MOOC Visual Analytics: Empowering Students, Teachers, Researchers, and Platform Developers of Massively Open Online Courses

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Abstract
Massively open online courses (MOOCs) offer instructors the opportunity to reach stu-
dents in scales of magnitude greater than they could in traditional classroom settings, while allowing students access to live or recorded lecture content by video and text. Students are expected to be at least minimally self-directed as they navigate the course materials and effectively interact with teachers and fellow students, research-
en projects, and Forums and discussion boards hosted on each online platform.

Along with these challenges, the sheer volume of data available from MOOC platforms provides unprecedented opportunities to study how learning takes place in online courses. This paper explores the use of data analytics and visualization as a means to empower teach-

er to better understand and analyze student engagement with their courses and each other and expand the impact of their courses.

MOOC platforms differ in terms of the nature of their course content, technical infrastructure, pedagogical practice, and the demographics of their student body. However, the vast majority of MOOCs suffer from the same challenges that traditional education suffers from:

1. How do students interact with course activities?
   2. Do students complete homework assignments?
   3. How do students participate in online discussions?
   4. How do students share content?
   5. How do students contribute to the course?
   6. How do students collaborate with each other?

Data

1. Statistics
   Line graphs, correlation graphs, and box-and-whisker plots are all exam-
   ines of how statistical data can be rendered visually.

2. Temporal
   Temporal analyses and visualizations tell when events happened and what
   happened in the span of a course. Data might be examined at different levels of aggre-
   gate, including individuals, group categories, or activities. A course might be
   segmented by semester, by course modules, or be-
   fore-and-after a midterm or final.

3. Geospatial
   Geospatial data might be examined at different levels of aggregation, includ-
   ing individuals, group categories, or activities. A course might be
   segmented by semester, by course modules, or be-
   fore-and-after a midterm or final.

4. Topical
   Topical analysis provides an answer to the question of “what is going on in
   a course.

5. Network
   Student cohorts might be created based on prior expertise, geographical
   region on time zones, access patterns, project teams, or grades.