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Visualizing Game Data

Collaborative Dashboard Design for Researchers and Teachers by Researchers and Teachers

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Abstract

Digital games have become one of the more popular learning mediums, both in and out of the classroom (Prensky, 2003). While they provide engaging and diverse learning experiences, it is still unclear how to properly assess student learning in these massively complex environments. Furthermore, the integration of these programs into existing teacher curricula requires a large amount of resources and development centered on how to provide concise professional development materials and meaningful data visualizations for the increasingly busy K-12 teachers (Work, M.D.). The ADAGE system aims to collect real-time telemetry data from games and present it to teachers and researchers in a way that can provide quick assessment of student learning (Stenerson et al, 2014). In this workshop, attendees will interact with three different educational games and asked to collaboratively design a mockup of an interface that they would use to assess learning in their professional lives.

Introduction

With research supporting the benefits of games in education (Squire, 2005), more and more educational game are being designed both by well-known academic institutions and commercial game companies (e.g. Games+Learning+Society Center, UW Madison, Schell Games, GlassLab, Kidaptive). Games have the potential to report hundreds of thousands of data points, these educational games are not only great opportunities for learning but also for innovations in learning assessment. However, while it is great to have all of this information, it is hard enough to make sense of all of these data points from a research perspective, let alone from the point of view of a teacher who might not have any direct knowledge of how the game was developed nor the time to look into it.

To solve this problem, novel ways of not only analyzing game data but also representing it to researchers and teachers need to be created. There are two main challenges: representing data in a quick and meaningful way on a single interface, and being able to apply that interface to a wide variety of game types and platforms.

The Assessment Data Aggregator for Game Environments (ADAGE) system being developed at the Games + Learning + Society Center is an open-source system for data analysis and visualization for educational games. This workshop aims to involve the audience, many of whom are end-users, early in the development process by leveraging their collected experiences in teaching and games research

to create early interface designs of ADAGE data outputs. By collecting this information directly from the primary users and future users of ADAGE, the organizers of this workshop hope that a singular user experience can be created that could leverage data from an ADAGE-enabled game to create quick references and visualizations regarding the state of student/player learning.

Introduce the Topic

The workshop organizers will explain how students, both during their formal and informal learning, use games as learning medium and how researchers and teachers fail to understand students' learning processes in these rich environments because of a lack of well-designed and scalable analytics tools. The organizers will show some example work from similar studies and projects in order to introduce the audience to the goal of the workshop: to create designs for an interface that will meet the needs of teachers and researchers using games as learning implements. There will also be a quick overview of how to think about software development use cases so that participants can start to think and talk like developers.

Hands-On Activity

The organizers will split the participants into three groups and will give each group a game to play for approximately 10 minutes. After they play their assigned game, each group will collectively design the user interface for a dashboard where they could visualize the data points they would personally expect or want to see and also design how they would want to interact with those points in an manner that is consistent with their role in the learning games community. Then, staying in their groups, they will be assigned a different game to repeat the play/design process from a different game genre and perspective. While they are encouraged to think about their initial designs during this time, they will be expected to create a completely separate artifact in an effort to qualify changes in their thinking between games during post-conference analyses.

Discussion

The workshop will conclude with a short overview of the different designs that each group created. Audience feedback on each design will be welcomed so that the organizers can take notes on the features that the audience found helpful and, conversely, the features that the audience felt didn't apply to their domain or the features that would be too confusing or time consuming. Also, in an effort to extend the iterative testing and design processes touched on in this workshop, the organizers will allow interested participants to sign up for future user-testing regarding the design and implementation of the ADAGE system.

Conclusion

Although there are tools for data analysis and visualization, many can be overly technical for teachers and researchers. Therefore, data cleaning and analyzing can take a long time before the even more challenging task of starting to interpret the data can begin. ADAGE aims to remove as much of the busy-work from educational data analysis as possible so that users of the system can focus on the interpretation and action needed in response to said data. In essence, we foresee that systems and tools

like ADAGE will help to eliminate many of the biggest technical hurdles for teachers and researchers studying games with big data thus enabling them to focus on what is most important: delivering positive learning experiences for student players.

Acknowledgments

References

Prensky, M. (2003). Digital game-based learning. *Computers in Entertainment (CIE), 1*(1), 21-21.

Squire, K. (2005). Changing the game: What happens when video games enter the classroom. *Innovate: Journal of online education, 1*(6).

Stenerson, M. E., Salmon, A., Berland, M., & Squire, K. (2014, October). Adage: an open API for data collection in educational games. In *Proceedings of the first ACM SIGCHI Annual symposium on Computer-human interaction in play* (pp. 437-438). ACM.

Work, M. D. Teachers Know Best.