6COSC023W

Computer Science Final Project

Final Year Project (FYP) - Report

**CricWizards XI**

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**Degree:** BSc (Hons) Computer Science

This report is submitted in partial fulfillment of the requirements for the

BSc (Hons) Computer Science degree

BEng Software Engineering degree

School of Computer Science & Engineering

University of Westminster

Date

# 06/05/2025

# Document Scope

The purpose of this document is to describe and reflect on the processes that took place in developing the Final Project. Discuss any ethical issues associated with your project and describe the methodology that was adopted to develop its design, implementation and testing.

All chapter word counts in this document are approximate and are not intended to be prescriptive.

# Declaration

This report has been prepared based on my own work. Where other published and unpublished source materials have been used, these have been acknowledged in references.

Word Count: The final word count

Student Name: Muhammad Ozair Khan

Date of Submission: 06/05/2025

*This is an important section!*

*Add the updated word count (do not count words in the Acknowledgments, Table of Contents, Table of Figures, Table of Tables, References, Bibliography and Appendix). Add your name and the date of submission.*

# Abstract

The process of selecting a national cricket team’s playing XI for international matches, especially in the dynamic T20I format, is intricate and high stakes. Historically, this selection has heavily relied on subjective judgment, recent performances, and, at times, public sentiment. However, with the increasing accessibility of detailed cricket data and advancements in data analytics, there exists a significant opportunity to make this process more objective, data-driven, and transparent. The project, CricWizards XI, aims to tackle the challenge of optimal team selection and performance evaluation by utilising modern web technologies and statistical algorithms to assist selectors, analysts, and fans in making well-informed decisions.

The principal objective of the project is to construct a web-based platform capable of analysing recent T20I performances of international cricket players and suggesting the best possible playing XI for any given team. Additionally, the platform offers thorough performance analysis, player comparisons, and visual insights to enrich comprehension and engagement.

The methodology comprises several key steps. Initially, the system acquires real-time player and team data from a reputable cricket API (SportMonks). This dataset encompasses individual player statistics such as runs, wickets, averages, strike rates, and more, covering both batting and bowling performances. The data is then processed and normalised to ensure uniformity and comparability across players and teams.

A fundamental aspect of the methodology is the player rating algorithm. This algorithm assigns a unified score to each player based on their recent batting and bowling performances, with particular emphasis on key metrics such as batting average, strike rate, boundary count, wickets taken, and bowling economy. All-rounders receive an aggregated score reflecting their dual roles. The team selection algorithm then optimises the playing XI by harmonising roles (batsmen, bowlers, all-rounders, wicketkeepers) and maximising the overall team rating, while still maintaining a reliable bench.

The web application is developed using Flask for the backend, with a responsive frontend employing Bootstrap and customised JavaScript for interactivity. Users can register, log in, pick teams, view projected XIs, analyse team and player statistics, and compare players directly. The platform also includes robust authentication and input validation to ensure data integrity and user security.

The primary results show that the system can effectively generate a statistically optimal playing XI for any major international T20I team, grounded in current performance data. The platform's analytical tools offer practical insights, such as recognising in-form players, spotlighting team strengths and weaknesses, and enabling direct player comparisons. User feedback indicates that the tool is user-friendly, enlightening, and valuable for both casual enthusiasts and serious analysts.

In conclusion, CricWizards XI exemplifies the impact of data-driven decision-making in sports. By automating and objectifying the team selection process, the project reduces bias and enhances transparency. The methodology proves to be robust and scalable, allowing for future integration of more sophisticated analytics, such as machine learning-based predictions or scenario simulations. Observations suggest that such platforms can play a crucial role in contemporary sports management, merging raw data with strategic decision-making and nurturing a deeper understanding of cricket performance analysis.

# Acknowledgements

I would like to express my sincere gratitude to my family for their continuous support and encouragement throughout this project. Their unwavering belief in me has been a constant source of motivation. I am also thankful to my university for providing the resources and academic environment that were key to the success of this project. My professors and mentors deserve special thanks for their invaluable feedback and guidance. Additionally, I appreciate my friends and peers for their suggestions, diverse perspectives, and moral support. Without the support of these remarkable individuals and institutions, this project would not have been possible. Thank you.

