

Smart Real-Estate System: A Data-Driven Approach to Property Management

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Abstract— *The real estate industry plays a pivotal role in economic growth, facilitating property transactions worldwide. In this digital era, efficient real estate management systems are crucial for agents, buyers, and property owners. This paper presents the design and development of a Real Estate Management System (REMS) using PHP, aimed at providing a comprehensive platform for property listing, search, and communication. The REMS enhances user experience, improves efficiency, and facilitates seamless communication between stakeholders. This article speaks about Smart Real Estate Application which is a cutting-edge platform created to make it easier to purchase and sell properties using the most recent technological developments. It uses machine learning algorithms to precisely forecast a property's EMI price based on various aspects like total amount, duration, and Interest rate. Users can search through a sizable database of properties and select the one that most closely matches their requirements. To reach a larger audience and improve their chances of finding the ideal buyer or renter, users can also post their properties for sale or rent. Overall, this article provides insight into Smart Real Estate Application which provides a thorough response to the issues that both buyers and vendors of real estate must deal with. Its incorporation of machine learning algorithms guarantees that real estate prices are correctly predicted, enabling a more open and effective process for buying and selling.*

Index Terms— *Smart Real Estate, Application, Machine Learning, EMI Prediction, Linear Regression, Random Forest, Text Process Algorithm, And Search Algorithm.*

I. INTRODUCTION

The Real Estate Management System (REMS) is a comprehensive web-based application designed to facilitate property streamline communication between agents and clients and provide a user-friendly platform for property management. Developed using PHP, REMS offers a range of features catering to real estate

agents, property buyers, and system administrators. One of the most lucrative and dynamic industries in the world is real estate. Intense rivalry, high transaction costs, and a variety of difficulties are features of the real estate market. The real estate sector has changed significantly since the emergence of technology. The difficulties faced by both buyers and sellers in the real estate market have given rise to an innovative solution in the form of smart real estate application.

With this article, a web-based application called the Smart Real Estate application can be created to make it easier to buy and sell properties by utilizing the most recent technology developments. The EMI price of a house may be precisely predicted by this application using machine learning algorithms based on several criteria like total price, duration, and interest rate. Conventional pricing techniques, such as the examination of comparable sales, can be laborious and unreliable. This issue is resolved by the Smart Real Estate Online Application, which makes precise property price predictions using machine learning algorithms.

In [1] authors discuss the Next generation pure component property estimation models: With and without machine learning techniques and the development of next-generation pure component property estimation models, both with and without machine learning techniques. The authors, Alshehri et al., explore the effectiveness of these models and their potential applications in chemical engineering. In [2] The random neural network in price predictions, the authors discuss the use of random neural networks in predicting stock prices. The study explores the effectiveness of this approach in comparison to other traditional methods. In [3] House price prediction

using machine learning algorithms describes a study on the use of machine learning algorithms for house price prediction. The authors, Vineeth et al., present their findings on the effectiveness of different algorithms for predicting house prices and discuss the potential applications of their research. The study was presented at the Second International Conference on Soft Computing Systems in 2018.

Section 2 speaks about related works which involve conducting a comprehensive search and analysis of existing literature, and research studies to identify the current state of knowledge, as well as any gaps or inconsistencies in previous work. Section 3 refers to the specific tasks or activities that are planned to be carried out to achieve the project's objectives. Section 4 presents, and analyses the results of the project in a clear and organized manner. Section 5 summarizes the key findings of the project and outlines potential future research directions.

II. SYSTEM DESIGN

In the development of the sales management system of real estate enterprises, the hardware and software equipment's mainly include a personal PC, SQL Server database system, Visual Studio development platform, and html, CSS, JavaScript, PHP Languages. These hardware devices and software devices are not expensive to purchase at present. The system installation is relatively simple, and it does not need to invite professional personage to undertake, which need to hire two system maintenance personnel only. The real estate project management system takes into account the computer base of different users. The software is easy to learn and master, so it doesn't take a lot of time to train students. The system can not only can improve the sales performance of real estate enterprises, but also helps to improve the management level of enterprises. For the real estate industry, the economic benefits of it is immeasurable. The target system is economically feasible in terms of the cost to be invested. According to the actual development of the system, the B/S mode is chosen as the system frame structure, which is a kind of web-based distributed application architecture, which can meet the needs of different types of users, and is suitable for the development of the sales management system of real

estate enterprises. B/S architecture model divides the whole application into three layers, interface layer, business logic layer and data access layer. In the process of execution, all interaction work with the users are given to the browser side of the system, namely the interface layer. The business and data related operations are given to the Web server to complete, so that the browser and the Web server work together to complete the user request processing. Sales management system is based on ASP.NET environment, system structure adopts B/S mode, the front desk programming uses html, CSS, JavaScript language, background database is SQL Server and PHP, foreground and background interaction is realized by ADO.NET connection. The system includes the client, application server and database server. The request from the client will be submitted to the application server, and then through the operation of the database, it realizes the response to user requests.

