Enhancing Esports Strategy: Predicting League of Legends Winners with Neural Networks and GRU

Abstract

This bachelor's thesis aims to advance esports strategy by building predictive models to forecast winning teams in League of Legends. Utilizing neural networks and Gated Recurrent Units (GRUs), this project focuses on analyzing pre-game data and crucial early-game information from the initial 15 minutes of play. The research holds immense potential to revolutionize the esports landscape, offering actionable insights to players, teams, and enthusiasts.

1 Introduction

League of Legends (LoL), a leading online multiplayer battle arena game, demands strategic gameplay and teamwork. The ability to predict match outcomes in LoL is a game-changer for players, teams, analysts, and fans. This thesis proposes the use of advanced machine learning techniques, specifically neural networks and GRUs, to harness pre-game insights and early-game dynamics, enabling accurate predictions of the winning team.

2 Objectives

The primary objectives of this thesis are as follows:

- Develop predictive models to forecast the winning team in League of Legends using neural networks and GRUs.
- Leverage pre-game data and critical early-game temporal data to enhance prediction accuracy.
- Compare and evaluate the performance of neural network and GRU models, emphasizing the impact of time series data on predictions.

3 Relevance

Understanding and predicting the outcome of a League of Legends match is not just a game; it's a strategic asset in the esports industry. Accurate predictions empower players and teams to adapt their strategies dynamically during the game, ensuring a competitive edge. Additionally, these predictions enrich the experience for analysts, spectators, and esports organizations, amplifying engagement and professionalism in the rapidly evolving esports landscape.

4 Methodology

4.1 Data Collection

- Gather comprehensive pre-game data encompassing team compositions, player statistics, and recent performance history.
- Capture real-time temporal in-game data for the initial 15 minutes, including gold differentials, kill scores, and objective captures.

4.2 Preprocessing

- Implement meticulous data cleaning and preprocessing to ensure high-quality input for the models.
- Normalize and transform the data to make it suitable for input into the neural network and GRU models.

4.3 Neural Network Model

- Design an intricate neural network architecture tailored to process pre-game data and optimize prediction accuracy.
- Train the neural network model using historical match data to predict the winning team with precision.

4.4 Gated Recurrent Unit (GRU) Model

- Develop a robust GRU-based architecture to analyze the dynamic temporal in-game data from the initial 15 minutes.
- Train the GRU model using the temporal data to predict match outcomes accurately.

4.5 Evaluation

- Compare the predictions of the neural network and GRU models to evaluate their performance, emphasizing the impact of time series data.
- Utilize appropriate metrics such as accuracy, precision, recall, and F1 score to assess and compare the models.

5 Expected Results

This research anticipates the creation of cutting-edge predictive models that reliably determine the winning teams in League of Legends matches. By synergizing pre-game and early-game data, this project is projected to surpass existing prediction methodologies, enhancing strategic gameplay and fostering a new era of competitive excellence in esports.

6 Conclusion

The proposed thesis is not merely a theoretical endeavor; it is a call to revolutionize esports strategy. By comparing neural networks and GRUs to process pre-game and critical early-game data, this study aims to redefine the possibilities in esports analytics. The resulting comparative analysis promises a transformative impact, offering actionable insights that can reshape how players, teams, and enthusiasts approach and perceive the captivating world of esports.