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##### Report Layout and Style

A template will be provided on Moodle to support your work. However, the following guidelines

**must** be adhered to:

* All **text will be black** in the report unless in very exceptional circumstance.
* Main body text must be at least **11pt font** using either **Arial or Calibri** font.
* Main body text will have **1.5 line spacing**.
* **Margins** will be a minimum of **2 cm on each side**.
* All **pages** will be **numbered consecutively**.
* **Figures** must have **captions** and be **numbered** (e.g., Figure 1).
* **Tables** must have **captions** and be **numbered** (e.g., Table 1).
* **Figures** may be **black and white**, or **colour**.

##### Word Count

There is a **10,000-word limit** for the project. Do not see this as a target, but rather a limit to the number of words we expect a project to have. All words in the main body, excluding words in figures and tables, will count to your word count. If you think you will go over 10,000 words, you should consider what can be removed from the main body and placed in an appendix.

##### Copyright and Intellectual Property Rights (IPR)

Your report should be written considering that it will be within the public domain. Normally, you retain copyright over your written work and Intellectual Property Rights (IPR) over any technical work. There are situations where this might not be as simple, for example when working with a company or on a larger university project. There are strategies you can utilise:

* You can inform your supervisory team that the project cannot be made available to other students undertaking an BSc Project.
* You can provide a shortened report for sharing that does not contain the protected information.
* You can assign IPR to the external collaborator, although you should take great care when doing so. It is best to speak to your supervisor.
* Non-disclosure agreements can be made between the external collaborator and the supervision team.

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# The best region and team in pro LoL Esports

### Subtitle if required

#### By

Thamiliniyan Aravinthan

#### Submitted to

**The University of Roehampton**

#### In partial fulfilment of the requirements for the degree of

**BACHELOR OF SCIENCE IN COMPUTER SCIENCE**

# Abstract

Abstract narrative

## Declaration

I hereby certify that this report constitutes my own work, that where the language of others is used, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of others.

I declare that this report describes the original work that has not been previously presented for the award of any other degree of any other institution.

**Enter your name here Date:** Enter the date here

Signed (apply signature below)

# Acknowledgements

Acknowledgements narrative

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## Introduction

GUIDANCE (text in blue can be deleted from your final submission)

An initial paragraph introducing the project context and idea (all projects).

The focus of this project is to visualise data from three regions (LEC – Europe/Middle East/Africa; LCS – North America; and LCK – South Korea)) in the professional League of Legends eSports scene from 2015-2017 and see where teams and regions outperformed one another in aspects of the game. These aspects are the total gold difference in games, the individual gold differences between the roles of the game (top, jungle, mid, bot, and support), kills, and objectives (Baron Nashor, Dragons, Rift Herald). The initial data that was sourced from Kaggle will be used to compare these various aspects and present them on an interactive web page that will allow users to explore the visualisations in different manners that may affect the visualisations.

### Research Question or Problem that will be Addressed

GUIDANCE (text in blue can be deleted from your final submission)

A hypothesis and/or research question(s) (research-based projects)

A focus of this project would be to determine which team performs the best within a region based on factors of the game and individual roles. Then the next question would be which is the best team out of the 3 regions to be compared, which will be judged on the same factors. With this information, the question now would be does it match with the results of the individual regions rankings and their ranking in the global world championship Worlds.

These research questions serve a purpose, as the answers found will show how relevant and impactful the factors of the game as visualised are within the game. It will show whether there is a correlation between these factors and the results of teams and regions or whether there is a need for more factors of the game to be taken into consideration.

### Aims

GUIDANCE (text in blue can be deleted from your final submission)

Aims are broad statements of desired outcomes and intentions.

The first aim would be to have an interactive webpage for users to have the ability to visualise data with the options to manipulate it in certain factors. Where users may use the webpage to solve their questions using the visualisations or to see where different teams/regions are strongest in. Another would be to source the manipulated data used for this project to the community so that others can use it for their own works, as the original dataset has been used for this project.

* Visualize the data so that it’s clear to all who is performing best in all aspects covered.

### Objectives

GUIDANCE (text in blue can be deleted from your final submission)

Objectives are the tangible steps that will be taken to achieve the aims -- tasks that will be done.