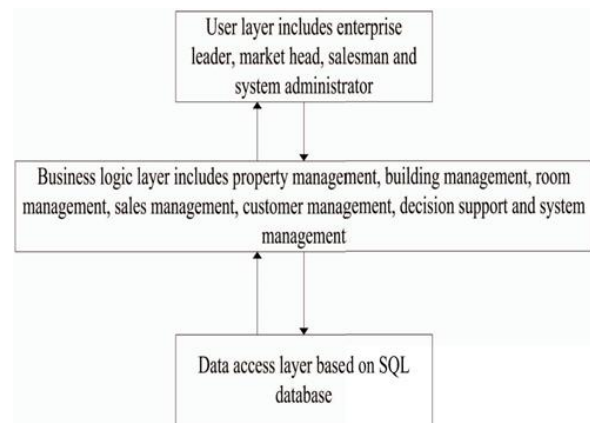


Figure 1. The overall architecture of the system

III. DEMAND ANALYSIS

The purpose of functional requirement analysis is to find out the functional index of the real estate enterprise sales management system, which is the function that the system should have. In the software development process, there are many tools used to describe user requirements, which can be discussed through use-case diagrams. The user of the system mainly includes enterprise leader, market leader, salesman and system administrator. The business of the system can be roughly divided into property management, building management, room management, sales management, customer

management, decision support and system management.

Property management mainly completes the maintenance of the basic information of the building, including building information adding, deleting, building information modification, and information query. The main users are market leaders and the system administrators. Customer management includes customer information addition, customer information deletion, customer information modification, and customer information inquiry. Decision support includes sales forecasting, performance statistics, performance reports and monthly reports. The system management mainly focuses on the system administrator, providing the maintenance of the basic information of the system, including user management, data backup, data reduction and permission setting.

Portability means that the target system can be ported to another environment for application. Due to the constant changes in the application environment, it is necessary to consider whether the software can be portable in order to extend the life of the software. It contains adaptability, easy installation and replaceability. Adaptability refers to the fact that target system has the adaptability with the development of computer technology, which can effectively use the network technology to complete the software upgrade and update. Easy installation refers to that the target system can easily carry out relevant installation operation, and the system can support users to install online. Replaceability refers to the chance that the target software can be used to replace other software when the environment is needed. The ultimate goal is to realize the software's long use and increase its service life.

Reliability refers to whether the target system can maintain normal performance during operation, and whether it can meet the user's normal operation needs. It mainly includes the fault-tolerance and recoverability of the system. For fault tolerance, the system can work normally, when the software fault occurs. When it detects the system error, it can recover, and does not affect the normal operation of the system. Recovery means that when the software cause some functions or performance of the software

fail, it can be recovered in a short time by a certain method.

IV. MODULE DESIGN AND ORGANISATION

A crucial component of creating a Smart Real Estate System that makes use of Machine Learning algorithms is module design and organization. The modules of the system can help guarantee that it operates effectively and efficiently by being properly organized and designed. The initial step in creating the Smart Real Estate System was to decide what essential tasks the system must carry out. Predicting property values, managing property listings, managing transactions, and offering a user-friendly interface were some of these duties. Then, each of these functions was divided into modules, each of which oversaw a particular duty. The system was created utilizing a modular design, with each module in charge of a distinct task.

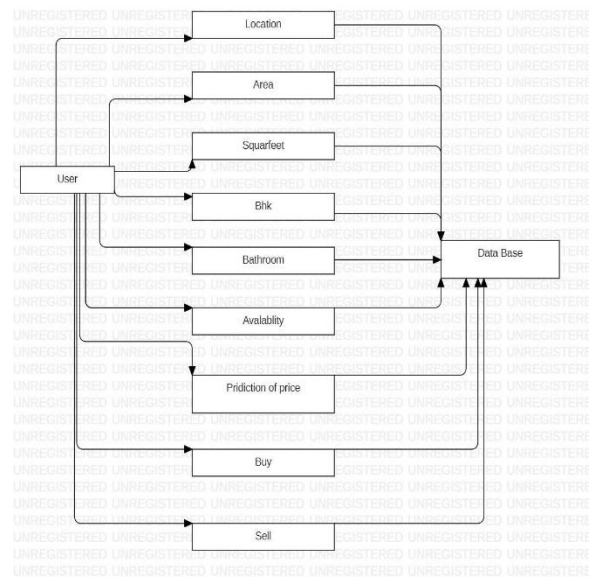


Figure 1. Modular Design and Organisation for Smart Real Estate System

V. LITERATURE REVIEW

Real estate management systems have become a popular tool for managing properties and listings, and PHP is one of the most popular frameworks for developing web applications. There is a wealth of literature on both topics, and this section will review some of the relevant research on real estate

