Comparing the Exploration of Academic Majors at Duke

Ben Chesnut, Katharyn Loweth, Fred Xu

Project Manager:
Zhennan Zhou

Faculty Mentors:
Jonathan Mattingly
David Toole

Background:

Although Duke undergraduate students are lauded by the administration as being interdisciplinary, little research has been completed on the academic pathways that students take while at Duke.

The **Data+** :

- Duke**MATH** UNIVERSITY
- Duke | GLOBAL HEALTH INSTITUTE

Goals:

- Better understand the academic paths and choices Duke students make
- Use insights to propose improvements to the Global Health and Math department curriculums
- Use visualization methods to create interactive models that accurately and intuitively display the academic and demographic data

Acknowledgements:

- Software used: MySQL, Python, R, Tableau
- Packages used: matplotlib, numpy, scikit-learn
- People: Paul Aspinwall, Laura Bey, Leslie Saper, Paul Bendich, Ashlee Valente, Ariel Dawn, Kathy Peterson

Contact Information:
Ben Chesnut: benchesnut95@gmail.com
Katharyn Loweth: katharyn.loweth@duke.edu
Fred Xu: fredxu2015@gmail.com

Math Department

Common Course Trajectories
- Duke students clustered into different groups based on math courses taken

Method
- <u>Hierarchical clustering</u>
  - Metric: Minimum distance pairing of two students' courses based on hierarchy of level and topic

Analysis
- Math students clustered into six groups:

Cluster	Typical Courses (>30% enrollment)	# of Students
1	212, 221, 230, 342, 356, 401, 431, 581	122
2	212, 221, 230, 342, 356, 401, 431, 487	195
3	212, 221, 230, 281, 305, 333, 356, 411, 421, 431, 493, 501, 531	45
4	212, 221, 230, 281, 356, 411, 481, 493, 501, 502, 531, 532, 602, 603, 611, 612, 621, 631, 633	32
5	111 (old), 114 (old), 212, 216, 230, 342, 353, 401, 431	48
6	221, 230, 342, 356, 371, 375, 401, 431	45

Course Proportions for Cluster 1
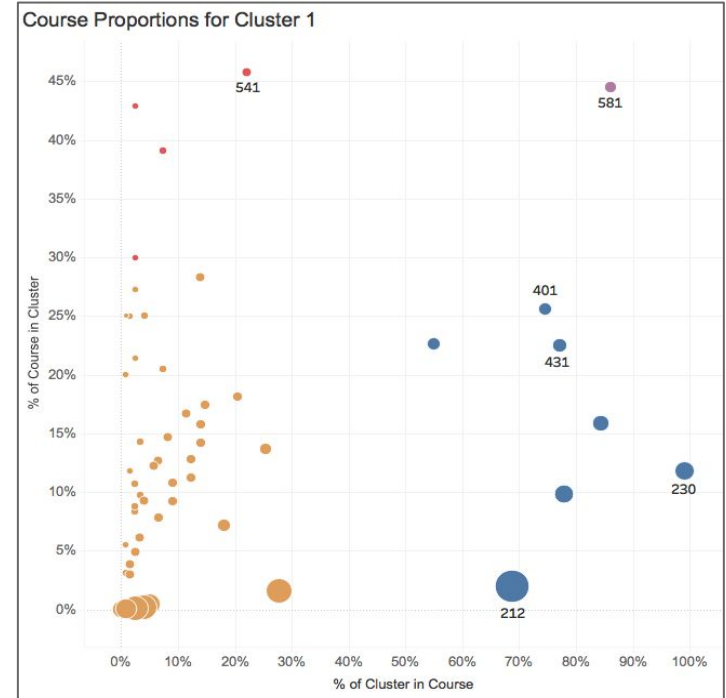
The x-axis represents the percentage of people in Cluster 1 who have taken a particular class. The y-axis represents the percentage of people in a particular course who are in Cluster 1.

Global Health (GH) Department

Major/Minor Analysis
- What are the differences between majors and minors?
- Can we distinguish minors who wanted to be majors?

Methods
- <u>Feature Selection</u> of features that most separate GH majors and minors (Fig. 1)
- <u>Hierarchical Clustering</u> of GH minors using selected features
  - Minors with strong "major" characteristics ("Major to Minor")
  - Minors with low "major" characteristics ("Minor")

Analysis
- Minors who wanted to be majors tend to take more classes than other minors. (Fig. 2)
- Comparing first majors suggests some (e.g. ICS) are easier to pair with the GH major than others (e.g. Neuroscience) (Fig. 3)
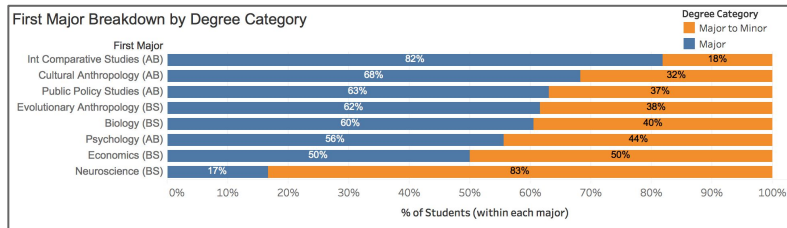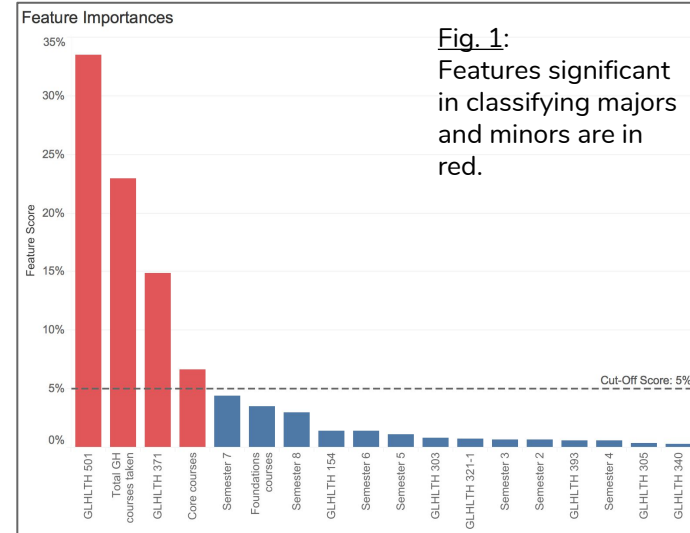

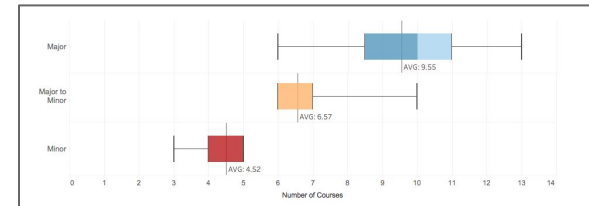Fig. 1: Features significant in classifying majors and minors are in red.

Fig. 2: Boxplots showing GH course count distributions for majors, major to minors, and minors.

Fig. 3: First majors and percent of students who officially majored/minored out of all students who attempted to major