

IST 659  
Database Administration Concepts  
&  
Database Management

Project Report

# Soccer Game-Scoring Interface System

**Team Byte Benders**

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**Date: December-2023**

- *Team Byte Benders*

# CHAPTER 1

## 1.1 Introduction:

Our project Football Game Scoring Interface System aims to address the absence of comprehensive, customizable tools for managing and analyzing football game data. The suggested application is designed to effectively gather and handle data from a football game score interface, storing it in a dependable database management system (DBMS). The collected data may then be processed and shown in a variety of ways, including tables, visualizations, and heatmaps, using an easy-to-use internet tool. Our team will create a scoring interface that contains several score points from a football game. The data saved in the DBMS will be accessible to analysts and important stakeholders inside the company. The final product, on the other hand, will cater to five distinct user interfaces, each tailored to the specific demands of various stakeholders: analysts, coaches, players, broadcasters, and fans. This personalization ensures that users have quick access to the information most relevant to their tasks. While analysts and coaches may want extensive numbers for performance analysis, fans, and broadcasters emphasize engagement and viewing metrics. Due to the project's scale, we will first construct this solution with a smaller dataset, but the aim is to deliver a full end-to-end program that meets all football scouting criteria. This flexible and adaptable system will provide invaluable insights and data.

## 1.2 The rationale for Selection to address the Business Problem:

This project was chosen to address two aspects of the current problem. "Gap in Current Market" and "Stakeholder Benefit". The current football market has complex applications that are not only expensive but are also difficult to satisfy in a single solution for Each group that has specific needs and preferences in regard to analysts, coaches, players, broadcasters, and fans. In the capacity to collect extensive and precise data that may be limited, particularly in the early phases. Data gathering might be complicated by factors such as the game's complexity, the dynamics of player motions, and the intricacies of in-game occurrences. A complicated programme like this may be expensive to develop and maintain. The second and most important aspect of this application is to benefit the stakeholders.

The tool will give detailed information and performance metrics to analysts and coaches. This data can aid in the formulation of game strategy, player development, and team performance. Personalised data that emphasises players' strengths and areas for growth might help them. This can help with the training and growth of the players, which will make them more successful on the field. Broadcasters can leverage the data for enhancing their narratives during live games. Access to unique metrics and insights can enrich the viewing experience and keep audiences engaged. With access to extensive game analytics, player information, and other intriguing content, fans will have a more immersive experience. This might

strengthen their bond with the team and the game. Keeping these aspects in consideration, we have developed an extensive application that bridges all these core aspects of implementation via a dynamic dashboard, incorporated and developed using SQL and supported via python, used to scrape the data using selenium.