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# List of Figures

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# Introduction

Cricket, known for its unpredictable nature, has undergone a significant transformation with the advent of technology and data analytics. In the modern era, the process of selecting a playing XI—particularly in the fast-paced T20 International (T20I) format—has become more complex, requiring a thorough assessment of player performances, team dynamics, and current form. Despite the abundance of available data, decision-making is often influenced by personal opinions, media narratives, and public sentiment.

The innovative CricWizards XI initiative aims to address these challenges by developing a data-centric web platform that leverages real-time cricket statistics and sophisticated analytical techniques to offer unbiased, insightful, and transparent team recommendations.

# 1.1 Problem statement

Selecting the playing XI for a national cricket team is a critical and often contested process. Traditionally, selectors have relied on experience, intuition, and recent observations—factors that are prone to bias, inconsistency, and external pressures (Sankaranarayanan et al., 2014). With the availability of vast cricket data, including detailed player statistics and ball-by-ball records, the need for objective tools to interpret this information and support decision-making has grown significantly (Wigmore, 2017).

In the context of T20 cricket—where outcomes can hinge on fine margins and individual moments of brilliance—optimal team selection is crucial. A single misjudgement can alter the outcome of a match or an entire tournament. The dynamic nature of T20s, which places a premium on power-hitting, adaptability, and role specialisation, adds further complexity to selection, necessitating the consideration of factors such as current form, fitness, opposition analysis, pitch conditions, and team balance.

Despite advancements in sports analytics, international team selection remains largely unstandardised and subjective. Data-driven approaches are still underutilised, particularly in emerging cricket nations where expert analysis may be limited. This disconnect between data availability and its practical application is increasingly evident.

There is a growing demand for a reliable, user-friendly, and objective selection tool, driven by rising expectations of transparency and accountability from fans, media, and other stakeholders. A data-driven platform can improve decision-making, reduce biases, and foster deeper fan engagement through informed discussions and analysis.

While Lemmer’s (2011) statistical model was initially designed for longer formats, its core principle—objective performance evaluation—can be adapted for T20 cricket. The CricWizards XI project seeks to bridge this gap by developing a web-based platform that harnesses real-time data and statistical algorithms to recommend the most suitable playing XI. By providing reproducible metrics and transparent justifications, the tool aims to enhance the credibility and efficiency of the selection process.

## Aims and Objectives

**Aim**

The primary aim of this project is to develop a web-based platform that utilises real-time cricket data and advanced statistical algorithms to recommend the optimal playing XI for international T20I teams. The platform also aims to provide detailed performance analysis, player comparisons, and visual insights to assist selectors, analysts, and fans in making well-informed decisions.

**Objectives**

To achieve this aim, the project focuses on the following objectives:

1. **Data Integration**: Integrate with a reputable cricket API to access real-time player and team statistics, ensuring data accuracy and relevance.
2. **Performance Analysis**: Develop algorithms to process and analyse player performance data across batting, bowling, and all-round metrics.
3. **Player Rating System**: Create a comprehensive player rating algorithm that objectively evaluates individuals based on recent performances and key statistical indicators.
4. **Team Selection Algorithm**: Implement an optimisation algorithm to select the most effective playing XI, ensuring balanced roles and maximising overall team strength.
5. **User Interface**: Design a responsive and intuitive web interface that allows users to generate predicted XIs, analyse statistics, and compare players.
6. **Authentication and Security**: Ensure secure user authentication and data validation to protect user information and uphold data integrity.
7. **User Engagement**: Incorporate features such as player comparison tools, performance trends, and visual analytics to enhance user engagement and understanding.
8. **Testing and Validation**: Conduct rigorous testing to ensure accuracy, usability, and reliability, incorporating feedback from users and stakeholders.

