L2D 2021: First International Workshop on Enabling Data-Driven Decisions from Learning on the Web

Danilo Dessì
FIZ Karlsruhe & KIT
Karlsruhe, Germany
danilo.dessi@fiz-karlsruhe.de

Tanja Käser
École Polytechnique Fédérale de Lausanne (EPFL)
Lausanne, Switzerland
tanja.kaeser@epfl.ch

Mirko Marras
École Polytechnique Fédérale de Lausanne (EPFL)
Lausanne, Switzerland
mirko.marras@acm.org

Elvira Popescu
University of Craiova
Craiova, Romania
elvira.popescu@edu.ucv.ro

Harald Sack
FIZ Karlsruhe & KIT
Karlsruhe, Germany
harald.sack@fiz-karlsruhe.de

ABSTRACT

By offering courses and resources, learning platforms on the Web have been attracting lots of participants, and the interactions with these systems have generated a vast amount of learning-related data. Their collection, processing and analysis have promoted a significant growth of learning analytics and have opened up new opportunities for supporting and assessing educational experiences. To provide all the stakeholders involved in the educational process with a timely guidance, being able to understand student's behavior and enable models which provide data-driven decisions pertaining to the learning domain is a primary property of online platforms, aiming at maximizing learning outcomes. In this workshop, we focus on collecting new contributions in this emerging area and on providing a common ground for researchers and practitioners (Website: https://mirkomarras.github.io/l2d-wsdm2021/).

KEYWORDS

Data Mining; Education; Machine Learning; Behavioral Mining.

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1 MOTIVATION

Education is relying more and more on online learning [4]. Educational and training institutions are being motivated to endorse online learning strategies thanks to their technical, economic, and operational feasibility. On the other hand, learners and teachers are benefiting from the flexibility, accessibility, and costs of learning and teaching online. Nonetheless, moving education online is bringing unprecedented challenges, such as learners feeling isolation online, massive content alternatives overloading learners and teachers who look for resources, and institutions being challenged to ensure academic integrity during exams [1].

The increasing amount of learning-related data and high performance computing are enabling intelligent systems to support stakeholders while facing these challenges. Indeed, as the underlying Data Mining (DM) and Machine Learning (ML) research is getting more mature, the crucial role of these systems in education on the Web is becoming more evident [2, 3]. Current research has greatly expanded our understanding on such artificial intelligence, but data, methods, and tools applied to online education are still limited, though they promise to proliferate in next years.

Given the growing importance of these topics, the WSDM community is more and more eager to delve into this applicative domain and, as a consequence, can strongly benefit from a *dedicated event*. This workshop thus draws the attention of this community in designing, developing, and testing novel intelligent algorithms that exploit the vast amount of data generated online in educational environments, such as teaching materials, students exercises, online exams, student-teacher interaction data. L2D 2021 is the WSDM's workshop aimed at collecting high-quality, high-impact, original research on online education systems empowered with DM and ML. Specifically, this workshop aims to pursue the following objectives:

(1) Raise attention on education in the DM and ML community;
(2) Solicit contributions targeting DM and ML in education;
(3) Get insights on recent open issues and methods in this area;
(4) Familiarize the DM and ML community with education tools;
(5) Expose gaps between research and actual needs in this area.

2 TOPICS

This workshop aims to collect novel contributions targeting DM and ML in education on the Web, focusing on the following areas:

- Data Set Collection:
  - New tools and systems for capturing educational data (e.g., eye-tracking, motion, physiological, etc.).
  - Proposals of procedures and tools to store, share and preserve learning and teaching traces.

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  - Ontologies and annotation schemas for data that can be leveraged for DM and ML in education.
- Model, Tool, and System Design and Implementation:
  - Semantic content-based retrieval of educational materials to identify appropriate contents.
  - Tools for adaptive question-answering and dialogue or automatically generating test questions.
  - Personalized support tools and systems for communities of learners (e.g., recommendation).
  - Behavioral and physiological analysis of learners while interacting in online education platforms.
  - Systems that detect and/or adapt the platform to sentiment or emotional states of learners.
  - Tools able to predict the learner's success or failure along the educational path.
- Evaluation Protocol Design and Implementation:
  - Evaluation techniques, metrics, and protocols relying on computational analyses in online education contexts.
  - Interpretability and/or fairness of the models and the resulting impact on real-world adoption.
  - Strategies to evaluate effectiveness and impact of DM and ML systems on educational environments.
  - Exploration of cognition, affect, motivation, and attitudes of stakeholders, while deploying systems.
- Ethics and Privacy Investigation:
  - Analysis of issues and approaches to the lawful and ethical use of intelligent DM and ML systems.
  - Tackling unintended bias and value judgements in DM and ML intelligent systems.
  - Regulations and policies in data management ensuring privacy while designing intelligent DM and ML systems.
  - Broad discussion on potential and pitfalls of intelligent systems for educational contexts.

