Comparing the Exploration of Academic Majors at Duke

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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.

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

The Data:
• Duke MATH
• Duke GLOBAL HEALTH INSTITUTE

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

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

Method
- Hierarchical clustering
  - Metric: Minimum distance pairing of two students’ courses based on hierarchy of level and topic

Analysis
- Math students clustered into six groups:

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Typical Courses (&gt;30% enrollment)</th>
<th># of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>212, 221, 230, 342, 356, 401, 431, 581</td>
<td>122</td>
</tr>
<tr>
<td>2</td>
<td>212, 221, 230, 342, 356, 401, 431, 487</td>
<td>195</td>
</tr>
<tr>
<td>3</td>
<td>212, 221, 230, 281, 305, 333, 356, 411, 421, 431, 493, 501, 531</td>
<td>45</td>
</tr>
<tr>
<td>5</td>
<td>111 (old), 114 (old), 212, 216, 230, 342, 353, 401, 431</td>
<td>48</td>
</tr>
<tr>
<td>6</td>
<td>221, 230, 342, 356, 371, 375, 401, 431</td>
<td>45</td>
</tr>
</tbody>
</table>

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
- Feature Selection of features that most separate GH majors and minors (Fig. 1)
- Hierarchical Clustering 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)