By meeting these objectives, the project seeks to deliver a robust, transparent, and user-friendly platform that transforms the approach to team selection and analysis in the T20I format.

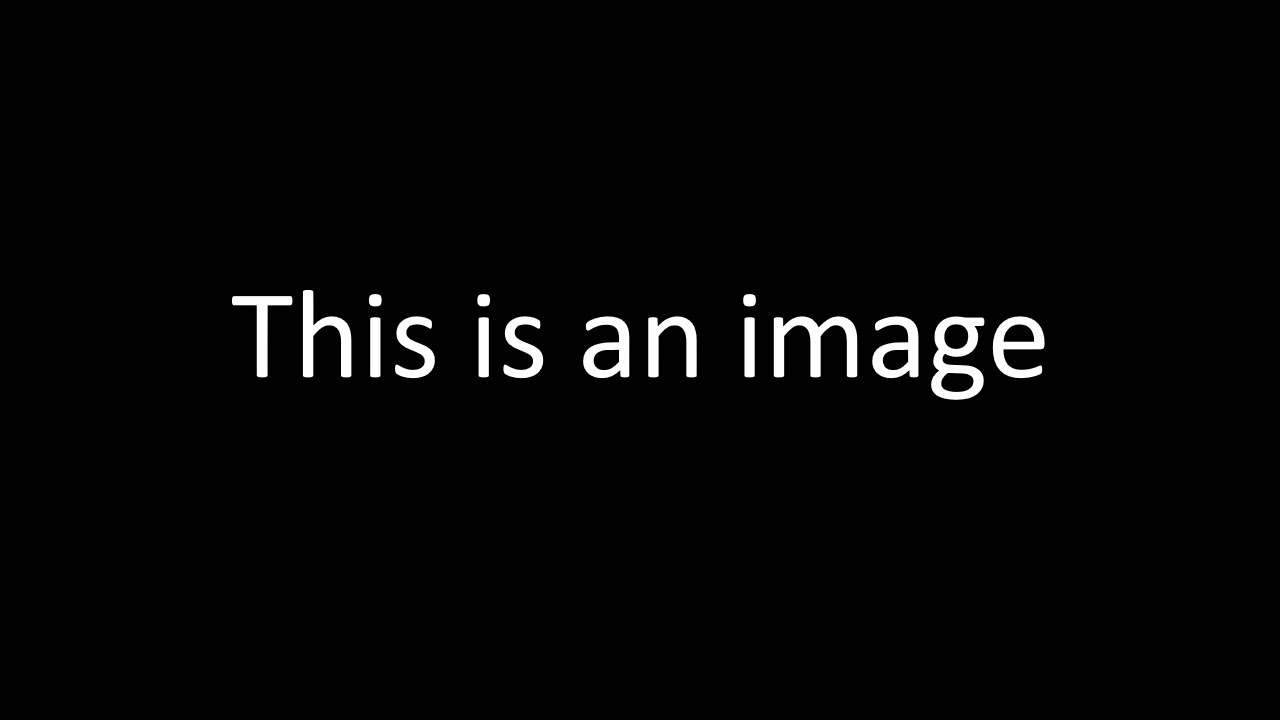


Figure 1. Add a caption explaining the image here.

# 2. Background

*Include a literature survey on the topic, discuss existing similar or relevant applications to yours and the result of a review of tools and techniques that are used to tackle projects similar to yours*.

## 2.1 Literature survey

*800 words*

*Describe the initial results of a literature survey on a selected research topic or application area related to your project subject. Use relevant books, published research articles as well as Internet content for the purpose. Make use of in-text references to indicate your sources*.

## 2.2 Review of projects / applications

*800 words*

*Describe your background research on existing projects/software/applications, tools/frameworks/methods/algorithms/techniques relevant to your project and their advantages and disadvantages. Use illustrations, diagrams, and screenshots for the purpose.*

*You may produce a Table of Features in this section, comparing the main features of the above projects/software/applications and the one you developed.*

*A comparison table may also be provided to distinguish the key characteristics of features/methods/algorithms/techniques relevant to your project*.

