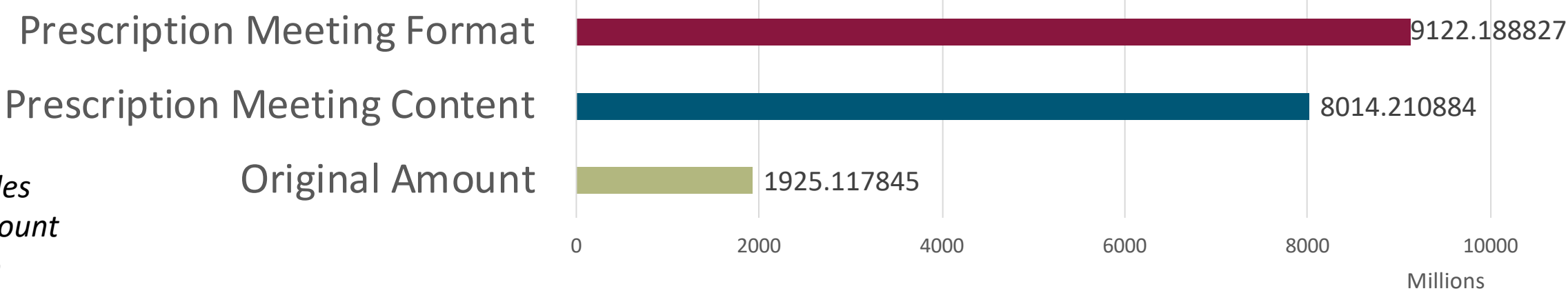
Graph2: Pie Chart on the distribution of the four activity content we identified in training set, the model has an over 70% accuracy on the test set.

Optimization Model Lifts Total Future Purchase Prediction



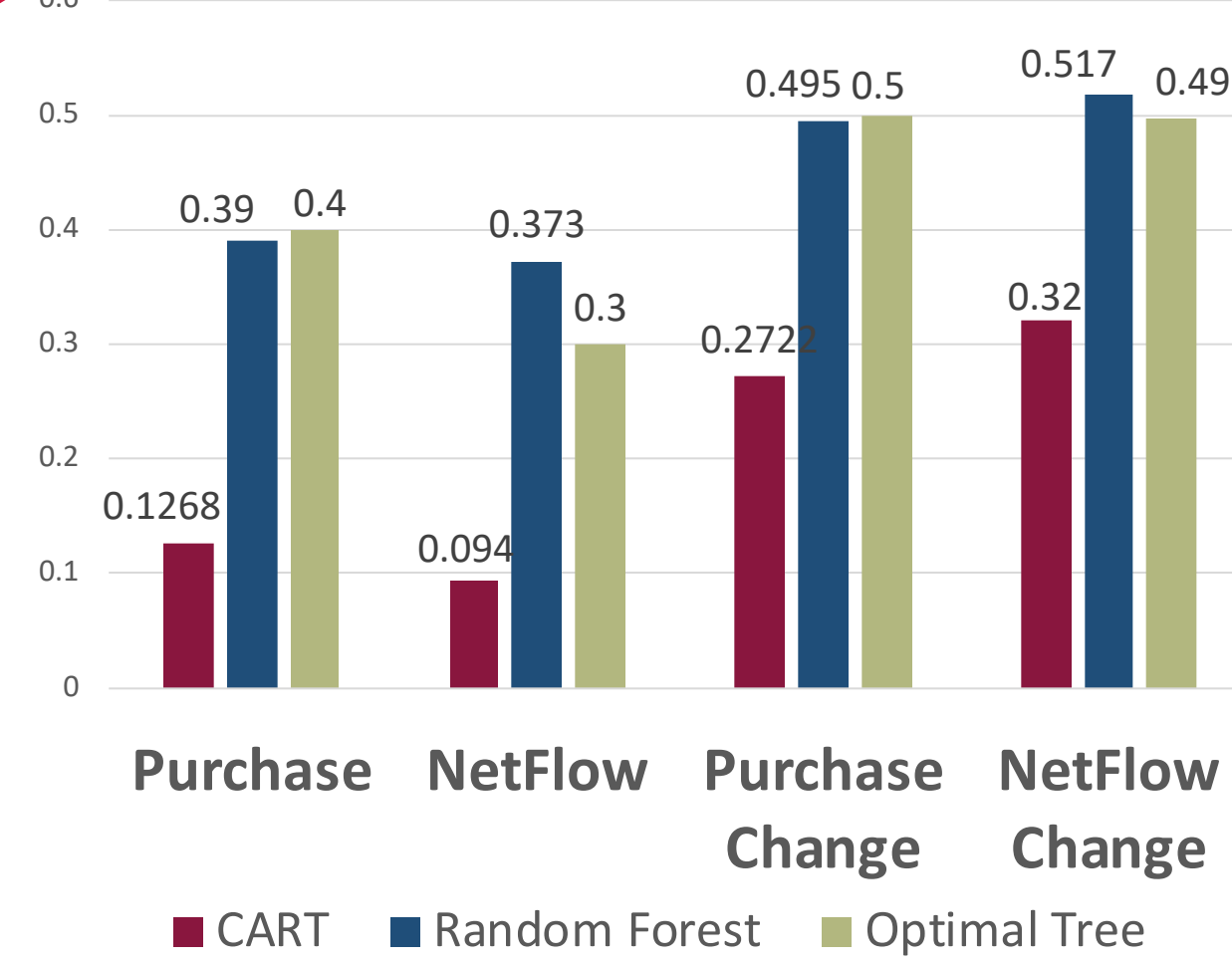
Graph5: Influence of optimizing current month sales resource allocation on the predicted purchase amount next month on 100 financial advisors. Note due to compliance we do not have information on actual sales capacity, there is about 30% increase for the total purchase amount compared to original without optimization