## CHAPTER 2

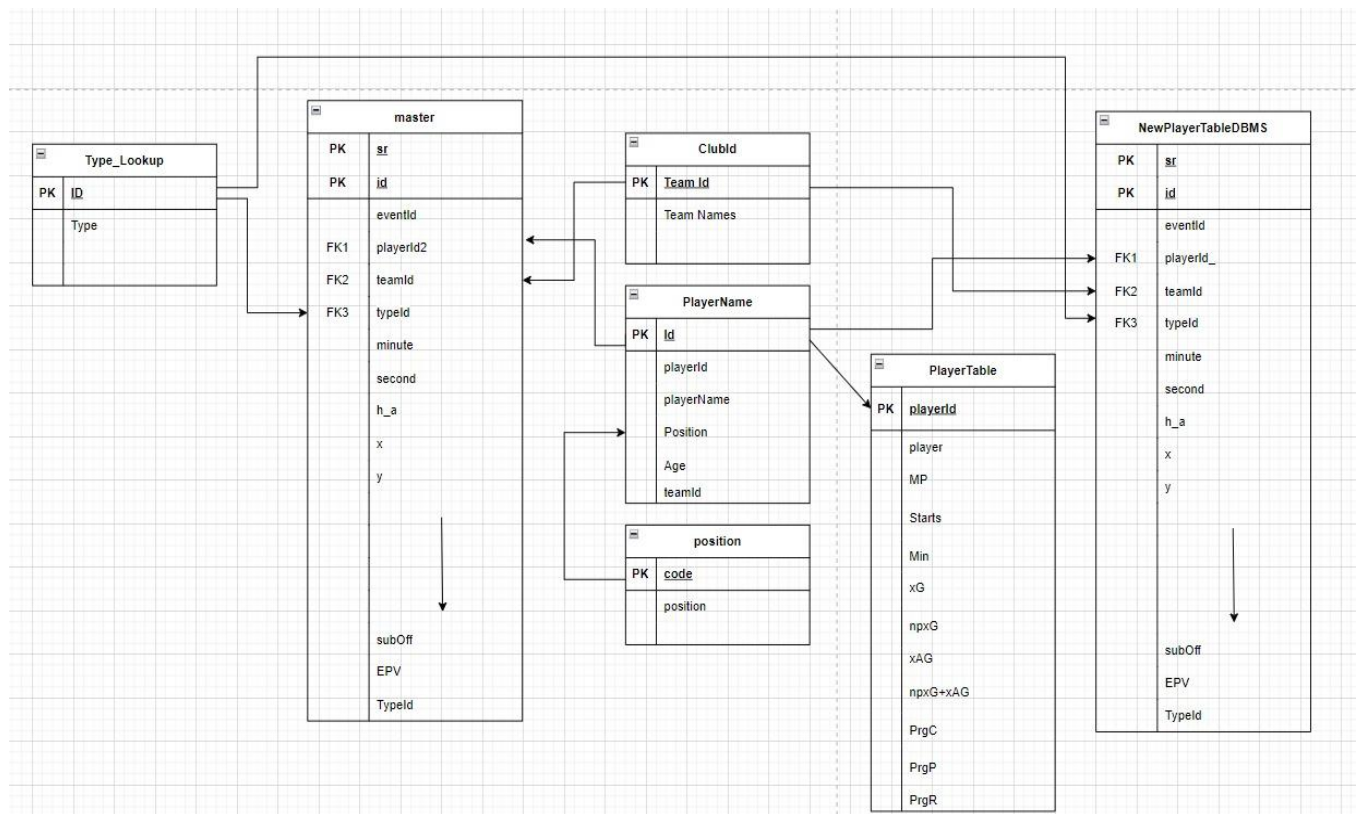
### 2.1 Data Characterization and Interpretation:

The data used for this project is real-time and updated from Opta, the data source for football analysis that we have generated. Some data tables have been scraped from the website to fill the gap points and generate more accuracy over the application. With over 151 columns and 58000 rows present in the master table, we have 5 tables. Us

