Alumni Gifts and Data Analysis

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Introduction

Project Goal
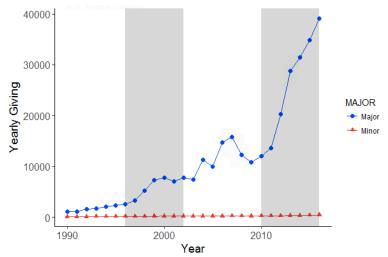- Identify distinguishing characteristics of major alumni donors and model their lifetime giving behavior

Contributions
- Visualized the distinctions between major and minor alumni donors
- Evaluated Development office's current affinity metric
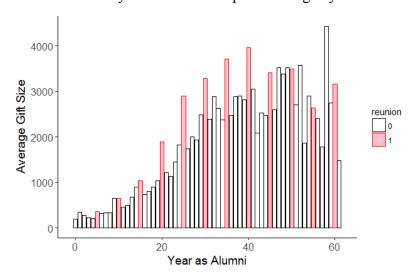- Clustered the donors by giving behavior and labeled clusters

Data

- 158,855 households with at least one alumni
- **Demographics:** Age, Gender, State of Residence, Marriage Status
- **Education:** Class, Major, Degree Type, School
- **Donation Record:** Giving Histories from 1972 to 2016

Major donors' gifts have grown more quickly than minor donors'
(Duke giving campaign years shaded)

5 and 10 year reunions are prominent gift years

Methodology
- Giving behavior regressed onto affinity score
- Covariates included age, gender, education, family characteristics, and Duke event attendance
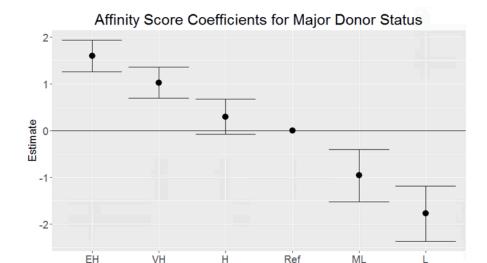- F-tests performed to determine relevance of affinity score

Methodology
- Clustered donors had complete 31 year donation trajectories and at least $1000 cumulative giving
- Features were descriptive statistics drawn from donation trajectories
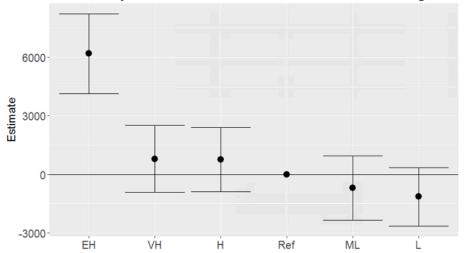- 13,574 donors clustered into 7 groups by k-means clustering

Clustering Details
- 31 year window chosen to balance sample size and donation trajectory length
- Number of clusters selected by sum of squared errors
- Mixed feature units transformed and normalized as appropriate

Affinity Score Coefficients for Major Donor Status
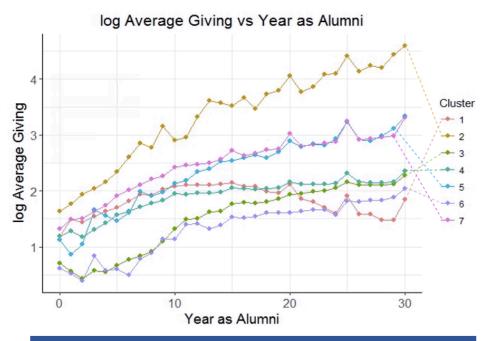

Affinity Score Coefficients for Past 5 Years' Giving

Affinity Scores: Extremely High (EH), Very High (VH), High (H), Medium High (Ref), Medium Low (ML), Low (L)

Features

- **Magnitude features:** cumulative giving, largest gift, average gift, largest increase in gift size, number of increases in gift size, average reunion gift, sum of absolute differences in gift size with and without giftless years

- **Timing features:** year of max gift, number of gifts in first and in last 10 years, number of reunion gifts

log Average Giving vs Year as Alumni

Group	Size	Cumu. Giving	Number of Gifts	First 10	Last 10	Donor Type
1	1,881	2.4K	13.2	5	2.3	Low
2	1,134	226.7K	21.7	5.3	8.2	Major
3	2,926	1.9K	15.9	1.5	8.2	Low
4	2,595	3.1K	23.7	6.3	8.6	Low
5	1,684	15.0K	13.5	1.9	6.1	Medium
6	1,396	1.0K	6.5	0.8	3.1	Low
7	1,958	16.1K	24.6	6.5	8.8	Medium

*This table presents part of the features above

Conclusion

Summary
- The current affinity metric does correctly correlate to donor behavior, but its explanatory power is limited
- Donors fall into 7 clusters with one of these clusters exhibiting great philanthropic promise

Future Work
- Predictive modeling of cluster membership based on early giving behavior and demographics

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