

Preface

Learning is the result of student's inner and outer actions with her own thoughts as well as his tutor, companions, and learning environment. In consequence, natural inquiries arise to consider the efficacy, efficiency, and the quality of the learning resources, processes, and outcomes, as well as other subtle issues such as learners' attitude, engagement, performance, behavior, attrition, cheating, and collaboration.

In addition, tutors' support, companions' influence and interaction, system scaffolding, content utility, interface friendship, and other items recreate a learning setting that bias learner's achievements. The evaluation of such factors claims specialized on-off-line data gathering procedures, huge databases, accurate models, reliable methods and techniques to examine information, powerful visualization tools, and qualified criteria to interpret knowledge and discover findings.

In this context, learning analytics (LA) arises as an emergent discipline that pursues improvement in teaching and learning by a critical evaluation of raw data and the generation of patterns that characterize learner habits, predict learner responses, and provide timely feedback. What is more, LA supports decision-making, tailors readable content, facilitates realistic assessments, and provides personal supervision of learner's progress. The goal is to scale the real-time exploitation of LA by learner, academics, and educational computer-based systems to enhance learners' accomplishments at course and individual tier.

This book shapes a glance of recent research, studies, and applications of LA in the field of education as a way to trace a conceptual and practical view of the LA field to recreate a state of the art and a vision of future trends to encourage forthcoming labor. Therefore, this book builds on recent activities in LA and presents works that report recent advances, carry out innovative explorations, and establish foundations for further research. According to the nature of the contributions accepted for this volume, the following four topics are presented in this book:

- *Reviews* highlight specific topics of interest that describe in detail a particular line of the LA arena, as well as sketch a broad landscape to define the nature, grounds, and applications of the emergent field.

- *Approaches* contribute with a particular paradigm and instrument to deal with specific issues concerned with the personalization of learning support and the exploitation of huge log data repositories.
- *Conceptual* introduces a particular topic (e.g., a priori knowledge), provides arguments to ground the concept, and explains how to apply it in LA settings with the purpose to enhance certain functionalities.
- *Applications* explains how to use and exploit LA perspectives, techniques, and approaches in order to achieve a given goal concerned to the analysis of assessment repositories and the scheduling on cloud servers.

This volume is the product of the research recently achieved by authors, who are engaged to promote their views, methodologies, results, and findings to the community of practitioners, pedagogues, psychologists, computer scientists, academics, and students interested in the emergent domain of LA!

As a result of the workflow that encompasses the submission of proposals and their respective evaluation, as well as the edition of the complete manuscript with the corresponding revision, tuning, and decision according to the Springer quality principles, nine works were approved, edited as chapters and organized according to the following sequence:

Chapter 1: Surveys LA works that apply some techniques to deal with particular issues in higher education settings. Moreover, the sample of works is organized into clusters according to the stakeholder traits to identify trends.

Chapter 2: By means of a review of related works, introduces teaching and learning analytics as a synergy between both teaching analytics and LA to transfer LA underlying elements to academics for improving teaching practice.

Chapter 3: Sketches a landscape of LA to define the nature, roots, and related domains of the field. Such scenery identifies related domains, learning paradigms, underlying elements and legal concerns, as well as approaches.

Chapter 4: Focuses on computer-based adaptive assessment and the way it can be optimized by means of LA approaches. The goal is to provide formative adaptive tests to learners by instructing the next actions to be fulfilled by user.

Chapter 5: Encourages the provision of personalized feedback and support to learners by means of a student relationship engagement system that follows a data-driven strategy that considers a holistic and human-centric view of data.

Chapter 6: Tackles the challenge of extracting meaningful information and discovering valuable knowledge from huge data sets collected from massive open online courses by using LA dashboards that facilitate the interpretations.

Chapter 7: Claims for addressing LA approaches according to theory-driven strategy that considers a priori knowledge. Thus, a two-level framework is proposed that defines LA as a meta-level process to guide five components.

Chapter 8: Aims at knowledge discovery in big data by the application of educational data mining and visualization tools. As result, clusters of students' profiles are organized and interpreted to measure the quality of education.

Chapter 9: Takes advantage of LA methods for inspiring the design of job scheduling on cloud servers. Such an approach defines that the cloud broker acts as a teacher, while local schedulers of cloud sites play as students.

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