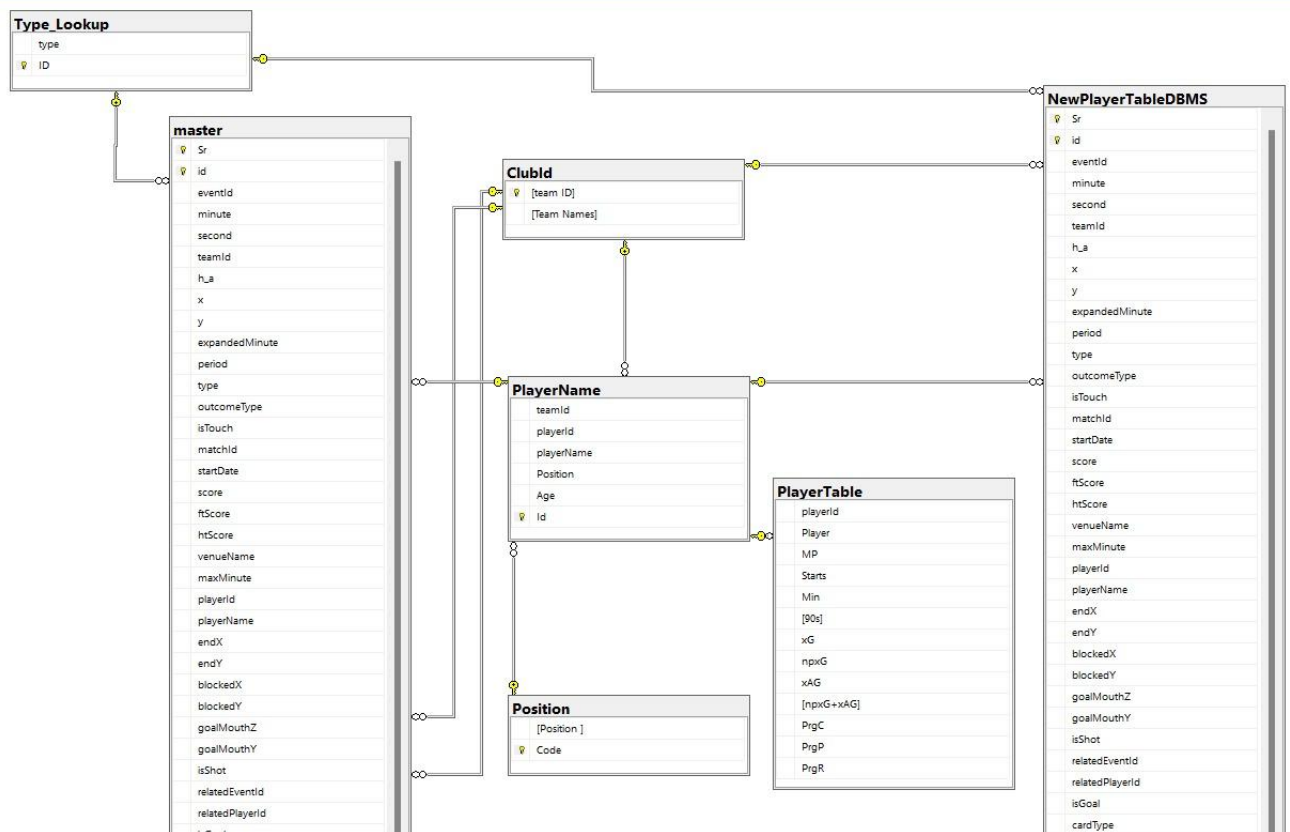
The ClubId is the lookup of all team names with the primary key as Team ID. The player's name is yet another table that defines the players with their player ID, their designation/position referenced from the lookup table that's stated as position, age, and team ID they play for.

### 2.2 Data Models:

#### Logical Data Model:



## Conceptual Data Model:



## 2.3 Code Implementation & Logic Design:

The project starts by pulling all of the data from two tables: `dbo.master` and `dbo.PlayerTableDummy`. In `PlayerTableDummy`, a succession of `UPDATE` statements recalculates and populates different player data. Total goals, goals per 90 minutes, shots, shots per 90 minutes, and various more measures are included. Each measure is recalculated using certain criteria. `Goals_per`, for example, is computed as the total number of goals divided by the number of 90-minute periods played, assuming the player played any minutes at all (to prevent division by zero). New columns are introduced to accommodate new metrics: `OffensiveDuels`, `DefensiveDuels`, `Cleansheets`, `ShotAccuracy`, and `GoalConversion`, indicating an increase of the sorts of data being recorded. `ShotAccuracy` and `GoalConversion` are advanced metrics that are computed. These are most likely key performance indicators (KPIs) for evaluating players. `ShotAccuracy` is determined as the ratio of on-target shots to total shots, while `GoalConversion` is calculated as the ratio of goals to total shots. A particular update is created for a player named 'Aaron Ramsdale,' increasing his `Cleansheets` to 14 and recommending individual record improvements based on external data or manual tweaks. Several `SELECT` queries are used during the process to evaluate the data in `PlayerTableDummy` and ensure that the modifications are applied successfully.