3 ORGANIZERS' BIOGRAPHY

Dr. Danilo Dessì is Postdoctoral/Senior Researcher at FIZ Karlsruhe – Leibniz Institute for Information Infrastructure and Karlsruhe Institute of Technology (KIT). He holds a Master's degree and a Doctoral degree from the University of Cagliari (Italy). He has been visiting researcher in international research centers such as Philips Research, Center for Data Science NYU, KMi – The Open University, and LIPN – University of Paris 13. He has served as PC member of ISWC, ESWC, and SAC international conferences, and several workshops. His current research focuses on Artificial Intelligence, Ontologies, Knowledge Graphs, and Scholarly Data.

Prof. Dr. Tanja Käser is Assistant Professor at the EPFL School of Computer and Communication Sciences (IC) and head of the D-VET laboratory. Her research lies at the intersection of machine learning, data mining, and education. She is particularly interested in creating accurate models of human behavior and learning. Her research activity brought her to publish papers in top-tier international conference proceedings (e.g., EDM, LAK, and ITS) and international journals (e.g., Springer IJAIED, IEEE TLT). Prior to joining EPFL, she was a Senior Data Scientist at ETH Zurich. Before that, she was Postdoctoral Researcher at the Graduate School of Education of Stanford University. She received her PhD degree from ETH Zurich. In her dissertation, she focused on user modeling and data mining in education, honored with the Fritz Kutter Award '15.

Dr. Mirko Marras is Postdoctoral Researcher at the Digital Vocational Education and Training - Machine Learning for Education Laboratory of EPFL (Switzerland). He received his PhD degree from University of Cagliari (Italy) in 2020. He has been visiting researcher at EURECAT (Spain, 2017-2018), University of Las Palmas (Spain, 2018), and New York University (USA, 2019). He has co-authored papers in top-tier international journals (e.g., Elsevier Computers in Human Behavior and IEEE Cloud Computing), and has given talks, demos, and tutorials at top-tier international conferences (e.g., ECIR 2019, INTERSPEECH 2019, and ICDM 2020). He has been part of the program committee of top international conferences in education and has served as a guest editor in two special issues.

Prof. Dr. Elvira Popescu is Full Professor at the Computers and Information Technology Department, University of Craiova, Romania. Her research interests include technology-enhanced learning, adaptation and personalization in educational systems, learner modeling, computer-supported collaborative learning, learning analytics, and intelligent and distributed computing. She has authored and co-authored over 100 publications, including two books, journal articles, book chapters, and conference papers. In addition, she has co-edited six journal special issues, as well as 16 international conference proceedings. She has participated in over 15 national and international research projects, three of which as a principal investigator. She is actively involved in the research community by participating in six journal editorial boards, organizing a series of international workshops in the area of social and personal computing for e-learning (SPeL 2008–2020), serving as a conference chair, program committee chair, and track chair for over 15 conferences.

Prof. Dr. Harald Sack is Full Professor of Information Service Engineering at FIZ Karlsruhe, Leibniz Institute for Information Infrastructure and Karlsruhe Institute of Technology (KIT). His current areas of research include Semantic Technologies, Knowledge Discovery, Machine and Deep Learning, as well as Multimedia Analysis & Retrieval. He has served as General Chair of many international conferences (SEMANTICS 2019, ESWC 2016, i-KNOW 2014-2016), as Program Chair (ESWC 2015, iSEMANTICS 2012-2014), and as Senior PC member or PC member of numerous international conferences and workshops. He is part of the Editorial Board of the Semantic Web – Interoperability, Usability, Applicability IOS journal, and has been editor of numerous special issues of internationally renown computer science journals. He is co-director of the International Semantic Web Research Summer School (ISWS) and author of popular massive open online courses at OpenHPI.

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