

Submitted in part fulfilment of the requirements for the degree
of
Master of Science in Business Analytics

League of Legends Victory Prediction Analysis

By

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Faculty of Arts and Social Sciences
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Executive Summary

(1000 words; 10% of marks)

Set out on its own immediately after the title page. This often takes the form of a series of summary statements, ordered under similar headings to those used within the Dissertation. These summarise the key information or findings. The Executive summary should be written for an intelligent layman. An example of an Executive summary can be found in SurreyLearn.

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Declaration of Originality

*I hereby declare that this thesis has been composed by myself and has not been presented or accepted in any previous application for a degree. The work, of which this is a record, has been carried out by myself unless otherwise stated and where the work is mine, it reflects personal views and values. All quotations have been distinguished by quotation marks and all sources of information have been acknowledged by means of references including those of the Internet. **I agree that the University has the right to submit my work to the plagiarism detection sources for originality checks.***

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Acronyms

MOBA Multiplayer Online Battle Arena

Glossary

| | |
|--------------------|--|
| baron | A neutral monster that spawns after the 20-minute mark that will give a powerful buff when slain. 3 |
| champion | A unique player-controlled character possessing a distinct set of abilities and attributes. 3, 4 |
| dragon | A neutral monster that spawns every 5 minutes that will give a moderate team-wide buff when slain. 3 |
| jungle | A section of the map where neutral monsters spawn that can be slain for gold, experience and buffs. 3 |
| meta | The most effective strategy for winning. 2 |
| minion | A unit that periodically spawns from the Nexus, advances along a lane towards the enemy Nexus and engages with any enemy they encounter. 3 |
| nexus | A structure that serves as the primary objective of the game. When the enemy Nexus is destroyed, victory is achieved. 3 |
| patch | A version of the game with a set of changes made to the game to update, improve or balance. 4 |
| rift herald | A neutral monster that spawns between the 8 and 20-minute mark that can be used as a powerful tower sieging tool when slain. 3 |

| | |
|--------------|---|
| tower | A structure that deals damage to enemies that come into its radius and must be destroyed in order to reach the Nexus. 3 |
| ward | A deployable unit that grants vision of the surrounding area for a duration, they are typically used to gain valuable information on the enemy. 3 |

Chapter 1

Introduction

1.1 Context

Esports is a form of competition using video games where participants will compete either individually or in a team for a chance at victory. These competitions attract millions of viewers, with estimates of 532 million spectators by the end of 2022, and this value is expected to grow annually at a value of roughly 8.7% (Newzoo 2022). The rapid growth in Esports has led to the industry becoming professional, with hundreds of players contracted on full-time contracts competing for prize pools of up to \$40 million (Esports Earnings n.d.). According to Newzoo (2022) this viewership will help the industry generate over \$1.38 billion in revenue by the end of 2022. As the Esports industry continues to grow, so does the importance on teams to win and remain relevant in the industry.

In traditional sports, analytics has become an extremely popular field with teams investing heavily in some form of analytics. These analytics can be used from evaluating opposing teams, to individual player forecasting and even used to decide signings or team selection (Sarlis & Tjortjis 2020, Apostolou & Tjortjis 2019). Apostolou & Tjortjis (2019), Sarlis & Tjortjis (2020) shows that these analytics can be applied for each athlete, giving an accurate estimation of key metrics such as goals scored per season or the number

of shots attempted in a given match. This same methodology could be applied to Esports, using these machine learning techniques could highlight specific factors both pre-game and in-game, helping analysts and coaches refine strategies within the game.

The ease of data collection coming from each match has led to a rise in Esports analytics. In-depth analysis of matches, teams and pre-game factors become key techniques for teams to gain this advantage over their competitors, with teams being required by their leagues to have at least one dedicated coach and analyst similar to traditional sports teams (LoLEsports 2022). These coaches and analysts use predictive analytics to maximise their team's likelihood of winning by altering numerous features related to pre-game and in-game strategies, current meta analysis and common patterns of their competition (Kokkinakis et al. 2021). However, this analysis is often completed manually by watching key highlights of matches using the analyst's intuition and using rudimentary analysis of in-game factors.