In brief, the goal of this project is to improve a football player metrics database. It involves extensive recalculations of player performance measures, database architecture changes, and particular revisions to individual records. The heavy usage of SQL displays a rigorous commitment to data management, ensuring that the metrics are current and accurate, and represent the players' on-field performances. This type of data manipulation is vital in sports analytics, as precise matrices guide critical judgments concerning player appraisal, team strategy, and performance analysis. We have implemented CRUD operations, up-down scripts, views, in-built stored procedures, triggers, and conceptual & logical data models are applied on a variety of metrics updated in this project ranging from basic metrics like goals and shots to more advanced metrics like dribbles per 90 minutes, expected pass values, shot accuracy.



## CHAPTER 3

### **Visualization Insights:**

Five dynamic menus have been incorporated in the construction of a sophisticated football analytics platform, each reflecting a different component of the game's performance data. The 'Players Dashboard', which allows for in-depth examination of individual players, is central to this interface. This dashboard includes a wide range of information such as appearances, Expected Goals (xG) and assists, ball progression, and extensive breakdowns of goals, assists, and dribbling abilities.

The 'Highlight Player Name' tab is an important element of this system. This interactive feature allows visitors to choose a specific player from a list of all players. When a player is selected, the dashboard dynamically adjusts to provide an array of statistical data relevant to that player, spanning all six measures. This feature not only gives a customized analytical experience, but it also allows for a more nuanced assessment of individual player performances within the context of the game.

The Coaches view dashboard is a sophisticated system for coaches to identify the contributions of each team player. The expected goal contribution gives a complete insight into how the goal strategy has been performed by the team players. The dynamic option to highlight team players showcases the count of each player. A few of the other metrics that help the coaches include Pass threat, ball progression, shot maps, and defensive contributions. The shot map also exhibits the field and the shot points indicating where the shot was placed by the team players.

The broadcaster's view emphasizes on 4 main plots along with 1 stats table representing the appearance of different players for different phases of the game. The 4 plots include defensive contribution, scoring frequency plot, chance creation, and passing analysis techniques.

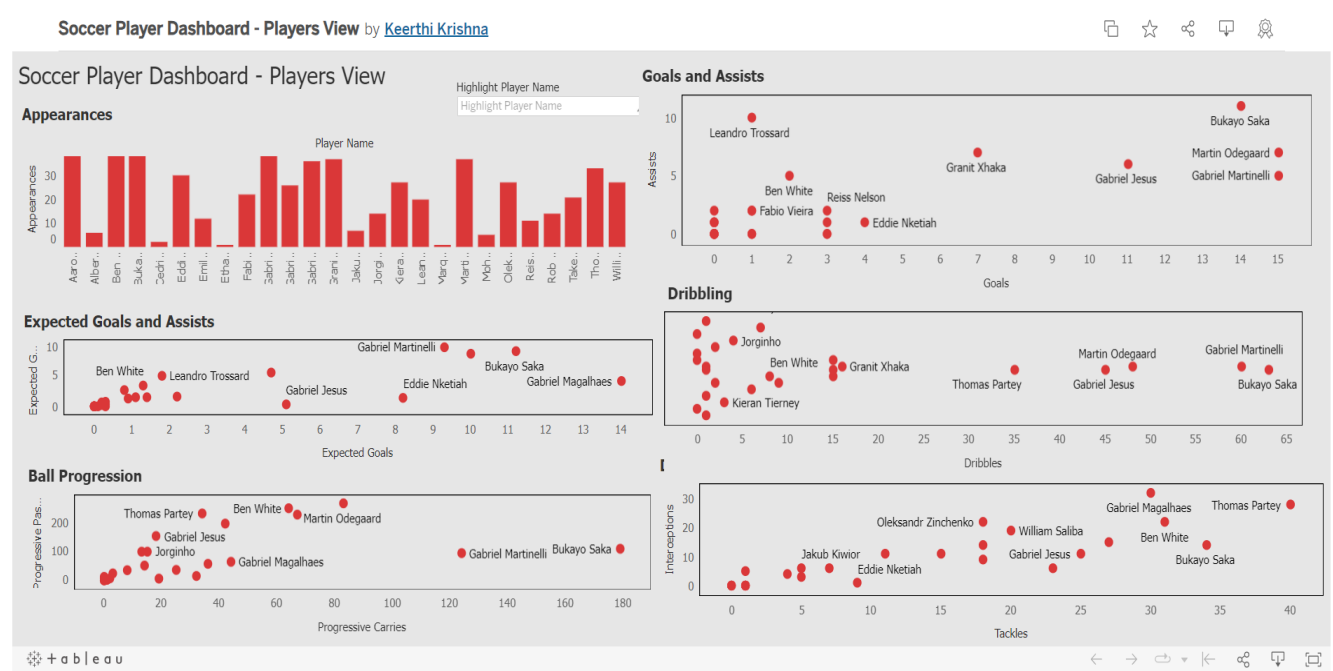
Amongst these complicated matrices, the simplest is considered for fans by considering their interests. It showcases 3 indicators, the appearance graph for each player, the goals vs assists scatter, and the player stats that include the numbers of 10 different parameters specifically designated for each player.