management systems and PHP. A real estate management system is a web application that helps property managers and real estate agents manage their properties, tenants, and listings. These systems typically include features such as property listing management, tenant, and sales. According to a research article by V. Subramaniaswamy and K. R. Chitra, real estate management systems are becoming increasingly important as more and more people turn to the internet to search for properties. The authors note that real estate management systems can help reduce the time and effort required to manage properties and listings, and can also improve communication between property managers, agents, and tenants. PHP is a lightweight web application framework that is designed to be simple and easy to use. It is a popular choice for developing web applications because of its flexibility and scalability.

In a research paper by A. M. Said and A. F. Almkudat, the authors note that PHP is a popular choice for developing web applications because of its simplicity and flexibility. The authors highlight the importance of using a lightweight framework like PHP for developing web applications, as it can help improve performance and reduce the time and effort required to develop and maintain the application. In another research paper by K. D. K. Dissanayaka and P. H. P. Dharmawardhana, the authors compare the performance of PHP to other popular web application frameworks. The authors conclude that PHP performs well in terms of response time and memory usage, making it a good choice for developing web applications that require high performance.

VI. ARCHITECTURE DESIGN BUILDING WEB APPLICATION

Client-Side (Frontend) Architecture: HTML, CSS, JavaScript Framework:

- Responsible for rendering the user interface and handling user interactions.
- Implements responsive design for mobile and desktop devices.

Components:

- Property Listing Component: Displays a list of properties with basic information.

- Property Details Component: Shows detailed information, images, and features of a selected property.
- Search Component: Allows users to filter and search for properties based on various criteria.
- User Profile Component: Provides user-specific information and settings.
- Server-Side (Backend) Architecture: PHP Framework:
- Provides a robust foundation for building web applications with MVC architecture.

User Interface (UI) Design: We will need to create a UI design for the web application using HTML, CSS, and JavaScript. We can use front-end frameworks like Bootstrap or Materialize CSS to make the design process easier.

PHP Web Application: We will create a PHP application to handle the user's requests and responses. The PHP application will be responsible for handling all the CRUD (create, read, update, and delete) operations on the database.

MySQL Database: We will use MySQL as our database to store all the user and property-related data. The database will store the following details: Property details: house number, features, rent, and status. Tenant details: full name, gender, national ID, phone number, email ID, and registration date.

Admin Dashboard: We will create an admin dashboard to manage the properties and tenants. The admin can add, edit, and delete properties and tenants.

User Registration and Authentication: We will create a user registration and authentication system for tenants to sign up and log in to the web application.

Search View: We will create a search view for tenants to find properties in their targeted area. The search view will allow users to filter properties based on various criteria like location, features, rent, and availability.

Security: We will implement security measures like password hashing and data encryption to ensure the safety of user data.

