

**A Machine learning approach to matchmaking for
online class-based first person shooters.**

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Problem Statement for Honors Research idea.

1.Introduction

1.1 Background

With the rise of the video gaming industry in modern times as shown by the staggering US\$365.60bn revenue forecast expected in the year 2023, it has continued to be an important goal for developers in the industry to improve their products. One of the ways in which these developers attempt to improve their products would be through the specific processes used to bring players together to compete against one another.

The phrase that would be used for this task would be called “matchmaking”. The general goal of matchmaking systems in any specific game would be to place players looking to play the game into teams in such a way that both teams have an equal chance of victory. This then in turn improves the game experience as this has the possible effect of improving player engagement in said game since matches should be more equal and enjoyable for all of the users.

1.2 Related Works

1.2.1 ELO

There have been a few developed ideas for matchmaking systems, looking through these we can begin to identify where current solutions thrive and fall short. One of the most common approaches has been to make use of the ELO system. With the ELO system, players are designated a rating and will lose more or less of their rating points depending on the opponent they lose or win against. It is then the job of the matchmaking system to match together players with similar rating points onto teams to create an equal match.

1.2.2 Machine learning approaches

There have been various studies with regards to matchmaking systems in many different genres. In the work done by Munnich (2015), various predictive models were trained on data retrieved from Battlefield 4 gameplay, the best models were then integrated into a matchmaking system. This system that was created did use data retrieved from completed Battlefield 4 games but seemed to lack in the sophistication of the features that were created and amount of retrieved data.

Another interesting approach taken by Wang et al. (2020) was to predict match outcomes based on the experience players had with their respective classes chosen alone in the game League Of Legends. Obtaining an accuracy of 75.1%, it was definitely shown that such a feature is an important predictor of match outcome. In the context of a matchmaking system however, such an approach might not be possible as classes are traditionally chosen by the players after the algorithm has put the players into teams.

1.3 Problem Statement

A common problem that is found with these matchmaking systems is that the teams picked are not always fairly distributed skill-wise. The main reason being that games are becoming more and more complex as the developers continue to add new features to their games. As this has been done, games have become vastly different from each other which makes it hard for any one system to fit every game let alone accurately define skill in any of them when so many factors are at play. This can then affect the experience of the gamers playing said game as the game has a high likelihood to be very one sided and boring. It is then apparent that better matchmaking systems would be beneficial to the experience of the gamers playing the game. It is then the idea of this research to use a machine learning approach focusing on a more specific genre of the gaming industry in an attempt to catch more of these complexities. As a result, we will be using the Class-based First Person Shooter game Team Fortress 2, extract data from many matches played in this game and finally create an algorithm that shall determine how equal games are before they are played.

2 References

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