

Reservation System for Football Matches Using Machine Learning

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ABSTRACT

The goal of this assumption is to find a solution to the football match scheduling issue. To create the most effective solution and then implement and test the concept of the reservation system, the work will assess the existing solutions to this problem, suggest improvements, examine user needs, and analyze existing solutions. Spring is the Java framework used to construct this reservation system. The key outcome of this premise is that the application concept will provide user authentication, the formation of new matches, the search for existing ones, and continued involvement in them.

Keywords :- Reservation system, concept, football matches, management of football matches, web application, Recommendations, choose team members.

I. INTRODUCTION

According to popularity, football is the most popular sport on Earth. 208 national football federations are members of FIFA, which is more than the number of nations that make up the UN. Football games are primarily about teams, not about any one person. The organization of a match is the primary factor in determining whether it occurs or not. The location, start time, and skill level of the players must all be decided before the match can begin. As a result, I decided to concentrate on developing a reservation system for the practical portion of my job to make the process of scheduling matches easier for all users involved. A team, not an individual, is the most important aspect of a football game player. The key process that determines whether a match happens or not is the organization of a match. For the match to

take place, it is necessary to set a place and time and determine the level of the participants. It is not an easy task to organize a game without making a prior agreement between all the participants. With the advent of the Internet, of course, all processes are simplified. However, I discovered it today based on my own experience. I will go into greater detail on the issue of football match organizing in the theoretical portion of the assignment. I will then analyze all the current applications. A model reservation system will be developed based on the analysis' best solution, which will also be presented. The SWOT analysis and the costs of developing and running this reservation system will also be completed. Teamwork is the collective effort of a group of people to reach a common goal or finish a shared task as quickly and effectively as possible. Compared with a single person, A team can integrate not only knowledge but also the

skills of individuals. Each member from various professional domains is reasonably based on their characteristics. football teams must carefully pick their players. Because of how crucial this procedure is, choosing the wrong player might cost a football club the championship and maybe several million dollars if they do not perform up to expectations. Professional football teams typically evaluate players using a variety of sports psychology tests. These evaluations are, without a doubt, highly helpful and useful when attempting to build a winning football squad. Yet, while attempting to determine whether a player is suitable for a squad, this procedure is just one piece of a much larger puzzle. Choosing the right players and putting together a strong team formation is essential for team sports to reach their peak.

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II. LITERATURE SURVEY

(a) Recommendation System

[1] Ayata et al The study of recommendation systems date back to the middle of the 1990s. Collaborative filtering, which is its major usage, involves recommending products or services to consumers based on their shared preferences. In social network apps, e-commerce services, and online purchasing, recommendation systems are crucial. There have been numerous practical concerns involving studies and advancements in the area of recommendations in recent years. For instance, suggested an emotion-based framework for music recommendations that gathers data from wearable physiological sensor inputs to learn user feelings.

[3] Strub et al. Sun and Zhang created a brand-new, unified deep reinforcement learning framework by combining approaches from dialogue systems and recommended systems. Moreover, improved the auto encoder-based hybrid recommended systems. Even so, there are not many studies. Based on a series of measurements using the somewhat uncommon approach of players' real measurements, our study offers a thorough examination of alternative football players. Additionally, it presents the outcomes of the practical evaluations based on the anthropocentric,

fitness, and skills assessments. Later subsections cover the input to this part (the test criteria of the subject articles). The results of various football tests designed to measure a player's physical fitness are used to rank football players. Moreover, information is gathered by their measurement. The output, which uses the technique for ordering performance by similarity to the ideal solution (TOPSIS) method to rank football players according to our set of variables, also provides additional context for each player's qualities and shortcomings. We created three indicators to assess the performance importance of teams and football players, which contribute to a novel framework for team composition.

