COLORADO SCHOOL OF MINES

Background

In Spring of 2024, a CS Field Session team successfully implemented a flowchart tool that extracted course dependency information from the current Mines catalog and constructed a 4-year flowchart for the various majors offered at Mines. Additionally, they constructed an interactive graph version of this flowchart showing dependencies (i.e., pre- and post-requisites for any selected course). However, it also became obvious that

1. Some of the course data was not easily extracted from the catalog as it was department dependent.
2. It was problematic getting the necessary data from the registrar directly.
3. The catalog data contained mistakes that would best be communicated back to the registrar.
4. The overall tool did not address pre-existing credits or "what-if" scenarios.

For more information on the existing tool, review http://minesflow.com

Project Description

To update and improve the existing tool to address the identified problems this development effort will:

- Implement a well-documented (possibly slightly manual) natural language processing techniques to parse the appropriate department specific requirements from the university catalog.
- Incorporate derived requirements into a visual representation course pathways (e.g., flowchart, heat map dependent on prerequisites, block diagram, etc.).
- Personalization of a flowchart to reflect existing credits (i.e., AP and/or transfer credits), desire for a minor and/or specification of major-tracks.
- Using predictive analytics, identify potential bottlenecks, critical courses to complete or challenging sequences (if grade data is available).
- Capture "what-if" scenarios and update the appropriate flowchart to reflect a modified "best-path" to graduation.

Depending on the implementation time and successful completion of these tasks, enhancements may include (incorporation of grade data (if possible)) development of a 'recommendation system' to suggest optimal course sequences, development of a user interface to allow customization of the resulting flowchart, or specification of minor or any additional user-specific requirements.

Desired Skill Sets

- Some experience with natural language processing and text parsing.
- Some basic graph theory to potentially create and/or visualize course flowcharts.
- Some fundamental understanding of user interface design.
- Possibly some database understanding if any kind of intermediate database is to be used.