Introduction to Games and Simulations

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***Abstract*—This paper will provide a high-level overview of Video Game Design and it overlaps with Game Theory and Decision Theory.**

***Index Terms*—Video Games, Simulations, Game Design, Game Theory**

I. Introduction

In many cases, Game Theory is the study of strategy and decision making in competitive scenarios, with the goal of mathematically modeling the decision making processes to determine opportune moves. In this way, Game Theory can be though of as "the science of strategy" [1]. Traditionally, the analyzed models are zero-sum competitions, where various choices are available that will lead to possible win/loss/draw scenarios for each player [2]. Using this decision tree analysis, modeling can be developed to demonstrate likeliness of winning a competitive scenario, and how each decision affects that probability. In the context of video games, there are some games that this could directly be applied to; for example, competitive Pokemon battle competitions draw steep competition across the world and meet most of the classic game theory requirements. The concepts of game theory in the context of Video Games are more broad.

When looking at Game theory in the context of Video Games there is a broad overlap of subject matter, like defining rules and agent decision trees, or looking at strategies for competition (with changes for more than two players, non-zero-sum rules, etc.). Additionally, Decision Theory applies to both traditional Game Theory and its application to Video Games. Decision Theory evaluates the set of prospects (available options) and analyzes preferences among those options for an agent in the scenario [3]. For Game Theory, we can then evaluate which selections are more opportune in a competitive scenario, or consider how Players may interact with the set of rules within the Video Game being developed.

Theory for Video Games expands on these concepts. In addition to the application of strategy and decision making, Video Games must be appealing to Players as the goal is to draw engagement from the users, using appealing visuals and creating games systems that are enjoyable and challenging to the Player. Categorizing by genre allows for users to assess and consider games based on similarity between similarity in rules, subject matter, and even difficulty so that Players can learn from experiences and apply these lessons to improving in skills required for certain games. For example, aim and reaction time may be critical to games in the First-Person Shooter genre, while Puzzle games may require critical or non-linear thinking to come up with solutions in the context of that game's world.

Practical approaches to games involve the actual programming and creation of games, like adding code to generate game mechanics for the Player or Agent to interact with. Additional practical approaches include visuals for the game, and creation of characters, models, and environments for the game. To have a complete game, it is important to consider games in both theoretical and practical ways; to fully immerse the player, the world has to be engaging and entertaining, but it is important to have challenges for the player to overcome to create additional satisfaction. Applying Game Theory allows designers to analyze mechanics for balance, making sure that challenges are appropriate for the current player skill level, or that all options for things such as in-game loadout have appropriate positives and negatives to encourage players to engage in different but viable strategies for success in games.

References

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