(b) Evolution of players and team as a whole:

[5] Salvo et al. The ability of a football player P_i , which we define as the total evaluation Overall, is the most crucial criterion for squad composition (P_i). Based on the player's overall performance in a football game, it is a complete property. A player's total evaluation takes into account their physical characteristics, football technology, and psychological make-up in addition to their various football skills. The team ability is defined as Overall (N), where N is the entire number of football players on a team, and we combine the overall ratings of all football players in a team to create it. Eq. shows the precise calculating equation (1).

$$\phi_{Overall}(N) = \sum_{i=1}^N \phi_{Overall}(P_i)$$

$$\begin{cases} \lambda_{Atk}(P_i) = Mean(\mu_{St}, \dots, \mu_{Cam}) \\ \lambda_{Def}(P_i) = Mean(\mu_{Cb}, \dots, \mu_{Cdm}) \end{cases}$$

Forming a professional football team just based on a player's overall rating, which will inevitably reveal some flaws, is insufficient.

[6] Özceylan et al For instance, if all of the chosen players are forwards, the team's strength will be insufficient. Soccer players' abilities vary significantly depending on where they are on the kick, as we have seen from the assessment above. We look for more offensive abilities when evaluating a forward's potential, including ball control, ball speed, and shooting prowess. Similar to how we want stronger defensive qualities, such as the capacity for physical contact, in a guard. Optimization for Football Team Member Selection.

(c) Optimization for Football Team Member Selection:

[4] Qader et al. Using the famous football player Messi as a reference, his offensive skill is typically superior to his defensive skill. Except the goalkeeper, we categorize each position into three categories based on the abilities of the players: attack position (e.g., striker, center forward), midfield position (e.g., center midfield), and defense position (e.g., center back). Whereas defensive position measures a player's defense attribute, attack position describes a player's offensive aptitude. In addition, due to the positional specialization of the midfield position, we consider both offensive and defensive skills. We use the variables $Atk(P_i)$, $Def(P_i)$, and GK to represent a football player's offensive and defensive skills for the Attack and Defence positions, respectively. GK also denotes the player's goalkeeping skill. The average score of a player's abilities in various offensive positions is used to calculate offensive ability (and defensive ability is measured similarly). To compute them, we use the following strategy: $Atk(P_i) = Mean(St, Cam)$ $Def(P_i) = Mean(Cb, Cd)$, where "performance" denotes the player's performance in various positions. As an illustration, "St" displays the player's efficiency as a striker (St).

(d) Facilitate the equipment system:

[7] Kamble et al. Whether you are the CEO of a national gym chain or the owner of a small local sports club, running a sports facility may be challenging, especially if you are having trouble drawing customers in or you are up against rivals. A.T. Kearney, a management consulting firm, estimates that more than \$620 billion is spent on sports annually. This does not include the millions spent on sponsorship or the wellness sector, which is now worth a staggering \$4.2 trillion due to consumers' growing concern for their physical well-being and appearance. The efficient operation of your facility and teamwork are the two main trends in sports facility management. Collaboration gives businesses a competitive advantage in today's competitive marketplace when consumers have more options than ever.

III. EXISTING SYSTEM

I discovered the following information after searching for and examining similar programs that make an effort to address the issue with the scheduling of football games or tournaments. The most fundamental features, such as registration and authorization, are present in every program. All programs include the ability to create teams and clubs, and they all have highly beautiful and rich features for modifying a team's or club's profile (such as adding a logo, a club location, a motto, or a history). The aforementioned capabilities to create or change each player's profile for that team or club are also available in practically every application. The majority of applications allow you to schedule a team meeting for training or another event, and you can automatically define meeting parameters like.

As result, each application serves as a useful tool for organizing training sessions by current teams. But they can't reserve the field for a practice or game, which could cause conflicts if another team chose to train

there at the same time. All of the aforementioned features are extremely constrained in that they do not let users organize live matches with actual players. Such a feature would enable the creation of two opposing teams, the holding of a genuine game, saving the outcome, and the gathering of data. Existing program lack of this feature severely restricts their use cases and, in certain cases, serves as a strong deterrent to users continuing to use the activity. Football match scheduling without the use of specialized web apps is accomplished using conventional solutions, which are detailed as part of this thesis.