The first objective for this project would be to source the data which was found on Kaggle and consists of data from 2015-2018 for over 10 different regions. From there the data is cleaned and selected to focus on what the project entails where only 3 main regions are selected and columns of unnecessary data are filtered out. Then based on the time constraints and when a finished prototype of the project is ready there would then be the idea to scrape further data into the dataset that focuses on other aspects of the game.

Next would be to research what would the best way to visualise the data so that it is able to achieve the aims of the project. This would be done by researching and testing in visualisation methods that I’m already familiar with like Python and Tableau and looking into other methods like d3js which allows for more interactive visualisations.

Finally, the last objective would be to focus on the styling of the webpage to make the visualisations stand out and be clear. This will require researching into html and css in a more advanced manner than what is currently known.

* Source the data, clean it and transform it for use
* Scrape for more data to add on
* Investigate the rough shape of the data and determine whether to use all teams in a region when comparing or top 3/5
* Research as to which method of visualization is best suited.

### Legal, Social, Ethical and Professional Considerations

GUIDANCE (text in blue can be deleted from your final submission)

Your project must include a description of the legal, social, ethical, and professional issues relevant to the project. All projects will have either a legal, social, ethical, or professional issue element. You must discuss these here and highlight any issues that had to be addressed before undertaking the project.

If your project required ethical clearance, then this must be clearly stated in this section, including how the ethical considerations were managed.

* The project is assumed to mainly cause social issues, and this would be for the fact that fans of teams may argue the numbers doesn’t show all.

### Background

GUIDANCE (text in blue can be deleted from your final submission)

You need to convince your examination team that your project is a viable one by answering the question -- **why is this a suitable project for an BSc Project?**

The aim of the background section is to provide the reader with the relevant contextual information necessary to understand your work. This section must be suitably referenced based on the reviews undertaken. There are two reviews that are likely to take place within this section -- a technology review and a literature review. The section concludes with a summary of the findings from the background investigation and how that **justifies** the work undertaken in your project.

### Report overview

Describe the upcoming sections in order -- this provides your reader with a roadmap of the report.

## Literature or Technology Review

GUIDANCE (text in blue can be deleted from your final submission)

**Literature Review** (for research or investigation-oriented projects)

All projects should reference some academic literature, although it is primarily research-orientated projects that will conduct a significant literature review in the background section. As with the technology review, the goal here is to make it clear why the choices were made in the project. It is expected that at least the research methodology and/or evaluation approach is defined from existing sources.

**Technology Review** (for build or investigation-oriented projects)

The technology review focuses on technology that will be and could be used for the project. Typically, it is expected that you have reviewed different technology options for your project and summarised these options here. It should be clear why the technology choices taken were made.

* ClickUp was used to manage the project as a task board
* Github was used to store, track and manage all the progress of the project
* Jupyter Notebook used to test data and experiment visualization
* ParseHub briefly used to try and scrape data
* D3 in python to create interactive visualizations
* Python to create web application
* HTML/CSS to format the front end

## Design or Methodology

GUIDANCE (text in blue can be deleted from your final submission)

Now you must tell your examination team what you are going by answering the question -- **how are you going to undertake the project?**

The aim of this section is to explain to your reader the work you are going to undertake. Depending on whether the project is more build or research-focused, this section can take one of the following forms.

**Design** (for build or investigation-oriented projects)

If your project is a build focused project, you should provide a design for what your project will build. The nature of this design will depend on your project, but it should provide a complete idea of what you are going to build, including the technologies to be used.

**Methodology** (for research or investigation-oriented projects)

If your project is research-focused, then you need to define the particular research methodology you are using to gather and assess data. Typically, this will involve some sort of data gathering process and statistical analysis of results. However, you should also describe the tools (e.g., technologies) that you will use as well.

* Gathered the data from Kaggle dataset which was then cleaned of any unnecessary data and data from any other regions than the 3 this project focuses on.
* Tried to scrape more data from sites like: “to list” using ParseHub but was met with difficulties and hence decided to come back to it later due to time limitations. However, to gather data from the most recent years would be much easier due to it being much accessible.
* Tried to make basic visualizations in Jupyter Notebook to see the shape of the data but faced a difficulty in what was assumed to be simple. Due to the arrays of data being of different sizes it proved challenging to work with and took a while to find a solution.
* Make basic visualization to see the shape of the data
* Experiment with different styles to see which method of visualization best tells the story I’m trying to tell.

