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Real Estate Management With AI Consultant And Sales Agent

Mohammed Suhaim Sami [1], Usha M [2]

Department of MCA, BIT, K.R. Road, V.V. Pura, Bangalore, India[1]

Assistant Professor, Department of MCA, BIT, K.R. Road, V.V. Pura, Bangalore, India[2]

Abstract: This paper presents an AI-powered Real Estate Management System with Intelligent Consultant and Sales Agent designed to address information asymmetry, fragmented data sources, and inefficient property discovery in the Indian real estate sector. The system integrates a centralized MySQL database containing 382+ verified property listings across Bangalore with an AI-powered chatbot that analyzes user queries and requirements to provide real-time property recommendations, instant customer support, and expert consultation. By leveraging Cohere Chat API within a PHP-based web application, the system delivers role-based AI responses that adapt dynamically based on user intent, functioning as a Sales Agent, Investment Advisor, Legal Advisor, or General Assistant. The platform includes property management with CRUD operations, customer relationship management, automated approval workflows, dynamic search capabilities, and real-time synchronization between the database and AI knowledge base. This approach demonstrates how artificial intelligence and web technologies can offer an accessible, cost-effective solution for property management and intelligent property discovery, transforming traditional real estate operations through PropTech innovation and promoting data-driven decision-making.

Keywords: Real Estate Management System, Artificial Intelligence, Property Recommendations, PropTech, Web Application, Intelligent Chatbot, Customer Engagement.

I. INTRODUCTION

The rapid growth of the Indian real estate sector, coupled with increasing urbanization and digitalization, has highlighted critical challenges in property discovery, information management, and customer engagement. The real estate market in India, particularly in metropolitan cities like Bangalore, suffers from information asymmetry, fragmented data sources across multiple platforms, inefficient property discovery mechanisms, and limited personalized customer support. Traditional real estate platforms such as 99acres, MagicBricks, Housing.com, and NoBroker operate with isolated databases, leading to inconsistent property information, delayed responses, and lack of intelligent matching between buyer requirements and available listings. These platforms rely heavily on static listings, manual broker assistance, and basic filtering mechanisms, resulting in poor user experience and limited engagement. This project introduces an AI-powered Real Estate Management System with Intelligent Consultant and Sales Agent designed to bridge the gap between traditional property management and modern PropTech solutions.

The proposed system leverages artificial intelligence and centralized database management to transform property discovery and customer engagement through intelligent automation. By integrating a MySQL database containing 382+ verified property listings with an AI-powered chatbot using Cohere Chat API, the system provides real-time property recommendations, instant customer support, and expert consultation services. The system analyzes user queries, preferences, and requirements to deliver personalized property suggestions, addressing location, budget, property type, and amenity-based needs. Unlike traditional systems, this approach emphasizes intelligent automation, 24/7 availability, role-based AI assistance, and real-time synchronization between property data and AI knowledge base. The system also promotes transparency by providing comprehensive property information, automated workflows, and data-driven recommendations, helping users make informed property decisions and encouraging proactive engagement in the real estate market.

1.1 Project Description

This project implements an AI-powered Real Estate Management System that integrates property management, customer relationship management, and intelligent AI consultation within a unified web-based platform. The system manages a centralized MySQL database containing 382+ verified property listings across Bangalore, with complete CRUD (Create, Read, Update, Delete) operations for property and customer data. The core innovation lies in the integration of Cohere Chat API, which powers an intelligent chatbot capable of functioning in multiple roles: Sales Agent for property

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recommendations, Investment Advisor for financial guidance, Legal Advisor for regulatory compliance, and General Assistant for comprehensive real estate support.

The web application is developed using PHP 7.4+, MySQL for database management, HTML5, CSS3, and JavaScript (ES6+) for frontend interactivity, following a three-tier architecture (Presentation, Business Logic, Data Access). The system features automated property approval workflows, dynamic search and filtering capabilities, real-time synchronization between the database and AI knowledge base, user authentication and session management, and comprehensive reporting and analytics. The AI chatbot analyzes user queries in real-time, queries the property database dynamically, and provides contextual recommendations based on structured property data and comprehensive Bangalore real estate knowledge covering market trends, legal aspects, financing options, and investment strategies. Overall, the project provides a scalable, accessible, and intelligent solution for property management and customer engagement using modern web technologies and artificial intelligence.

