PSG 286: "Combining Machine-learning and Learning Analytics to provide personalized scaffolding for computer-supported learning activities"

Brief Annual Report: 2020

Project's objective: *The main objective of the project is to study how we can combine computational models informed by learning analytics with established pedagogical theories in order to provide personalized scaffolding to students targeting their specific needs.*

Project's annual goal: *By the end of the second year of the project we aim to have: a) an established taxonomy of Learning Analytics indicators that can be used to identify students at risk of dropping out from their studies;, b) an outline of modeling approaches to support the learning analytics taxonomy and c) a finalized, refined methodological framework for personalized scaffolding.*

Research activities

During the second year of the project (January 2020, December 2020) we carried out the following research activities:

- **Workshops and Research Studies**
  - 15 September, 2020: colaps @ ECTEL 2020 – Workshop: "CoFeeMOOC: Designing Contingent Feedback for Massive Open Online Courses" (description, pdf)
  - 23 – 27 March, 2020: colaps is co-organizing ADORE '20 and attending LAK'20 (canceled due to COVID-19 outbreak - PC committee meeting and published proceedings)
  - We submitted one workshop proposal for ADORE 2021 as part of LAK2021 (accepted)
  - We organized 6 design workshops with stakeholders of UT organized in 2 rounds:
    - 1 round (5 workshops) carried out from January to February 2020. Aim: requirement analysis for the development of metrics and feedback mechanisms supported by a Learning Analytics Dashboard. (WP1)
    - 2 round (2 workshops) carried out in October - refining findings of round 1.
- **Data collection, and analysis, Results**
  - Data analysis for 1st round of workshops (April-May)
  - Design of a dynamic web-based dashboard to support the provision of feedback as a standalone component for UT (June-August)
  - Design of personalized feedback interventions based on collected data and theoretical frameworks (September - November)[Ph.D. student Paraskevi Topali was involved in this part working on pedagogical reasoning and scaling solutions]
  - Evaluation of personalized feedback intervention using crowdsourcing (part 1) (November-December)
  - Designing, developing and training a student model for identifying students at risk using Machine Learning(September - December) [master student Hasan Mohammed Tanvir was involved in this step]
  - Systematic Literature Review on Providing Data-Driven Personalized Feedback at Scale (in progress)

- **Internships and external collaborations**
  - 3 summer internships (for master students)
  - 1 phD guest visit

Publication activities

- Research article "Exploring teachers' perceptions of Artificial Intelligence as a tool to support their practice in Estonian K-12 education". Submitted in iJAIED in June 2020, in press. Journal publication (1.1)

- Research article on "Causes and cures of student dropouts in Higher Educational Institutions: Institutional analytics agenda" (tentative title). (under submission). Journal publication (1.1)
- Research article with the tentative title "A Participatory Approach for Designing Data-Driven, Personalized Feedback" - in progress. Journal publication (1.1)
- Systematic Literature Review on Providing Data-Driven Personalized Feedback at Scale (in progress - to be submitted) [phD student Paraskevi Topali was involved in this part]. Journal publication (1.1)
- Research article on "Exploring the evolution of impact factors on Higher Education Dropout Rates over a 10-year span using Machine Learning". To be submitted to Educational Data Mining Conference 2021 (master student Hasan Tanvir is involved in this work) (Conference Publication 3.1)

Dissemination activities

- Participation as an AIED expert in the Global Summit on the Ethics of AI in Education, organized by the Institute for Ethical AI in Education (November 2nd to 4th, 2020).
- Series of online articles on Emergency Remote Teaching as a response to the COVID-19 outbreak (published on colaps blog)
- Knowledge-base on data-driven LA (in the form of a wiki installation)