##### Alternative Approaches

Another important point in this section is to document any alternative approaches you could have taken to complete the project. For example, were there different technology choices, design choices, or methodological choices you could have taken? You should explain why you have taken the approach you have taken rather than these alternatives.

## Implementation or Results

GUIDANCE (text in blue can be deleted from your final submission)

Once the examination team know what you planned to do, you must tell them what happened --

##### What was the outcome of the work you undertook in the project?

A build or investigative project will discuss the implementation. **Do not just paste in lines of code to your report and call that an implementation! Your report should feature minimum code to only discuss points.** The idea for implementation is to describe how the design has actually turned out.

A research or investigative project will present the results from performing the methodology. These results must be correctly presented, using appropriate tables, charts, and statistical tests that suit the nature of the project. Results should be summarised, and any findings clearly presented.

### Evaluation

GUIDANCE (text in blue can be deleted from your final submission)

The examination team now need to know how well the project went -- **How good was the outcome from the project?**

Evaluation is an important element of any project. You must tell your reader how good the final deliverable is. **Your project does not have to be perfect -- indeed the outcomes might have been bad.** The point is you must evaluate the outcome and discuss its strengths and weaknesses.

A key element of this section is a reflection on the aims and objectives set out at the start of the project, and how well these have been met. **Again, it is possible not to achieve an aim or objective.** The point is you evaluate how well you did meet your goals.

### Related Work

GUIDANCE (text in blue can be deleted from your final submission)

Answer the question -- **Who else has done something similar and how does my work compare?**

Another key element of this section is evaluating your work against that of others. How good is your work when compared to other people who have undertaken similar work? It is important to be able to understand how well you have achieved your goals in relation to others, while also considering the time limitations of the project.

## Conclusion

GUIDANCE (text in blue can be deleted from your final submission)

The conclusion summarises the project. You need to highlight your key outputs and/or discoveries. There are some particular subsections that must appear in your conclusion.

### Reflection

GUIDANCE (text in blue can be deleted from your final submission)

You must critically reflect on the entire project process and how well you have worked on the project. What particular things have you learned during the project? Why were you able and unable to meet project goals? What would have you done differently in hindsight?

A common approach many students take in this section is to claim poor time management. **Poor time management is rarely a problem unless you had too much to do in the project.** Normally, what is called poor time management is poor organisation, planning, and motivation. Being honest in your reflection will help you understand how you can improve these issues rather than focusing on time management issues.

### Future Work

GUIDANCE (text in blue can be deleted from your final submission)

Answer the question -- **What next?**

You've completed a significant piece of work -- perhaps the largest piece of work you have ever done. But no project is ever 100% complete, and you will have found new ideas along the way. If someone were to pick up your project, what avenues should be explored next?

## References

GUIDANCE (text in blue can be deleted from your final submission)

In this section, you **must** reference any sources used in your work. Typically, these sources will have come up during the investigation and related work sections. Your referencing must use the IEEE referencing style [IEEE Citation Guidelines2.doc (ieee-dataport.org)](https://ieee-dataport.org/sites/default/files/analysis/27/IEEE%20Citation%20Guidelines.pdf) .

It is **highly** recommended that you use reference management software such as Mendeley or Zotero.

Many students ask how many references are required. That is like asking how long a piece of string is. Your project should have as many references as is required for it. However, having few references indicates that no thorough investigation has occurred.

## Appendices

GUIDANCE (text in blue can be deleted from your final submission)

Appendices appear after references. Your appendices depend on the nature of your project. **Do not assume people will read your appendices.** Even if you direct them to do so in your main text, appendices are considered additional information and should not be relied upon to understand your main body of work. Refer readers to an appendix using a phrase such as *see Appendix A for further details*.

The following documents **must** be included as references:

* + Your Project Proposal.
  + Your Progress Review Form.
  + Your original plan and revised plans as your project evolved.
  + A description of how to access any technical output. **It is strongly recommended you use GitHub or something similar to do this.**

Any important communications between you and external stakeholders -- **please ensure private data is removed and communications anonymised.**