Prescription Model Lifts Total Future Purchase Prediction



Graph4: Influence of prescribing current month meeting format and meeting content on predicted following month purchase amount based on optimal prescription tree

Prediction Model Performance



Graph3: The performance of different methods in predicting different future transactions evaluation metrics measured in accuracy

Better Understand Activity Influence

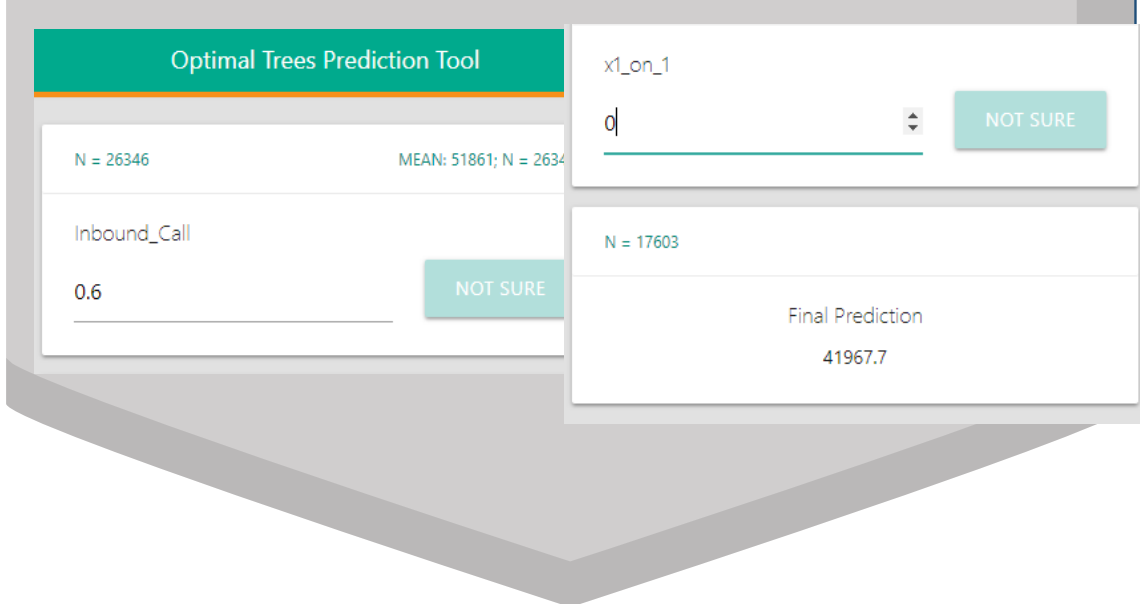
The prediction model gives a better understanding of how different frequency and different types of activities influence future purchase amount. For example, we examine by adding a specific activity, what change will bring compared to baseline which includes 2 inbound call 3 months ago, 2 sales call one month ago and over 10 market fact content conversation over 6 months.

- Treatment A: 1 more in bound call 1 month ago
- Treatment B: 1 more inbound call 3 months ago
- Treatment C: 1 more Sales call 1 month ago
- Treatment D: 1 more 1 on 1 meeting 1 month ago



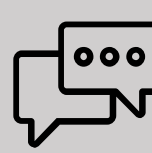
Optimal Trees Helps To Make Decision

- Majority of the sales team have no background in data science and rely on user friendly and easy interpretable tools to implement the models we built
- With the help of optimal trees and prescription trees, anyone interested in using data in the decision making process can utilize the models
- The tools we developed could be further adjusted based on feedbacks from sales team for better integration with their work



Influence on Future Data Management

- It is the first time unstructured data has played an important role in data science project in MFS.
- It provides a new perspective on how unstructured data could be stored and managed in the future
- By using the pipeline for processing unstructured data we developed, this project could be expanded to cover activities with the other 300+ partner financial advising companies



Activity



Raw Text



Structured Data