

# Understanding Student's Learning using Keyword Discovery and Sentiment Analysis in Serious Game

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## Abstract

Serious games have been widely adopted as an alternative medium for teaching. The results of serious games (i.e. game scores) might be used to determine the effectiveness of using serious games as a teaching medium. However, understanding the learning process of students is difficult because the results of the game alone may not be able to represent the student's learning. The inputs or feedback from students during the game sessions may be limited, especially if the game is used as a formative assessment and not regarded. Additionally, for existing serious games in the industry, students' inputs are mainly used to improve the quality of gameplay instead of understanding students' learning process.

In this work, we focus on gathering and analyzing the feedback from students to understand their learning processes while playing a serious game. Apart from the results achieved in game, we want to find out how they feel towards the game and their difficulties faced while playing the game. Students will be able to give their feedback based on their experience through the serious game.

We incorporate a feedback gathering mechanism inside a serious game for one IT subject developed by Temasek Polytechnic. We then analyze the feedback using keyword discovery and sentiment analysis techniques. The analysis is used to support the lecturers to understand general opinions that the students have in learning the topics using the serious game. It is also used to understand the opinions that students have towards using serious games as a learning medium.

The first technique used is keyword discovery. Keyword discovery is an analytic technique used in text analytics. It is used to find keywords that were commonly mentioned in the feedback. These keywords can help the lecturers to understand the feedback by grouping them together and showing it through a word cloud. A word cloud is a visual representation for word frequencies. The size of the words shown on the word cloud is directly proportional to the frequency.

The second technique used is sentiment analysis. Sentiment analysis is an analytics technique that has been widely used to study opinions, sentiments and emotions expressed in texts. It can be used to identify positive or negative opinions based on a set of positive and negative lexicon. The sentiment analytics technique is applied to the students' feedback. The sentiments (i.e. positive and negative sentiments) are then visualized using graphical tools to provide lecturers with a summary of the sentiments. Using this information, the lecturers can determine whether the students require additional help based on their emotions and the feedback they provided.

The results from keyword discovery and sentiment analysis are visualized in a dashboard for lecturers. The dashboard also includes the information about the student's game scores. This dashboard would provide them with meaningful insights so that they can gauge the effectiveness of implementing a serious game as an alternative teaching medium. It also allows the lecturers to determine the next steps or interventions to assist with the student's learning.

## Keywords

Serious game, data analytics, keyword discovery, sentiment analytics, feedback

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