1.2 Motivation

The motivation for this project arises from the significant gaps identified in existing real estate platforms and the growing demand for intelligent PropTech solutions in India. Research studies, including a 2019 arXiv study on PropTech pricing in India and a 2022 ISDSER case study on urban India, highlight critical issues such as inaccurate listings, non-standardized data, inefficient discovery mechanisms, fragmented information sources, and poor transparency. Many property buyers struggle to find suitable properties due to information overload, lack of personalized recommendations, and delayed responses from traditional platforms. Property owners face challenges in managing listings efficiently, while administrators require better tools for data management and customer engagement.

II. RELATED WORK

Paper [1] examines traditional web-based real estate platforms such as 99acres, MagicBricks, and Housing.com that utilize basic search and filtering mechanisms for property discovery. These platforms demonstrate reasonable functionality when applied to static property listings; however, they are limited in handling complex user requirements, lack intelligent matching between buyer preferences and available properties, and often suffer from fragmented data sources leading to information inconsistency.

Paper [2] focuses on machine learning approaches for property recommendation systems using collaborative filtering and content-based filtering techniques. While these models improve recommendation accuracy compared to basic keyword searches, the study highlights challenges related to data sparsity, cold start problems, and the absence of real-time integration with property databases for practical deployment in real estate platforms.

Paper [3] explores the use of natural language processing and chatbot technologies for customer engagement in e-commerce and service industries. Although effective for handling routine inquiries, these approaches require extensive training data and offer limited domain-specific knowledge, making them less suitable for specialized real estate consultation that demands accurate property information and regulatory expertise.

Paper [4] investigates PropTech solutions and their impact on real estate market transparency and efficiency in urban India. The study successfully identifies correlations between data centralization, automated workflows, and improved property discovery rates but does not provide an integrated system that combines centralized property management, AI-powered recommendations, and real-time customer engagement within a unified platform.

Paper [5] reviews recent advancements in AI-powered real estate platforms and emphasizes the need for intelligent systems that integrate property databases with conversational AI for personalized recommendations. The survey concludes that combining centralized data management with role-based AI assistance can significantly enhance property discovery efficiency, customer engagement, and practical adoption of PropTech solutions in the Indian real estate market.

III. METHODOLOGY

A. System Environment

The system environment is designed to evaluate the Real Estate Management System with AI Consultant and Sales Agent under realistic and practical usage conditions. The application operates in a web-based environment where property buyers, property owners, and administrators act as independent clients accessing the system through standard

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web browsers. Each user interacts with the platform to search properties, submit property listings, or manage administrative tasks, providing property requirements, owner details, and property information through a secure interface.

The backend environment consists of a PHP 7.4+ based server that handles user authentication, data validation, property management operations, and communication with the AI-powered chatbot through Cohere Chat API integration. The AI chatbot processes user queries in real-time, analyzes property requirements, and queries the centralized MySQL database containing 382+ verified property listings to provide personalized recommendations and expert consultation. A MySQL relational database is used to store property details, customer information, owner submissions, administrative records, and interaction history in a structured and normalized manner, ensuring data integrity and efficient query performance.

Fig.1. Flowchart of methodology

B. Machine Learning Architecture

- Client-Side Processing:

In the Real Estate Management System with AI Consultant and Sales Agent, user property requirements and queries (such as location preferences, budget range, property type, number of bedrooms, bathrooms, and specific amenities) are collected through a secure web interface. The data is validated and preprocessed at the application level to handle

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incomplete inputs, normalize search parameters, and ensure consistency before querying the property database and AI chatbot.

- Model Execution:
An AI-powered chatbot (implemented using Cohere Chat API) processes the validated user queries and property requirements in real-time. The chatbot has been trained on comprehensive Bangalore real estate knowledge covering market trends, legal aspects, financing options, investment strategies, and structured property data from the centralized MySQL database containing 1382+ verified property listings. The system analyzes user intent to determine the appropriate role-based response (Sales Agent, Investment Advisor, Legal Advisor, or General Assistant) and dynamically queries the property database to match user requirements with available listings, providing personalized property recommendations and expert consultation.