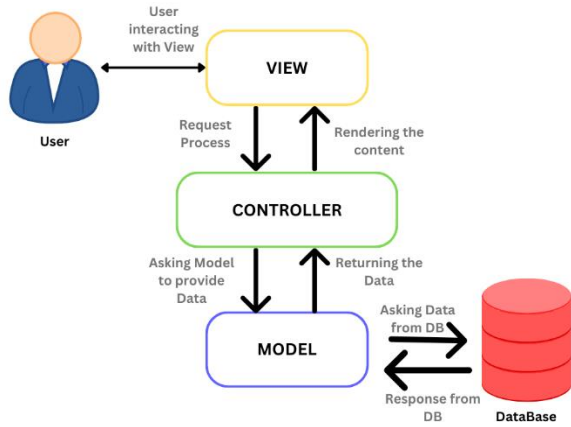


Figure 1. MVC Architecture

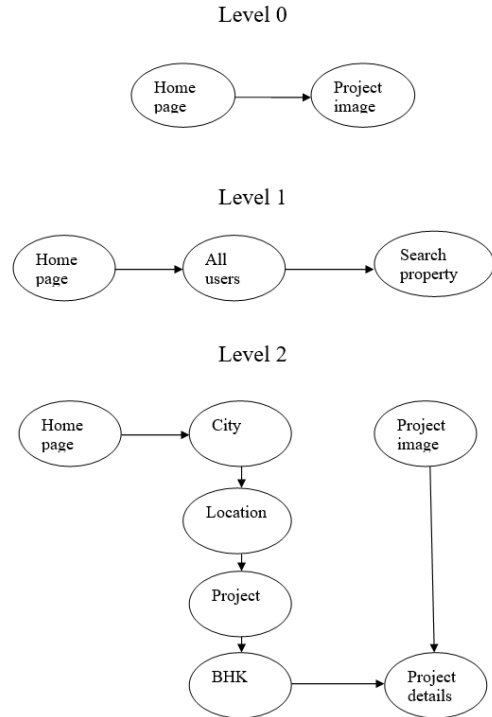


Figure 3. Data Flow Diagram

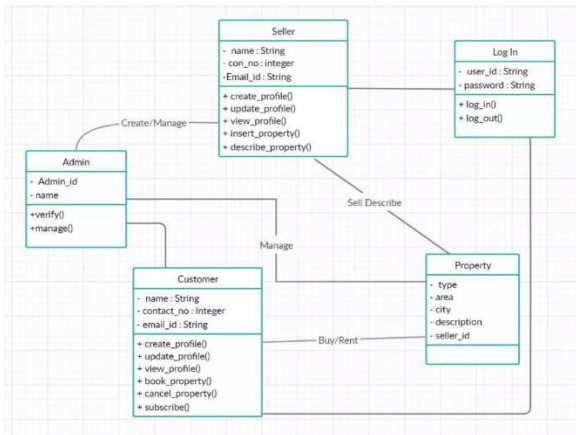


Figure 2. Class Diagram

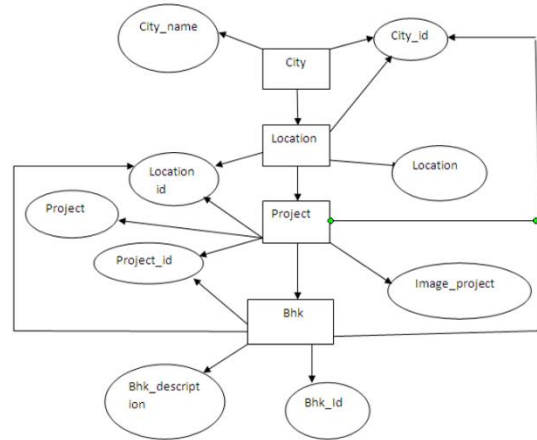


Figure 4. ER Diagram

To summarize, we will develop a real estate management system using PHP as the web framework, and MySQL as the database. The system will have an admin dashboard, user registration and authentication, search view, and security features.

VII. METHODOLOGY

The proposed real estate management system using PHP will be developed using a combination of HTML, CSS, and JavaScript for the front-end and PHP for the back-end. The system will incorporate a database system, which will store information about properties, including their location, price, size, and amenities, as well as information about property owners and potential tenants. The system will provide features like property search, online payments, maintenance requests, and lease management, among others. The system will also allow property owners to register and post their property details, such as address, number of bedrooms, bathrooms, rent or lease, and document registration number. Registered users will be able to search for properties based on location, price, size, and other parameters.

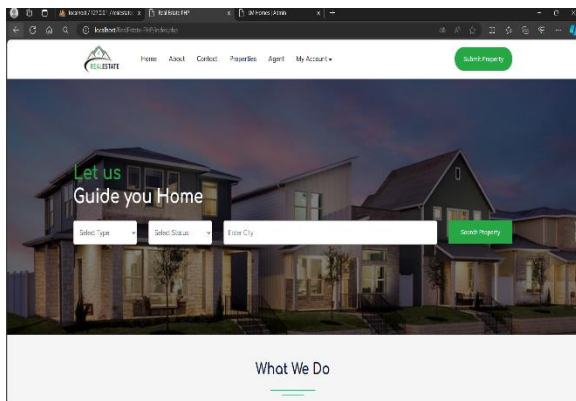


Figure 1. Home Page

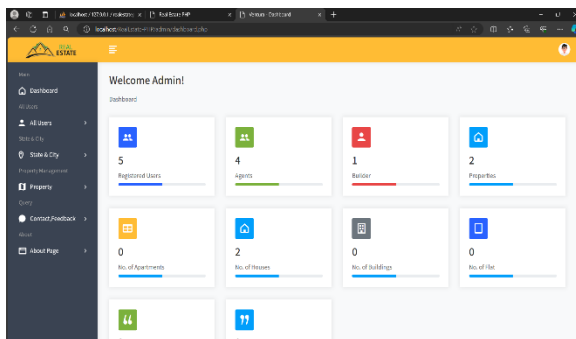


Figure 2. Admin Dashboard

CONCLUSION

The Real Estate Management System (REMS) developed using PHP offers a comprehensive solution

for property management, catering to agents, buyers, and administrators. The system's modular architecture, user-friendly interface, and robust security measures ensure a seamless and secure experience for all stakeholders. Future enhancements may include AI-driven property recommendations and enhanced data analytics for market insights.

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