

**KTO KARATAY UNIVERSITY**

**FACULTY OF ENGINEERING AND NATURAL SCIENCES**

**DEPARTMENT OF COMPUTER ENGINEERING**

**CLUB MANAGEMENT SYSTEM REPORT**

**Project Name:** Club Management System with Data Science

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# CHAPTER ONE

## INTRODUCTION

Nowadays, innovative projects that lead to revolutionary changes not only on the pitch but also in club management are becoming increasingly important. In this context, we decided to develop a soccer club management system that focuses not only on traditional methods but also on machine learning based solutions.

This project stands out by integrating machine learning models using a range of comprehensive data sets, from the players to the overall performance of the team. Taking a beyond the ordinary approach, we have created a system that can predict the price of players and identify the most suitable positions. We have also developed a system that can identify the most successful starting 11 based on the overall performance of the players using the player dataset within the team.

The main goal of our project is not only to optimize the on-field strategy, but also to contribute to the evolution of club management to a data-driven and future-oriented perspective. In this project, which we completed after 14 weeks of intensive work with our teammates, we have created an infrastructure that is open to development and can integrate new machine learning models.

## Background Data Driven Football Club Management

Emerging technology and advances in data science have led to a series of innovative applications affecting sports management. In this context, football clubs are increasingly turning to data-driven solutions to improve their performance and optimize their strategic decisions. In line with this trend, our project has been developed with the aim of taking football club management beyond traditional boundaries.

Today, a wide range of data is available, from the players to the overall performance of the team. However, effectively analyzing and using this data requires an advanced information processing infrastructure and the integration of machine learning models. Our project is designed to overcome these challenges and provide football clubs with a smarter and data-driven management system.

Moreover, with increasing competition in the football world, clubs need to gain an advantage not only on the pitch but also in the transfer market. At this point, machine learning-based price prediction models and player position predictions are becoming important tools to support clubs' strategic transfer decisions.

The background of our project reflects the emergence of a football club management system designed around the integration of data science and machine learning, in line with the increasingly complex dynamics of football.

## Problem Analysis/Declaration: Challenges in Football Club Management

The problem analysis underpinning our project focuses on the current challenges in football club management. These challenges include areas that cannot be overcome by traditional management approaches and where data-driven solutions are needed. Here are the key points from which our project emerged to provide solutions to these challenges:

* Data Stack Complexity:

Football clubs have a large and complex mass of data such as players' performance, transfer data, injury history. Traditional management systems are unable to effectively analyze and translate this abundance of data into strategic decisions.

* Uncertainty of Transfer Strategies:

The transfer market is an environment characterized by uncertainty and rapid change. Clubs have difficulty in determining the right transfer strategies and often rely on subjective assessments when making these decisions.

* Uncertainty in Player Position Prediction:

It can be difficult to determine the most effective positions of players using traditional methods. This can limit proper placement and tactical flexibility within the team.

* The Need for Big Data Analysis:

Big data analysis is inevitable for an advanced soccer club management system. However, performing this data analysis manually is a time-consuming and error-prone process.

Our project aims to provide a more data-driven, strategic, and effective management approach to football clubs by providing solutions to the challenges mentioned above.

## Aim/Goals of the Study: Data Driven Football Club Management

In this section, we can elaborate on the main purpose and objectives of our project:

* Building a Data-Driven Management Infrastructure:

Our goal is to provide football clubs with an infrastructure to help them effectively manage and analyze large data sets.

* Integrating Machine Learning Models:

Another goal of the study is to successfully integrate machine learning models for use in predicting transfer values and player performance.

* Improving Transfer Strategies:

Our project aims to optimize transfer strategies to make more informed and strategic decisions against transfer market uncertainties.

* Improvements in Player Position Prediction:

We aim to predict the most effective positions of players by using machine learning on data sets obtained from soccer players. Thus, it will be possible to make smarter player placements within the team.

* Optimizing Successful First 11 Selection:

Our project aims to use machine learning models to determine the most successful starting 11 using player datasets within the team. In this way, it will be possible to maximize team performance.

In line with these objectives, our project aims to provide a solution that focuses on the integration of innovative approaches to football club management, data-driven strategies, and machine learning.

## Proposed System: Data Driven Football Club Management System

The solution presented in this project will provide the following possibilities:

* Online Database Access:

Online interaction with the club database through the user-friendly interface provided by the system.

* Management of Player Information:

Management of players' history and information on the site.

* Management of Internet Users (Managers/Coaches):

Management of users who will access the internet.

* Opportunity for Team Leaders to Update Information:

Allows team leaders to update information on the site to share the latest team news with fans.

* Management of Season Teams and Categories:

Management of season teams and categories.

* Creating and Updating Teams:

Creating new teams or updating existing information within the system.

* Scheduling Team Matches and Match Times:

Scheduling team matches and match times.

* Updating Data in the easiest way using the Internet:

The easiest way to update data is using the internet.

* Possibility for the User (Managers/Coaches) to Track Player Movements:

Possibility to track the movements of the user's players.

* Reading Summaries of the Matches Played:

Possibility for the user to read the summaries of the matches played.

* Ability to View Information of Favorite Teams or Players:

Possibility to view the information of the user's favorite teams or players.

These features are designed to make football club management more effective and data-driven, allowing for closer interaction with fans and making it easier to update information within the club.

## Definition of (unfamiliar) terms:

* Football Club Management System (FCMS):

FCMS, also known as Football Club Management System, is a software system designed to optimize the operations and management of a football club. Such systems typically manage player data, transfer operations, match schedules and other valuable information related to the football club.

* Frontend (React - HTML, CSS, JS):

Frontend refers to the collection of components that make up the user interface of a web application. React is a library that manages the display and user interaction of web pages using technologies such as HTML, CSS, and JavaScript (JS). HTML determines the structural layout of the page, while CSS provides styling and design. JS manages the interactions on the page.

* Backend (Django, Django Rest Framework, JWT Authentication):

Backend refers to the part of a web application that is not visible to the user, usually running on the server side. Django is a Python-based web framework and is used for fast development and security-oriented projects. Django Rest Framework is a library that allows to create RESTful APIs with Django. JWT (JSON Web Token) Authentication is a standard for user authentication.

* Database (SQLiteDB):

A database is a system for organizing and storing information that can be retrieved and used later. SQLite is a relational database management system (RDBMS) and is preferred for small and medium-sized projects. It works as a simple file-based database and is known for being lightweight.