If matches can be accurately predicted using machine learning techniques, then analysts can provide new opportunities to optimise player strategies and can lead their teams to better outcomes. Applying the same findings found in Gray & Wert-Gray (2012), it can be seen that the overall performance and fan satisfaction with a sports team's performance has a measurable impact on revenue via fan attendance and their media response. Esports fans also appear to increasingly demand skillful performances especially from players that are deemed as '*superstars*', with these players being more likely to attract new viewers, thus increasing the economic gain of the market (Mangeloja 2019, Ward & Harmon 2019). It would then be in the interest of both teams and individual players to maximise their abilities and career longevity using these advanced analytics, so they can fully realise their potential; especially when the volatility of a players job security results in only the top 10% of players having lasting, stable careers (Ward & Harmon 2019).

1.2 League of Legends

1.2.1 General Information

League of Legends is a Multiplayer Online Battle Arena (MOBA) game developed by Riot Games released in 2009, it is one of most popular esports games in the world with over 180 million monthly players and a peak of 73.8 million concurrent viewers (Riot Games 2021, McLaughlin 2021). A MOBA is fusion genre of real-time strategy, role-playing and action games in which two sets of teams will compete in a known arena. The objective of each game is to defeat the opposition by destroying the enemy's base.

Each player will select and control a unique champion with their own set of distinct abilities, this champion will be selected before the game starts and cannot be changed until the game has ended - this will be covered further in Section 1.2.2. Players can strengthen their champions by gaining experience and gold, this can be done by slaying enemy minions, jungle monsters, enemy structures or enemy champions. This gold can be spent in the shop allowing players to purchase items that enhance the attributes of their champion, as well as various utility items such as wards.

A map of League of Legends can be seen in Figure 1.1. There are three lanes, Top, Middle and Bottom, with the jungle filling the space between these lanes. Typically, a player will be assigned to each of these lanes including the jungle, the exception being two players assigned to the bottom lane. Each coloured dot represents a tower that must be taken in order to reach the enemy Nexus. A river separates the territories between the Blue (Team 1) and the Red team (Team 2) along the dotted black line seen in Figure 1.1. In this river you can find Baron or Rift herald in top-side and the Dragon in the bottom-side, they are key objectives that will often be contested.

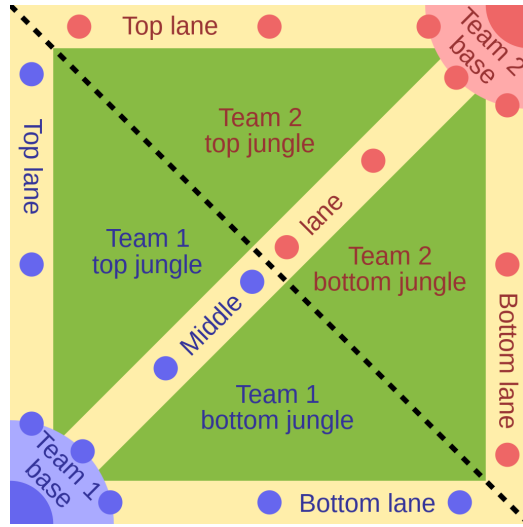


Figure 1.1: Map of League of Legends

1.2.2 Champion Selection

Champion Selection plays an important part in every game of League of Legends. Certain champions have inherent synergies with one another, meaning they are beneficial to be picked with each other. Likewise, some champions are considered counter matchups when they are good at stopping another champion. This means that picking a good mixture of champions that are solid synergistically, whilst also ensuring the opponents champions do not counter yours is vital. These ideas are the fundamentals of champion selection, and they are what professional coaches and analysts attempt to solve each week. Factors such as player champion experience, the current game balance patch or a champion's ability to be flexible across different lanes will change champion select from game to game.

