**Results**

We find that course recommendations using topic models are promising. We used expert validation to evaluate the results of the recommendations: alumni and members of academic advising were asked to interact with the system and comment on the usefulness and coherence of the recommended courses. The use of self-selected key words targeted at the content of a student’s interests were most useful. Alumni were surprised when they were recommended courses from other faculties that they had not previously been aware of. The quality of recommendations decreased with the use of transcript data. This is because topics containing explanations on the format or structure of the course overwhelmed content recommendations. For instance, words such as *research*, *method*, *period*, and *skill* were identified as part of a student’s interest along with *film*, *gender*, *literature* and *culture*. The recommendations then included most variations of courses such as *Research Methods: Interviewing,* *Research skills*, and *Research Project* offered at different faculties. As a consequence, courses such as *Narrative Media*, *Pop songs and poetry*, or *Cultural Studies II* which are recommended when only the second set of key words is selected were lost from the recommendations. However, even when recommendations were overwhelmed by methodologies, they still showed sensitivity to student interest. A more quantitative student got the suggestion of *Research Methods: Survey Research* instead of *Interviewing*. The approach of using a topic model as a basis for recommendations was useful because of the flexibility of the models. Given that the same word belongs to different topics, multiple interpretations of the word can be captured by our model. Moreover, the topics acted as a buffer between the search of the student and the courses, thereby identifying courses with similar thematic, even when the course description did not contain the key words a student selected.

The warning system proved to be more challenging. Whilst we managed to use the topic expertise of students along with GPA at different levels of granularity to predict student grades with an error of around 0.8 points of a grade, identifying preparatory courses was difficult because of the sparsity of the coefficients in our lasso model. Thus, the courses which had the greatest impact on the grades of students for a particular course were not always coherently connected to said course in terms of content. For instance, our system identified the course of *Nutritional Neuroscience* as a preparatory course for *World History*. Whilst such incongruencies were not always the case ( e.g. *Introduction to Adult Neuropsychology* as a preparatory course for *Psychology and Law*), we must find a way to improve this. Nevertheless, our approach to grade prediction was successful and provides academic advisors important information to keep in mind when discussing success strategies with particular advisees.

**Future work**

The difficulties suggested above indicate three pathways for future work. First, in the context of capturing student interest, there is a need to classify the topics into those describing methods/structure and those describing content. This would enable us to give topics different weights depending on the student’s priorities. In the same way, we must give students the possibility of adjusting the level of redundancy in course recommendations from different faculties (which provides scheduling flexibility), as well as the priority given to courses from their own faculty.

Second, in the context of topic modeling, would like to expand our topic model to include literature and other course materials beyond course descriptions. Moreover, we are looking into the possibility of moving towards a Structural Topic Model instead of LDA. Structural Topic Models (Roberts, Tingley, Stewart, Airoldi, 2018) use covariates to build the model and calibrate topic prevalence and topic content depending on metadata. They would therefore help us improve our model based on information such as which faculty offers the course.

Thirdly, in the context finding preparatory courses, we identify approaches: First, to integrate topic model information in order to increase coherence of the preparatory and target courses. Second, to move away from informative recommendations which can be used for curriculum improvement and use an approach similar to Jang, Pardos and Wei (2019).

Reference

https://scholar.princeton.edu/files/bstewart/files/stmnips2013.pdf