Analysis and Visualization of Membership Behavior
American Mathematical Society

PURDUE UNIVERSITY | The Data Mine

AMS American Mathematical Society

1: Introduction

The American Mathematical Society is facing a situation of declining membership and donor retention. Our goal is to provide AMS with well-structured insights and tools to help them increase member retention rates.

2: Data Preprocessing

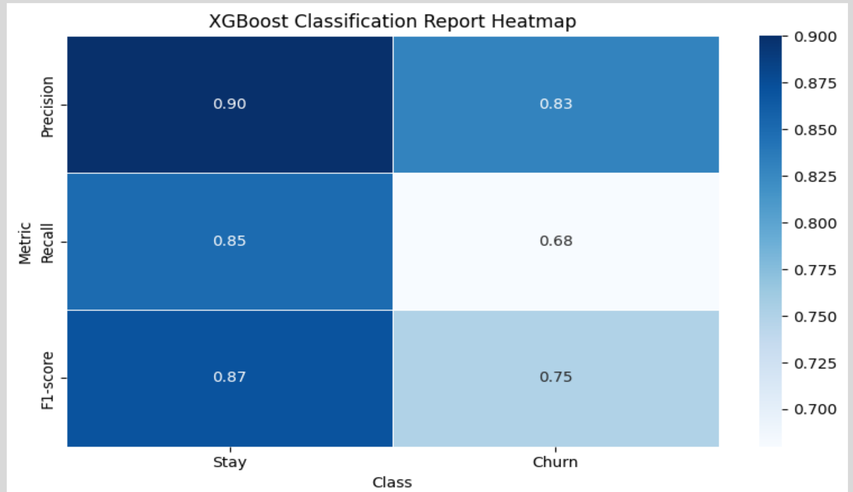
- 20-year dataset with ~600,000 rows
- Aggregated duplicate rows over multiple years and removed unnecessary columns
- Estimation algorithms to fill missing values
- Cleaned dataset for Power BI dashboard and Churn Model

Range Checks

Column	Range	Values Eliminated
BIRTHYEAR	1940-2005	1626
GRADYEAR	1955-2035	103
MEMBERSINCE	1955-2025	121
LASTCHAPTERYEAR	1955-2025	17
LASTDONATIONYEAR	1955-2025	0

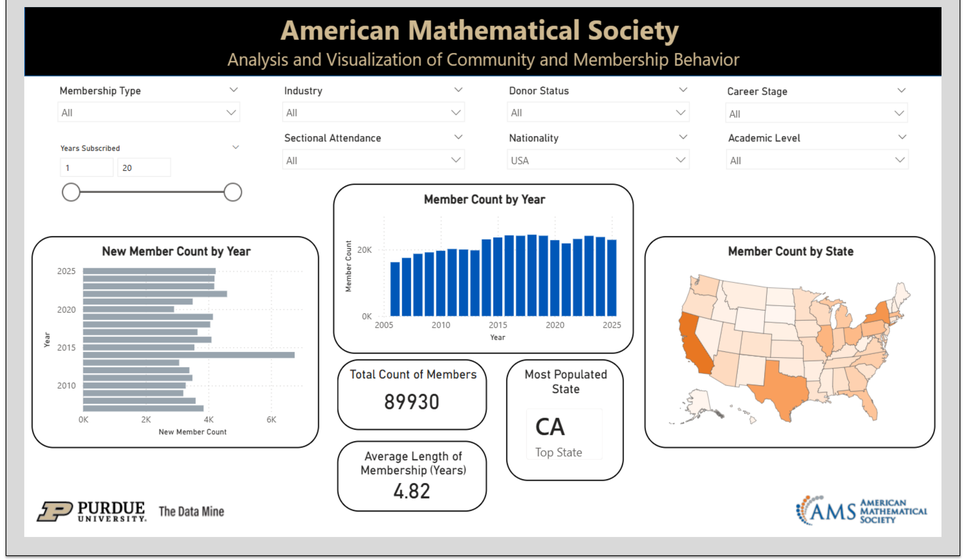
4: Churn Model

- Incorporates the past 20 years' worth of data to flag high-risk members.
- Classifies members into buckets from low-risk to high-risk based on the members probability to churn.
- Precision of 83%, with true around 68%.



5: Interactive Dashboard

- Developed for AMS employees to easily filter data and identify membership trends
- Visualized key demographics and KPIs such as state, career stage, total members, and average membership length
- Graph retention rate over years to highlight historical trends



3: Timeline

6: Conclusions

Over the past sprints, our team migrated data given by AMS from Excel spreadsheets into a Churn model and PowerBI dashboard to create insightful visualizations of the data. We provided detailed insight reports flagging various trends within the data and provided recommendations to help increase member retention.

7: Future Plans

- Automate monthly churn model predictions
- Parameterized scoring system for judging potential high-risk members
- Real-time analytics integration for PowerBI dashboard.

8: Acknowledgements

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