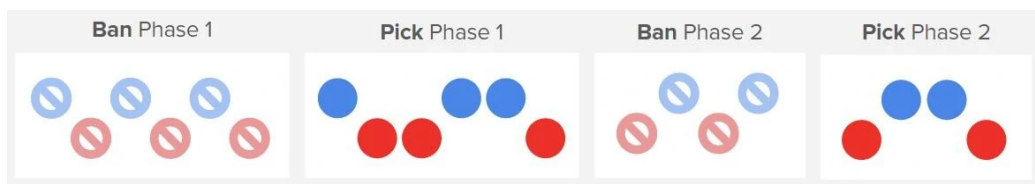


Figure 1.2: Champion Select

As seen in Figure 1.2, the current draft phase works as follows: Ban Phase 1 begins starting with the Blue team, in turn each team bans three champions from the pool. After Ban Phase 1, Pick Phase 1 begins starting with a singular pick from the Blue side, followed by two picks from the Red side. Blue side will get two more picks, followed by a singular pick from Red side for three picks each. It will then enter Ban Phase 2. Here both teams will ban two more champions in turn, with Red side starting. After both teams have banned two more champions, the final Pick Phase will begin. Here Red side get their fourth champion pick, followed by two picks from Blue side and finally Red side pick their final champion.

1.3 Structure, Aims, and Objectives

The following section explores an overview of this dissertation:

The next chapter, Chapter 2, discusses the role of...

Chapter 3 follows the techniques and tools used for predicting the effect of pre-game choices on the outcome of the match. Beginning with...

Chapter 4 then proceeds with a discussion of the work carried out and presents the outputs of the model created. An evaluation of...

Finally, chapter 5 will conclude the dissertation giving an overall summary of the work completed, as well as any further opportunities for research.

Having pre-established the landscape of Esports and its relationship with analytics, it is clear that refinement in the way that this industry uses its highly available data is needed. Many academics have predicted the outcomes of matches in Esports titles such as Silva et al. (2018). However, performing these studies, few academics addressed the implications of the champion select phase on the overall outcome on a given League of Legends match. Often it is put into the model as a singular feature defined as champion or ban, without giving much implication on how an individual champion effects a game more than another. In contrast to other studies, this study uses a much larger, updated dataset and will concentrate much more on the overall effects of the pre-game choices that a team will make inside champion

select. This includes the effects of each individual champion on the likelihood of winning a match. Therefore, the research question that will be addressed is as follows:

*Can the outcome of a League of Legends match be predicted during
Champion Selection?*

Chapter 2

Literature Review

3000 words

This section gives an overview of the context and background to the research problem. It builds on your problem definition and aims and objectives and so is an expansion of the concise arguments you make there. It is probably the section that will give you most scope to show off the wide range of sources you have consulted. Although based on existing literature, you should still present your material critically.

1)Reiterate your research objectives in the beginning and outline how the LR will help to answer those

2)Draw on theories/concepts/data and critically evaluate the information in the light of the research objectives

3)Deduce hypotheses from the information/formulate research questions

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Chapter 3

Methodology

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This section evaluates and justifies the research methodology that will be used to obtain the data to answer the research questions. It states the research problem, discusses the operationalization of hypotheses (where relevant), discusses the research instrument used, the method of collecting the data – including sampling, the analysis of the data and the validity and reliability of data. It should contain enough detail to allow someone else to repeat your study.

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Chapter 4

Results

3000 words

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Chapter 5

Conclusion

1500 words

It can be hard to know which section to discuss your results – this or the preceding one – and you may decide to combine these two sections into one or more chapters based on theme, depending on your topic and your supervisor’s views. However, what is vital is that your Dissertation contains sufficient analytical discussion in addition to the more descriptive ‘scene setting’ material of the literature review sections, and presentation of results. It is here that you will compare and contrast your findings with those already reported in the literature.

Here you need to answer the “So what?” question. What significance do your research findings have? For whom? Why? and How? In this chapter you link the research problem with literature review and findings, stating what you can conclude based on the work conducted. Based on your conclusions you should comment on managerial implications, the limitations of the research, suggest further work and better ways to resolve the problem.

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