A football match can be traditionally organized using social media dialogue without the use of any web applications. A common chat or group is created by one of the organizers or participants, detailing all the details of the upcoming event, and after the chat, a decision is made on the rules of the game. Facebook, the biggest social network in the world, is without a doubt the most popular service. There are two ways to tackle the issue of field reservations: either you can get in touch with a field manager directly, which is an option in some cities, or you can use a specialized online booking service. Based on several optimization parameters, we formulate the team composition problem as a multi-objective optimization problem. The multi-objective optimization problem can be written as follows:) For a football player named P_i , let S be the player's wage and let B be the team's overall budget. where NGK is the number of goalkeepers and N players are the total number of football players in the three positions of attack, midfield, and defense. N , N players and NGK are all constant parameters. In our case, N players = 10, $NGK = 1$, and $N = N$ players + $NGK = 11$ specifically. The suggested model, which is shown in Eq. (3), can, be extended to a match-day team with reserves or to the complete team. Consider the bench players, for instance.

$$\begin{aligned}
 \max \quad & \left\{ \begin{array}{l} \sum_{i=1}^N \phi_{\text{Overall}}(P_i) \\ \sum_{i=1}^N Po(P_i) \\ \sum_{j=1}^{N_{\text{players}}} \lambda_{\text{Atk}}(P_j) \\ \sum_{j=1}^{N_{\text{players}}} \lambda_{\text{Def}}(P_j) \\ \sum_{k=1}^{N_{\text{GK}}} \lambda_{\text{GK}}(P_k) \end{array} \right. \\
 \text{s.t.} \quad & \sum_{i=1}^N S(P_i) \leq B
 \end{aligned}$$

[7] These days, "Image-Based Statistical Analysis" methods that combine images and statistics provide more insightful analyses of team or player performances,[cited 2018 April 15] available from <http://tr.matchstudy.com>. Participants claimed that in a football team, analysis is carried out by compiling field events using a computer program, and the generated data is then analyzed and reviewed to create the data that the coaches require.

However, it is stressed that the analysis process is not feasible with club facilities because it takes too long for the data processor to convert match facts into statistical data, the assistant coaches to convert match facts into information, and the head coaches to convert match facts into information.

DISADVANTAGES:

- Monitoring the attendance at a future event is a feature.
- Participants who are unable to attend, are likely to participate or will attend this event Some programs include extra features, including communication between participants and the organizer on the website, as well as notifications and event reminders.

IV. PROPOSED SYSTEM

One of the most crucial and difficult directions in the recommendation problem is team composition. The advantage of a team over a single person is mostly demonstrated by the complementary synergy of team

members' collaboration. The challenge of how to select the team members has become complex while trying to create a high-performance team. In this study, the selection of football team members is analyzed as a multi-objective optimization problem. We also simulate a football game while dealing with various financial restrictions, and we compare our findings to those of previous works. The combined effort of a team to reach a shared goal or finish a shared task most effectively and efficiently is known as "teamwork."

A team, as opposed to a single person, can reasonably integrate the knowledge and skills of each member from various professional domains based on their individual qualities. The signed players and users of My Suggested System came across a module that comprises a registration page, which is in the form of a form, where players and users fill out their information and upload their credentials to reserve their slots for the matches. Also, the user and game interact more using my suggested system. As a result, it will be up to the users to decide which stadium or venue will be used for the upcoming matches. My Recommended System includes a live streaming module that allows website visitors to watch the game live without being interrupted by any of the advertisements that other streaming services may have included. On the index page, users will discover a ticket booking section where they may choose their destination, match date, and time to reserve tickets for the games. Users will find payment choices underneath that, including debit, credit, etc. Users can use it to pay for their reserved tickets by clicking on it.

ADVANTAGES:

- The combined effort of a team to reach a shared goal or finish a shared task most effectively and efficiently is known as "teamwork."
- A team, as opposed to a single person, can more effectively integrate the knowledge and skills of each member from various professional domains depending on their traits.