## 2.3 Review of tools, frameworks and techniques

*800 words*

*Describe the results of a survey on relevant tools/frameworks that can be used to develop applications such as the one you built for your project, such as programming languages and environments and libraries. List their advantages and disadvantages. Use illustrations, diagrams, and screenshots for the purpose*.

# 3. Legal, social, sustainability and ethical issues

*500 words*

*Consider any legal, ethical, social, professional, sustainability and security issues associated with your research and the software/application you are building and/or the data you are collecting/analysing*.

# 4. Methodology

*1000 Words*

*Describe the life cycle stages of the project, methodology, and development techniques you followed in the design and implementation of your project.*

*As examples: Gantt chart for life cycle, Waterfall or Agile for development methodology. Use an appropriate methodology for the project and list the key steps and milestones.*

*Discuss the implementation of your project and your consideration for UX, UI. Describe your testing methodology and give adequate examples, e.g., unit testing for typical client-server applications, white box for algorithmic and mission critical code etc. Discuss why your chosen methodology is suitable for the project.*

*Please note that even if you are using Agile methodology, you will still need to provide a high-level waterfall plan with key milestones, with any agile iterations also detailed in this report*.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Category 1 | Category 2 | Category 3 |
| Item 1 |  |  |  |
| Item 2 |  |  |  |
| Item 3 |  |  |  |

Table 1. Add caption here.

# 5. Design

*Describe your final software structure using diagrams where necessary.*

*1200 Words*

*Discuss in some detail (if relevant) issues relating to:*

* *User Interface*
* *Infrastructure*
* *Functionality*
* *Algorithm development*
* *Content creation*
* *Other*

*Discuss how those address the project requirements.*

*Use appropriate design methods for your project and extend your design to include implementation details that were not included in your Project Specification Design and Prototype (PSPD) report. e.g. make use of UML such as class diagrams, sequence/activity/state diagrams for complex algorithms and workflows, use UI design methodology and heuristics for predominately UX based projects. If you intend to develop an app/software/dashboard, you may have to use/create ERD, flowcharting, storyboarding, prototyping. It is up to you to use the appropriate design that best describes your implementation*.

# 6. Tools and implementation

## 6.1 Tools

*500 words*

*Describe the tools (programming environments & languages, frameworks, and libraries,) you used for the development of your application. Justify your choices with references to your use cases or list of requirements.*

*State existing skills development and any new skills you employed for building your project*.

## 6.2 Implementation

2500 words

Explain implementation of main code by use case. Include pseudocode or snippets of any novel code. Highlight any code that is adopted/adapted and give the original sources. Make references to your design documentation where appropriate.

# 7. Testing

*Create sufficient test cases to determine that the applications satisfy the requirements and works correctly*.

## 7.1 Test coverage

*800 words*

*Discuss black box and/or white box testing against the requirements. Include specific test cases labelled by the relevant requirements*.

## 7.2 Test methodology

*800 words*

*Describe how the output was tested and why. Discuss how you obtained and used feedback, using expert or/and non-expert users*.

# 8. Conclusions and reflections

*1000 words*

*Provide critical reflections on ALL aspects of the project lifecycle. Include conclusions on the resulting application, research, and findings. Reflect on each aspect of your project life cycle. Critically evaluate how effectively your results meet your stated objectives. Reflect on strengths and weaknesses of your implementation, discuss the acquisition of any new knowledge and skills and consider further work*.

# 9. References

*Include a list of cited in your text items (books, papers, websites, etc.). Use Harvard style for the purpose, or any other preferred standard referencing style*.

# 10. Bibliography

*Include here a list of general reading items (books, papers, websites, etc.). List the items in alphabetical order, using Harvard style to describe them*.

# Appendix I

*Provide additional material, if appropriate, in separate appendices.*

*Use one Appendix to provide a link to an on-line video demo of the project.*

*Do not include the entire code in print as an appendix.*