With the simplest, we have also got the most analytical dashboard among the 5. The analyst view is more specifically used to draw any statistical conclusions. A chance in football corresponds to a shot, whether on target or not. There are two actions that directly create a chance, a shot and a pass that leads directly to a shot. Both these indicators are displayed for each player.

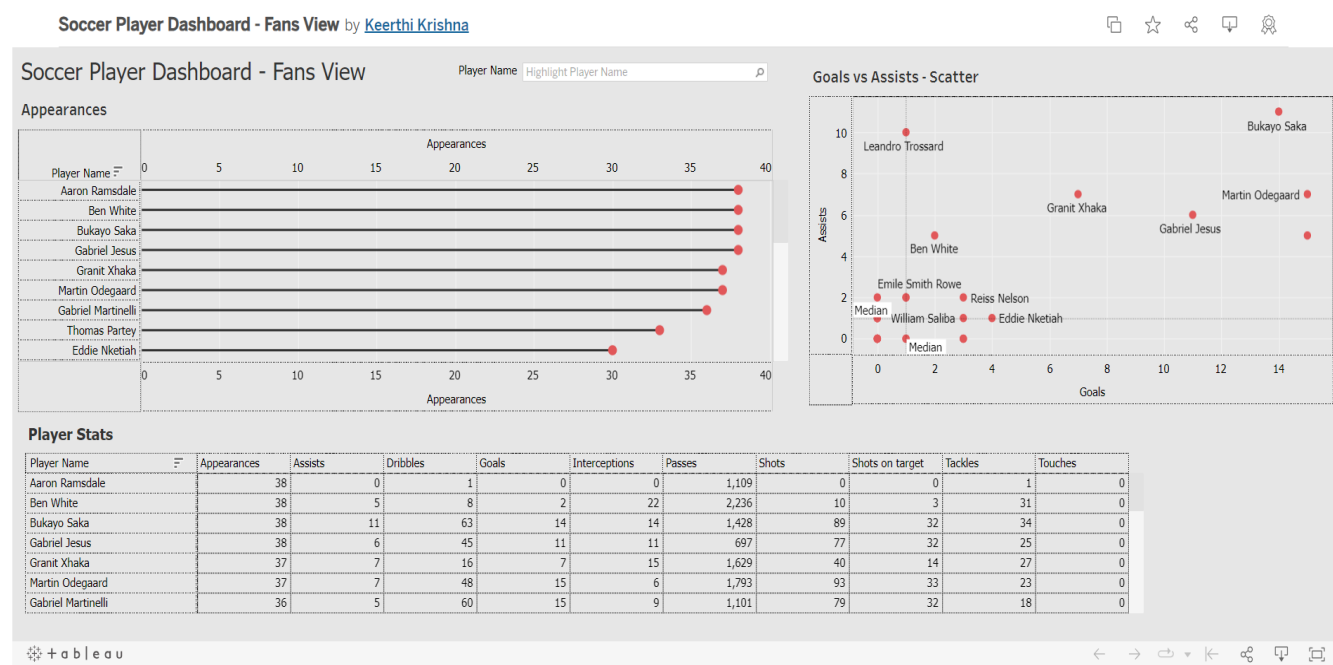
## Home Page of the Project:



