

Advances in Game-Based Learning

Christian Sebastian Loh
Yanyan Sheng
Dirk Ifenthaler *Editors*

Serious Games Analytics

Methodologies for
Performance Measurement,
Assessment,
and Improvement

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Preface

In 2013, Springer published the edited volume on *Game Analytics: Maximizing the Value of Player Data* (Seif El-Nasr, Drachen, & Canossa, 2013). On the surface, it would appear that game analytics is applicable to serious games also. However, this is not true because the motivation for game analytics is monetization (hence, maximizing monetary value of data), but the purpose of *Serious Games Analytics* is to measure the performance of play-learners for assessment and improvement.

Serious games is an emerging field where the games are supposed to be using sound learning theories and instructional design principles to maximize learning and training success. But why should stakeholders believe serious games to be effective, if they have no reference as to what actions performed in the serious games constitute newly acquired skills, abilities, or knowledge? Are players simply having a fun time, really learning something (that may or may not relate to said skills/abilities), or gaming the system (i.e., finding loopholes to fake that they are making progress)?

The purpose of this edited volume is to collect in one place how gameplay data in serious games may be turned into valuable analytics (or actionable intelligence) for performance measurement, assessment, and improvement, using existing or emerging empirical research methodologies from various fields, including: computer science, software engineering, educational data mining, educational sciences, statistics, and information visualization.

Besides being the companion book to *Game Analytics: Maximizing the Value of Player Data*, this volume is also the first book in the *Advances in Game-Based Learning* (AGBL) series (Ifenthaler, Warren, & Eseryel; www.springer.com/series/13094)—both by Springer. Despite what some may feel to be a buzzword-loaded title, our intention in publishing *Serious Games Analytics* is three folds:

- (a) To identify with the growing serious games industry
- (b) To recognize the existing market need for actionable insights and analytics
- (c) To present, in one place, advanced research related to serious games and analytics from both academia and the industrial sectors

It should be clear that the book points to a clear and present need for serious games analytics, and that researchers and industry leaders are already taking active parts in working out the issues surrounding serious games analytics. A total of 67 authors put their thoughts and efforts behind these chapters, describing problems faced and solutions found, as well as highlighting issues currently discussed and debated within the serious games communities.

The 19 chapters in this book represent the first step in defining what serious games analytics are—at least, for this point in time, and what they can become in the near future. The chapters in this edited volume are divided into six parts:

- In *Part I, Foundations of Serious Games Analytics*: the two chapters review the history and the rise of serious games as training/learning and policy-forming tools, discuss the movement towards analytics, and differentiate among game analytics, learning analytics, and serious games analytics. A meta-analysis of serious games data collection methods reveals not only the trends but also the lack of standardized and better-validated methods for research in serious games analytics.
- In *Part II, Measurement of Data in Serious Games Analytics*: the four chapters examine the design issues of serious games. Instead of gameplay design, serious games are more concerned with the design of in situ interaction data collection (via telemetry or *Information Trails*), and the design of analysis to yield actionable insights. The many areas of discussion include the recommendation for in situ data collection, the types and quality of interaction data (log files, online database, psychophysiological data), and innovative methodologies (e.g., data mining, statistical/machine learning, similarity measures, pattern recognitions) to obtain analytics and insights for performance improvement.
- In *Part III, Visualizations of Data for Serious Games Analytics*: the two chapters discuss the importance of data visualizations and their applications in serious games analytics. More than just pretty graphics, visualization of information should become a pertinent feature in serious games because it helps communicate to stakeholders the analytics and insights obtained from the in situ user-generated interaction data.
- In *Part IV, Serious Games Analytics for Medical Learning*: market forecast informs us that the next wave of serious games applications would be in the fields of medical learning and mobile applications. The three chapters in this section examine the applications of serious games for medical use—e.g., medical education, rehabilitation, and patient care. Serious games researchers would do well to take note of this upcoming, but largely unexplored area of research.
- In *Part V, Serious Games Analytics for Learning and Education*: the four chapters in this section reflect the current trends of “assessment” in educative serious games. Although the Evidence-Centered Design (ECD) framework has its origin in the measurement and testing industry, it has since been applied to stealth assessment for game-based learning, psychometric testing, and serious game design.
- In *Part VI, Serious Games Analytics Design Showcases*: we have included several showcases of serious games research projects with innovative designs

and/or interesting applications. They include: psychological profiles generation, replay analysis in game design, startle reflex in affective computing, and gameplay assessment through pattern matching.

We hope the chapters included in this volume will serve as launch pads or blueprints for future research and development projects and provide the serious games industry with the empirical evidence it has been seeking. Serious games publishers, developers, researchers, and consumers need to come together to dialog and create the foundation for *serious games analytics* research for future collaboration and to further advance the field.

Without the assistance of experts—in the field of serious games and game-based learning (two related, but different, groups), and their contributions in writing the chapters, this book project would not exist, at all. We must also thank the series editor of AGBL and Springer for believing in this book project. Last but not least, we would like to thank all the reviewers for their tremendous help in providing constructive and editorial comments for the chapters. We would like to extend a big handshake (virtually) and “Thank You” to all of those who have made this book journey a pleasant one. Kudos to all and we now know who to contact for our next book project!

Sebastian would like to thank his family for the mental supports. Working with Springer (and Dirk) on this first edited book project has been a true blessing because they have made the process a breeze. He would like to thank Yanyan for the many lunch meetings and discussions sessions about the book chapters. In addition, he would like to extend special appreciations to Dirk for being a friend when he came calling in 2010 and for providing him and his wife with fond memories of the Black Forest.

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