My Module's Features:

There are two possible approaches from which to view my module.

Login and sign-up are available.

- A welcome page where the users and the players have been selected is where the logged-in user and player are met.
- If the logged-in user is a football player looking for a chance to shine, he can click on the title "Player log in."
- A series of questions were asked of the player to determine his eligibility to reserve a slot.
- If the user has registered to participate in anything, he will have access to a page where he can cast his vote in a poll to determine where the next football game will be played.

1) Functions and evidence of usage:

- Users' information should be able to be persistently stored by the program.

2) Characteristics of football fields:

- Football fields and details about them must be able to be permanently stored by the application.

3) Confirmation of a match:

- The application must have the capacity to permanently store matches and related data.

4) Registration:

The user needs to register to access all of the web application's features. The user must enter mandatory information during registration, including a username and password.

5) Registration and managing a private sports ground:

After registering and receiving authorization, the owner of a private sports facility can designate a new site for football games by providing all the relevant details about his facility and also mentioning the number of the ownership certificate for the facility.

6) Non-functional requirements:

- Availability

System availability is anticipated to be constant, except for any unexpected downtime or irregular updates.

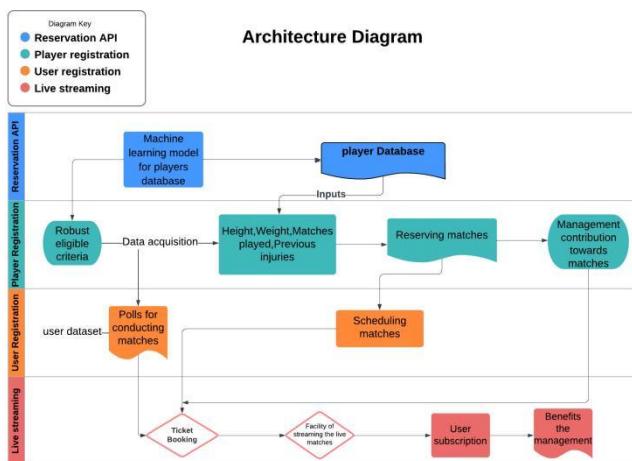
- Safety

The application should process the fundamentals of authentication, ensure data consistency, and uphold user rights. In the interest of user safety, applications should make advantage of technology that will be utilized for encoding crucial data.

- Reliability

In the event of a power outage, user-entered data must maintain its structure, and the program must be

V. ARCHITECTURE DIAGRAM



VI. ANALYSIS AND DESIGN

I'll go over the functional needs in this section. Only after registering and receiving authorization will users be able to use the capabilities of registering a new match, or football pitch, or joining the match. Only previously mentioned things will be visible to unauthorized users.

prepared to remove collisions if incorrect user requests are made. The application should employ the principle of the transaction to get rid of logical data discrepancies to prevent these issues.

- The subsequent non-functional conditions are,
 - i. Web Application
 - ii. Supports all major browsers.
 - iii. Database MySQL

7) Organization of users:

- The application will include the roles listed below. Because the roles are listed in ascending order, each role also includes the rights of the role before it in addition to its own.
- User: A user who has already registered on our website will have access to all areas of the website and is neither a player nor a user.
- Player: Who has access to the player login page, where he finds a form allowing him to register matches and reserve a spot?

VII. IMPLEMENTATION

Current application development scope:

Instead of developing a full-fledged application, it is necessary to design a prototype as part of this thesis that will allow the user to register in the application, establish his or her match, or find an existing one and participate in it.

MYSQL:

MySQL is a relational database (see [HTTP://en.wikipedia.org/wiki/Relational database](http://en.wikipedia.org/wiki/Relational_database) for additional information). It organizes data into one or more data tables where the data may be connected. The relational database's data can be created, modified, and extracted using the SQL programming language, which is also used to manage user access to the database. A relational database management system

(RDBMS), such as MySQL, interacts with an operating system to implement a relational database in a computer's storage system, manage users, permit network access, and make it easier to evaluate database integrity and create backups.

