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EDGE: A Simulation Game to Change How We Teach and Learn Analytics

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EDGE: A Simulation Game to Change How We Teach and Learn Analytics

Prototype Demonstration

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Abstract

In this document we describe and showcase EDGE (Educational Data Game Experience), a simulation game developed in the field of analytics. EDGE is designed to help participants apply and consolidate different data analytics concepts in a realistic setting. It places participants in a scenario where they will be working on a fundraising campaign for a charitable foundation with a million members. Students will have to decide which members to target for a possible donation. The simulation game provides pedagogical flexibility so that it could be used in classes of different levels (e.g., UG, MBA) and with students with varying levels of statistical knowledge and competency.

Keywords

Simulation Game, Analytics, EDGE (Educational Data Game Experience).

Introduction

While serious games are becoming widespread tools for learning and teaching various business and management concepts (Legner et al., 2013), developing and accessing realistic, engaging, and dynamic games remains a challenge for many schools and academic departments (Léger et al., 2014). While management fields such as business process management, project management and supply chain have been the main topics for game development and use for the past decades (e.g., ERPsim, Albasim, Beer game), more recent fields are yet to benefit the same level of focus. One such field is business analytics.

Serious games in analytics could either include add-ons to existing games such as built-in analytical tools in ERPsim (Labonte-LeMoyne et al., 2017) or new games specific to analytics (our approach in this study).

This article presents EDGE (Educational Data Game Experience), a simulation game developed in the field of analytics that could be used across different levels (e.g., Undergraduate, Masters, MBA) with participants with varying levels of statistical knowledge and competency. The simulation game is designed to help participants apply and consolidate different data analytics concepts in a realistic setting. It also helps them develop skills by gaining hands-on experience with tools commonly used in the industry (standardized statistical software package).

We have tested the use of this simulation game in a North American business school and obtained the following main outcomes: i) students' engagement due to the dynamism and competitive nature of the game, ii) interaction among students, iii) desire to know more and to explore different options to perform better in the game.

EDGE

EDGE places participants in a scenario where they will be working on a fundraising campaign for a charitable foundation, which is a 12-year old, not-for-profit organization with a million members. The foundation has decided to add a direct contact campaign to its list of marketing activities. Participants will be using a standardized statistical software package to predict how many and which individuals to target in the campaign. The objective is to fundraise the highest donation amount while managing the expenses of contacting donors.

Participants will be provided with the dataset of potential donors, which they will use to create a model that scores donors. The list of scored donors will be exported to an Excel file. Participants will have to decide how many potential donors to target and will have to create a list of IDs of those potential donors. Participants will have to upload the created list to the game platform which will score and rank the submissions based on operating surplus – i.e., sum of donations minus the total cost of calling. The results will be displayed in a leaderboard, part of which is shown in Figure 1. The instructor will be able to use the results in a discussion in subsequent classes about which models worked best and what tradeoffs were made when conducting the analysis.

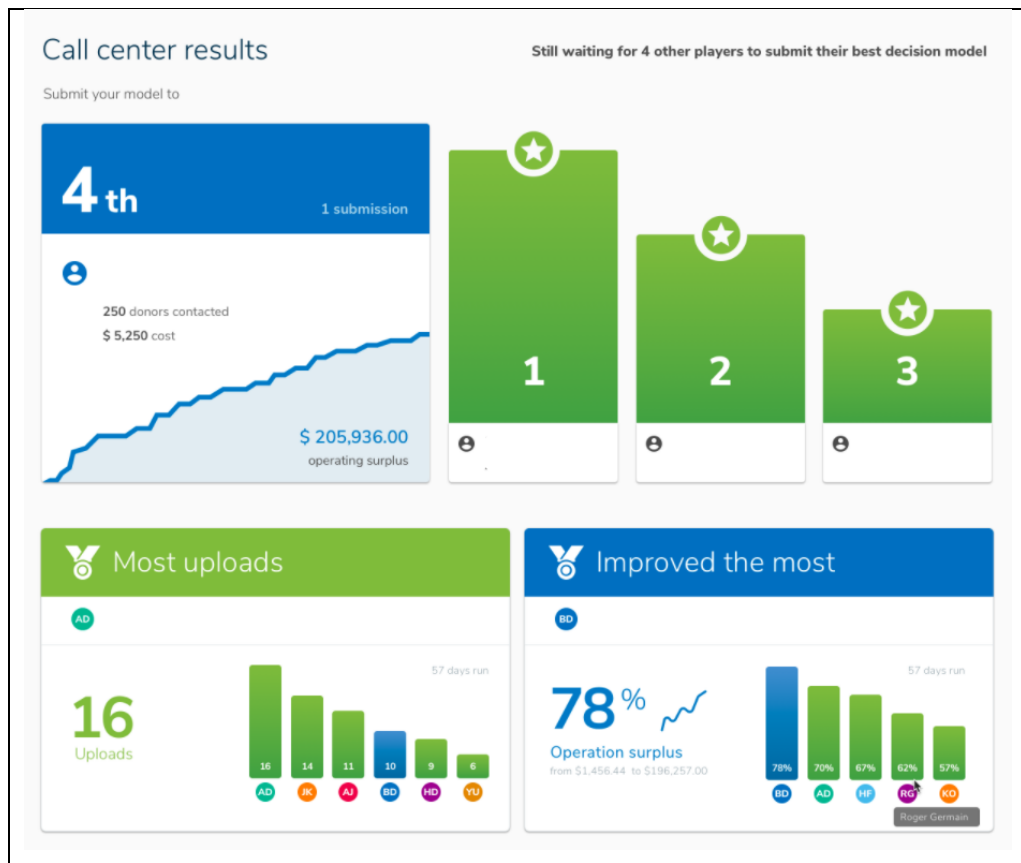


Figure 1. EDGE Interface

The game's scenario allows for pedagogical flexibility so that instructors could adjust the game's level of difficulty according to the specific needs/competency of their students. For example, for MBA students with limited statistical training, the instructor might decide to choose the easy version of the game, in which participants are provided with pre-built models and are only required to explore models and change the parameters of those models. On the other hand, for participants with higher levels of statistical competencies, such as master students in data science, the instructor could decide to choose a more difficult version of the game – example: providing only the dataset with no further instructions. Moreover, the game could be played in a one-off session or across multiple sessions during an academic term.

Depending on the statistical package used, there are several models available to the students to use during their analysis such as regression, decision trees, random forests, neural networks, and gradient boosting. Depending on the course's length, learning objectives, as well as students' competency in statistics, instructors could decide on the number of models to introduce or the depth of the training provided for each model.

Conclusion and next steps

The purpose of the simulation is to allow participants to understand and apply key concepts of data analytics. The game reinforces theoretical concepts (e.g., overfitting, fair assessment of models) by giving participants the opportunity to apply their knowledge in a practical scenario of testing, validating and refining techniques to solve a realistic business problem. In doing so, the simulation evaluates the effectiveness of data modelling decisions made by the participants comparing to other participants in the class.

The simulation engine allows the participants and instructors to immediately observe the outcome that would otherwise have taken weeks to realize. This immediate feedback feature facilitates participants learning. It also enhances instructors' ability to coach their participants.

The game is being further improved to provide additional feedback elements both for students while they are playing the game and for instructors to use during discussion and debriefings. Pedagogical material including participants guide, teaching notes and instructional videos are under preparation.

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