# Players View



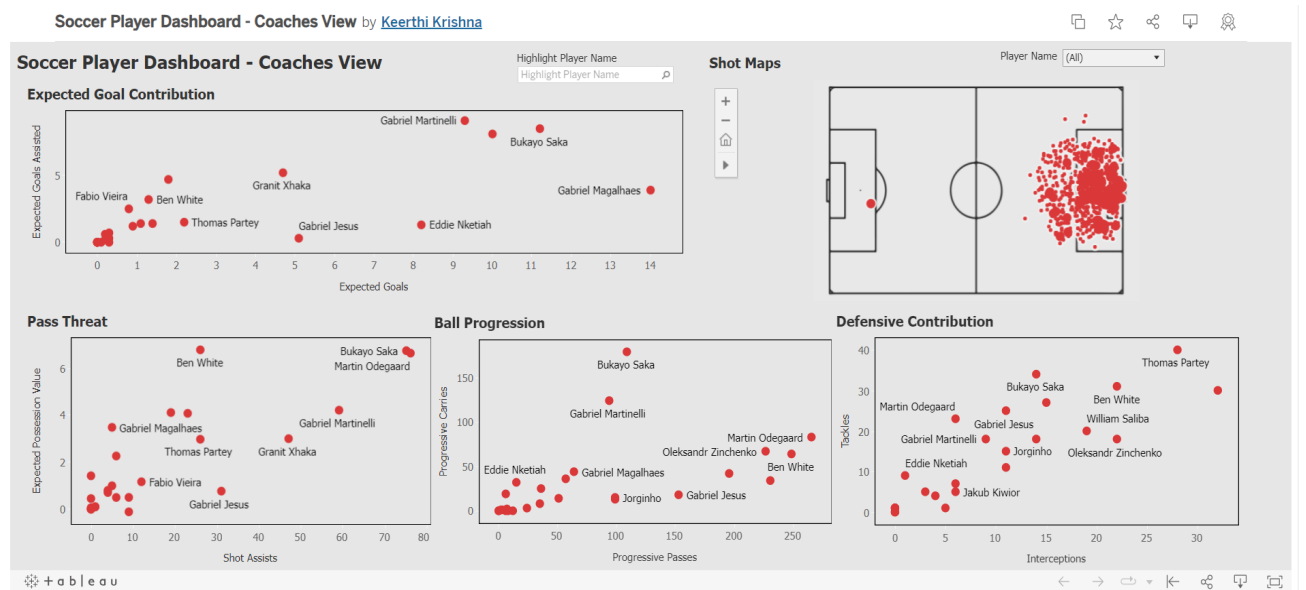
# Fans View



## Analysts View

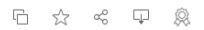


## Coaches View



# Broadcasters View

Soccer Player Dashboard Broadcasters View by [Keerthi Krishna](#)