Choice OF Technology:

After weighing all the benefits and drawbacks of the various website-building technologies, I discovered that Java or PHP is most frequently employed. Going back to the 2000s, when Java introduced the first concepts for Web applications with Servlets and Struts, helps us grasp how Java and PHP compare to one another. The MVC pattern is the foundation of the Struts framework. Hence, Java develops a new path for Web development technology, and the first PHP web framework based on the MVC paradigm only comes in 2011 [12]. "Java is currently the gold standard for large-scale enterprise web development, including banking, insurance, and ticketing. "Among programmers, one of the most popular websites is Between January and August of 2017, stack-overflow.com performed research and gathered data on the variations in programming technology between wealthy and developing nations, as well as the effects of these discrepancies on the growth of the global industry. 64 nations in total were questioned, and throughout this time, there were at least five million visitors to the questions. They discovered a negative correlation between requests for Android and the GDP per capita of the nation. Therefore, they decided to look into other platforms and languages. Python, Java, and R's association with GDP are positive, but that of Android and PHP is inversely correlated with GDP. There are always exceptions (South Korea uses Android, for example).

Description of technologies (Php):

PHP is a scripting language designed specifically for web development

([http://en.m.wikipedia.org/wiki/Web development](http://en.m.wikipedia.org/wiki/Web_development)). It is a general-purpose programming language ([http://en.wikipedia.org/wiki/General-purpose programming language](http://en.wikipedia.org/wiki/General-purpose_programming_language)).

A PHP interpreter, which can be implemented as a module, daemon, or Common Gateway Interface (CGI) executable, typically processes PHP code on a web server. The output of PHP code that has been interpreted and performed on a web server could be any kind of data, including produced HTML or binary image data, and would make up all or a portion of an HTTP response. There are numerous web frameworks, online content management systems, and web template systems that can be used to organize or make the development of that answer easier. In addition, PHP may be used for a wide range of programming activities outside the context of the web, including the control of robotic drones and standalone graphical applications. PHP code can also be directly executed from the command line.

Bootstrap:

A CSS and JavaScript framework is called Bootstrap. It includes pre-made styles and scripts that simplify and enable flexible web page creation.

Html and CSS:

The Hyper-text Markup Language, sometimes known as HTML, is the accepted markup language for documents intended to be viewed in a web browser. Technology like Cascading Style Sheets and scripting languages like JavaScript are frequently used to help with this.

A web page's layout can be formatted using Cascading Style Sheets (CSS). The color, font, size, spacing between items, positioning of elements, background images or background colors, different displays for

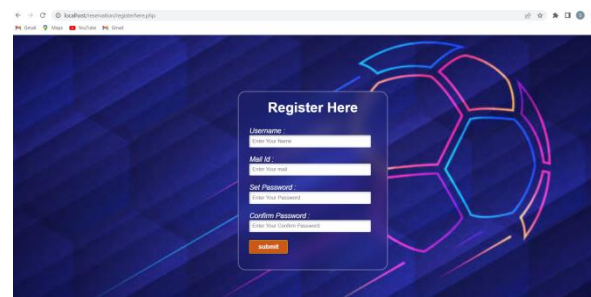
various devices and screen sizes, and much more may all be controlled with CSS.

Xampp Controller:

XAMPP is a cross-platform, free, and open-source web server solution stack bundle created by Apache Friends that primarily consists of the Apache HTTP Server, Maria DB database, and interpreters for PHP and Perl scripts.

