Affiliation and Affect Changes of MOOC Discourse
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Background
Massive Open Online Courses (MOOCs) have recently gained popularity in higher education, for their roles in increasing inclusiveness and revolutionizing learning experiences. However, it was rarely investigated how MOOCs students have changed over this period. Therefore, this poster presents the changes of discourse features in MOOCs, based on linguistic features extracted from discussion forums. In particular, we demonstrate here that discussion languages:

- have reflected less affiliation and drive over time for most courses
- have reflected changes in varied directions in affect across different courses

Methods
Courses: Five MOOCs on the Coursera platform which ran for several sessions (N = 59,017 participants). Each course was different with respect to the length of the course, the instructor, learning objectives, participants, and domain being taught. All courses met the following criteria:

- Instructional designers confirmed each of the courses chosen experienced minimal changes between course offerings
- The courses chosen all ran between six and ten iterations, and all the data were included

LIWC (Linguistic Inquiry and Word Count)
A text analysis program that counts words in psychologically meaningful categories (Pennebaker, Boyd, et al., 2015).

Discourse Features:
- Affiliation was captured by the linguistic category "affiliation". Example words: ally, friend, social.
- Drive is a synthesis of related linguistic variables, including affiliation, achievement, power, reward and risk.
- Affect is also a group of related linguistic variables, including anxiety, anger, sadness, positive and negative emotions. Example words: sweet, love, worried.

Discourse Feature Findings

<table>
<thead>
<tr>
<th># Students</th>
<th>N = 7,805</th>
<th>N = 1,820</th>
<th>N = 33235</th>
<th>N = 2079</th>
<th>N = 13902</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affiliation</td>
<td>0.2</td>
<td>0.3</td>
<td>0.1</td>
<td>0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Drive</td>
<td>0.2</td>
<td>0.3</td>
<td>0.1</td>
<td>0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Affect</td>
<td>0.2</td>
<td>0.3</td>
<td>0.1</td>
<td>0.2</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Statistical Analyses
Three Linear Mixed Effect Models were constructed:

Independent Mixed Effect Models were constructed:
- Time * Course
- Random Effect
  - ~ 1|Participant ID

Model Evaluations:
The likelihood ratio tests indicated that the full model fits significantly better than the random effects only models, so adding the interaction significantly improves the prediction above and beyond the individual participant characteristics.

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Null vs Full Model</th>
<th>Full Model $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affiliation</td>
<td>1767.9</td>
<td>.029</td>
</tr>
<tr>
<td>Drive</td>
<td>1353.1</td>
<td>.023</td>
</tr>
<tr>
<td>Affect</td>
<td>254</td>
<td>.004</td>
</tr>
</tbody>
</table>

Conclusions
- While not all courses have the same amplitude of affiliation decrease, there is a decreasing trend seen in all courses except for two with smaller sizes
- There is a more uniform decrease in affiliation and drive over subsequent offerings while the trends of affect vary across different courses
- We have not addressed the question as to why discourse patterns are changing in MOOCs. It may be:
  - MOOCs learners might experience reduced interaction and sense of belongingness
  - Affiliation change is not reflected in the change of students' emotions
- Future work will also explore additional population characteristics, and incorporate the total number of posts per learner into the models

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