## Soccer Player Dashboard - Broadcaster View

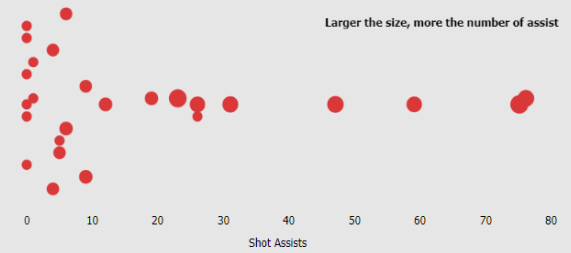
Highlight Player Name

Highlight Player Name

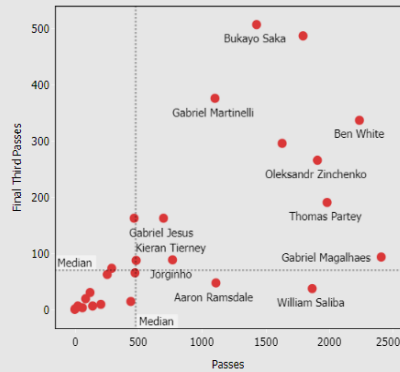
### Appearance Stats

Player Name	Appearances	Starts	Minutes Played	Goals
Aaron Ramsdale	38	38	3,420	0
Ben White	38	36	3,055	2
Bukayo Saka	38	37	3,181	14
Gabriel Jesus	38	38	3,409	11
Granit Xhaka	37	36	2,993	7
Martin Odegaard	37	37	3,127	15
Gabriel Martinelli	36	34	2,789	15
Thomas Partey	33	28	2,483	3
Eddie Nketiah	30	9	1,089	4

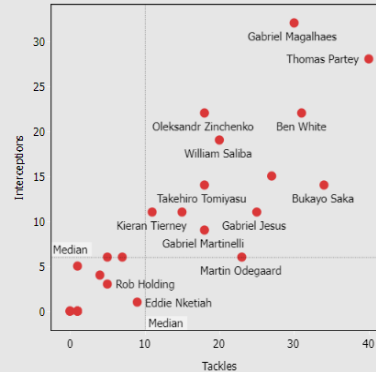
### Chance Creation Plot



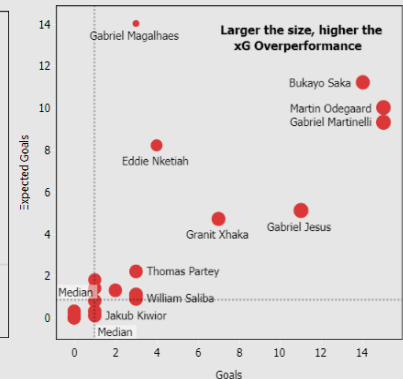
### Passing Analysis



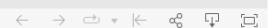
### Defensive Contribution



### Scoring Frequency Plot



+ a b l e a u



## CHAPTER 4

### 4.1 Scope & Limitations:

We have successfully managed the dataset size by limiting the scope to 27 players from two teams. This choice is critical in a situation in which each player's actions and movements might create massive volumes of data.

Every minute of play, every goal, non-penalty goal, expected goal (xG), non-penalty expected goal (NPxG), and other precise playing actions are recorded and analyzed in our dataset as we have taken the real-world professional football match results for consideration. These comprehensive indicators are extremely useful for player evaluation and team strategy, but they also lead to a rapid growth in data volume. By focusing on a manageable subset of the data, we have applied sophisticated analytical techniques without overburdening the system. This targeted approach allows for a more detailed and nuanced analysis of the selected players and teams.

### 4.2 Future Scope:

For the future scope of our project, we foresee an end-to-end online application that serves numerous stakeholders, including analysts, coaches, players, broadcasters, and fans. This application will focus on offering specialized analytical tools and data dynamics that are tailored to each group's demands. The user-friendly interface will make it possible to obtain multiple viewpoints and insights with a single click. We also intend to broaden the dataset to include additional teams and players. This extension will allow us to do more in-depth research, allowing stakeholders to discover the greatest players of the season and leaders across several criteria. This would broaden and deepen the analysis, making it a more valuable resource for all parties involved.

## CHAPTER 5

### 5.1 Conclusion:

The project's ultimate deliverable comprises three critical components: a launch and analytical page, a robust database management system executed and worked using SQL, and interactive user dashboards. Subsequently, user-interactive dashboards are generated by extracting data from the database developed using real-time data that is scraped using Python. These dashboards will be tailored to meet the specific requirements and use cases of the stakeholders. Each user interface will retrieve data based on the necessary constraints. This project is a one-stop solution for multiple perspectives and analyses required for the stakeholders.

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- [5] Kang, C., Hwang, J., & Li, K. (2006, December 1). Trajectory Analysis for Soccer Players. *IEEE Xplore*. <https://doi.org/10.1109/ICDMW.2006.160>