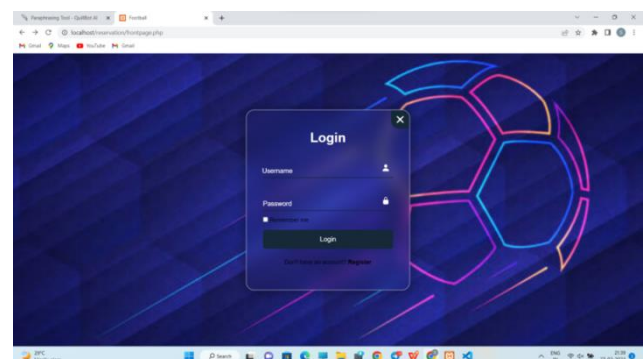
Registration on the site:

Using the Register button under the login form, the new user registers.



Login:

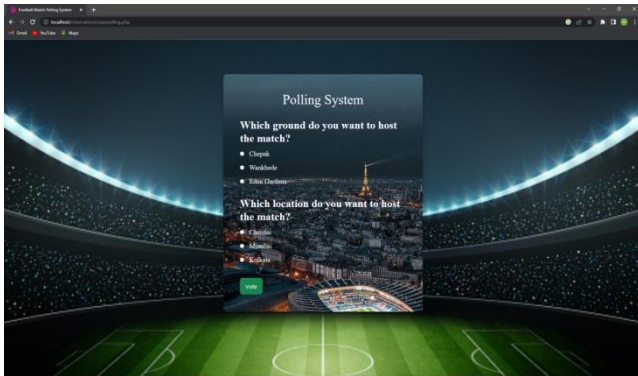
There were data after the user registered. The user inputs their name and password on the login page, which then displays the index panel once the following data is implemented into the MySQL database.



We can see Live Streaming, Player Login, and Polling on the Index panel. If the logged-in user was a player who came to input his information, he could click on

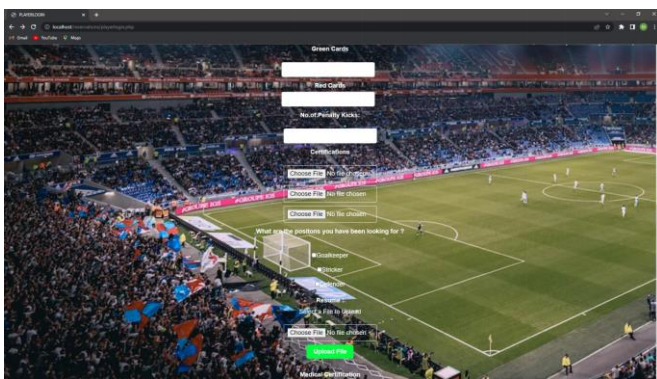
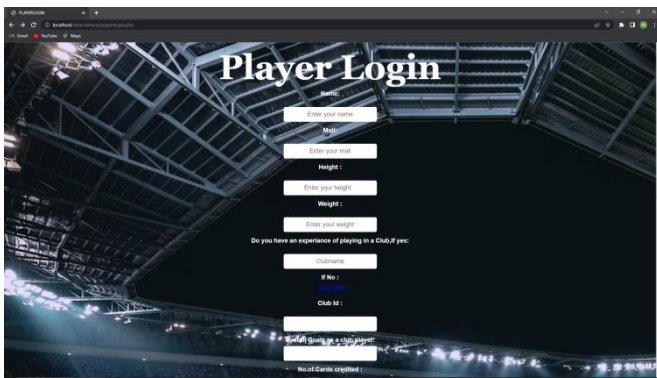
"player login" and fill out the necessary information as seen in the following screenshots.

User Polling:

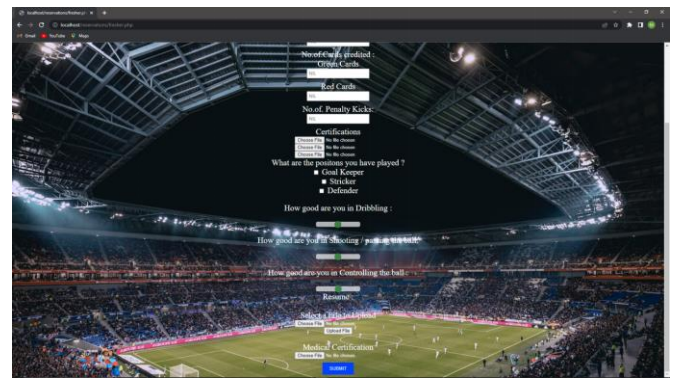
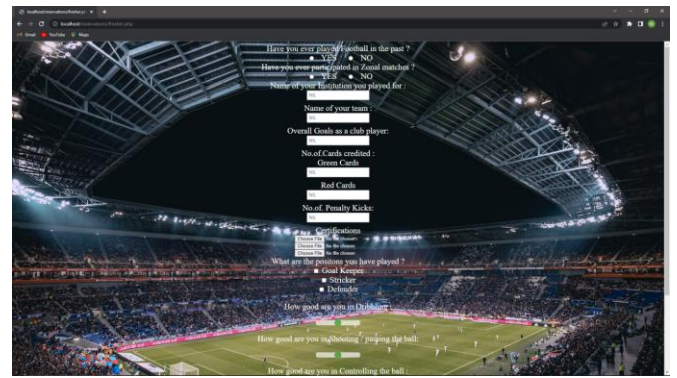


In the section that follows, polling users can cast their votes to choose if a scheduled match can take place.

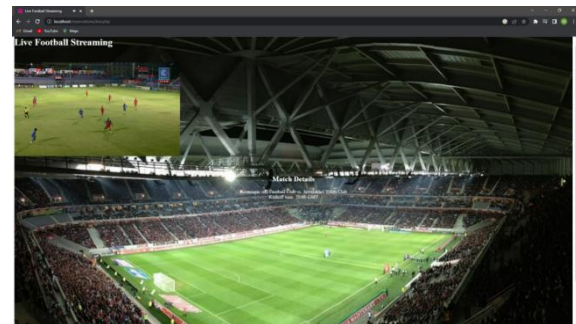
Player login:



Fresher Login:



Live Streaming:

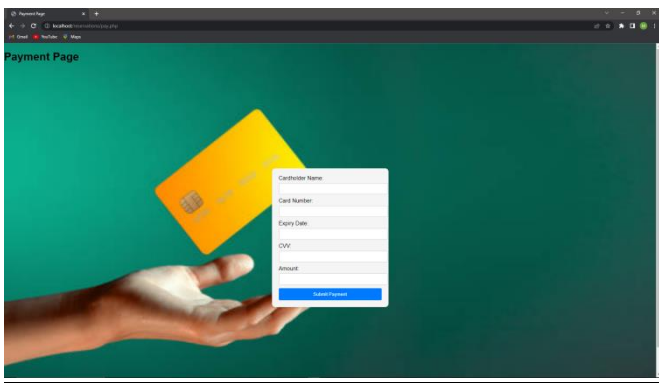


The user discovered the live streaming funnel on this panel, which broadcasts the rural football matches that take place throughout India. This made the user aware that football matches cannot only be concentrated at the international level.

Ticket Booking:



Payment:



VIII. CONCLUSION

The goal of the job was to evaluate the current state of the problem of organizing football games, examine the applications that already address this issue, create a complete application that satisfies all end-user needs, construct the prototype, and test it. The procedure for setting up football games and the attendance issues were outlined and detailed in the research portion. It discussed the majority of currently available programs addressing this problem, listed their advantages and disadvantages, and assessed how well they can carry out the outlined work. The investigation revealed that no application is fully functional enough to carry out the entire organizing procedure, and all existing ones can only partially handle the problem. All of the functional and non-functional criteria for the reservation system were identified in the analytical part, which more precisely predicted the system's

future functionality. Web applications were then created based on all the requirements. It was decided to use a web application to implement the reservation system. The architecture of the web application was established, and the domain model was developed using the standard methods for developing web applications. The technologies that were chosen and explained in the implementation phase were those that were used to implement the model. The prototype enables the user to search for registration themselves as well as reserve football matches based on predetermined parameters. Ultimately, the suggested method for further development and implementation.

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