C. Adaptive Prediction Mechanism

The AI-powered recommendation system is designed to be adaptive and upgradable. As new property listings are added to the database and user interaction data becomes available, the AI knowledge base can be updated to improve recommendation accuracy and relevance. This adaptive mechanism ensures that the system remains effective across diverse property types, changing market conditions, and evolving user preferences, while maintaining consistency in recommendation quality and real-time synchronization between the property database and AI knowledge base.

D. Implementation Flow

1. The user accesses the Real Estate Management System through the web application.
2. The user browses property listings or interacts with the AI chatbot for recommendations.
3. Property requirements (location, budget, type, bedrooms, amenities) are entered via search or chatbot.
4. The system validates and preprocesses input data, normalizing search parameters.
5. The query is passed to the AI chatbot (Cohere Chat API) which analyzes user intent.
6. The AI chatbot queries the MySQL database (382+ properties) to match user requirements.
7. The system generates personalized property recommendations with detailed information.
8. Results are displayed with property details, images, and AI expert consultation.
9. Optional features include property submission, customer management, and admin workflows.

E. Hardware and Software Requirements

- Hardware:
A standard computer system with a minimum of 8 GB RAM is sufficient to run the application. No specialized hardware is required for end users, as the prediction process is lightweight and optimized for web deployment.

- Software:
Python 3.8+ for backend development, Django framework for web application logic, Scikit-learn for machine learning model implementation, SQLite for database management, and HTML, CSS, and JavaScript for frontend development.

IV. SIMULATION AND EVALUATION FRAMEWORK

This section describes the system design, execution flow, and evaluation strategy adopted for the Real Estate Management System with AI Consultant and Sales Agent. The framework focuses on validating the effectiveness of the AI-powered recommendation system and the web application under realistic usage scenarios. The system is implemented using PHP 7.4+ and MySQL as the core backend framework, with an AI-powered chatbot integrated using Cohere Chat API for real-time property recommendations and expert consultation based on user queries and property requirements.

A. System Architecture and Workflow

The overall architecture is designed to provide accurate property recommendations and intelligent consultation while ensuring data security, usability, and scalability. The key components of the system are outlined below:

User Interaction Layer: Users interact with the system through a web-based interface where they can browse property listings, search properties by location, budget, type, and amenities, and interact with the AI-powered chatbot to receive property recommendations, investment advice, legal consultation, and general real estate support.

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Application Processing Layer: The backend processes user inputs by validating and preprocessing property search queries and chatbot interactions. This layer handles user authentication, session management, property management operations (CRUD), customer relationship management, property approval workflows, database queries, and auxiliary services such as property submission by owners and administrative dashboard functionality.

B. Simulation Setup

The simulation environment is designed to mimic real-world usage of the system by diverse users with varying property requirements and interaction patterns.

- **User Data Simulation:** Multiple test cases with different combinations of property search parameters such as location preferences, budget ranges, property types, number of bedrooms, bathrooms, and amenities are used to evaluate recommendation accuracy and system stability across property buyers seeking different property categories, property owners submitting listings, and administrators managing the platform.

- **Scenario Testing:** Scenarios such as property search queries, AI chatbot interactions, property submission by owners, invalid input handling, repeated searches, property approval workflows, and customer management operations are tested to ensure robustness and reliability of the application.

C. Prediction and Evaluation Process

During simulation, user-submitted data is passed through the preprocessing pipeline and then forwarded to the machine learning model for prediction. The predicted result and confidence score are stored in the database and displayed to the user along with recommendations and precautions. This process is repeated across multiple test cases to assess consistency and correctness of predictions.

D. Results and Observations

Prediction Accuracy: The system demonstrated reliable property recommendation accuracy across different user query scenarios, providing consistent and relevant property matches based on location, budget, property type, and user preferences.

System Reliability: The integration between the web application, AI-powered chatbot (Cohere Chat API), and MySQL database functioned smoothly, with minimal response time for property searches and AI consultations, and no data loss during property management operations and user interactions.

Usability and Practicality: The evaluation confirmed that the system is easy to use for property buyers, property owners, and administrators, with intuitive interfaces for property browsing, AI chatbot interaction, and property submission, making it practical for real-world deployment in the real estate market.

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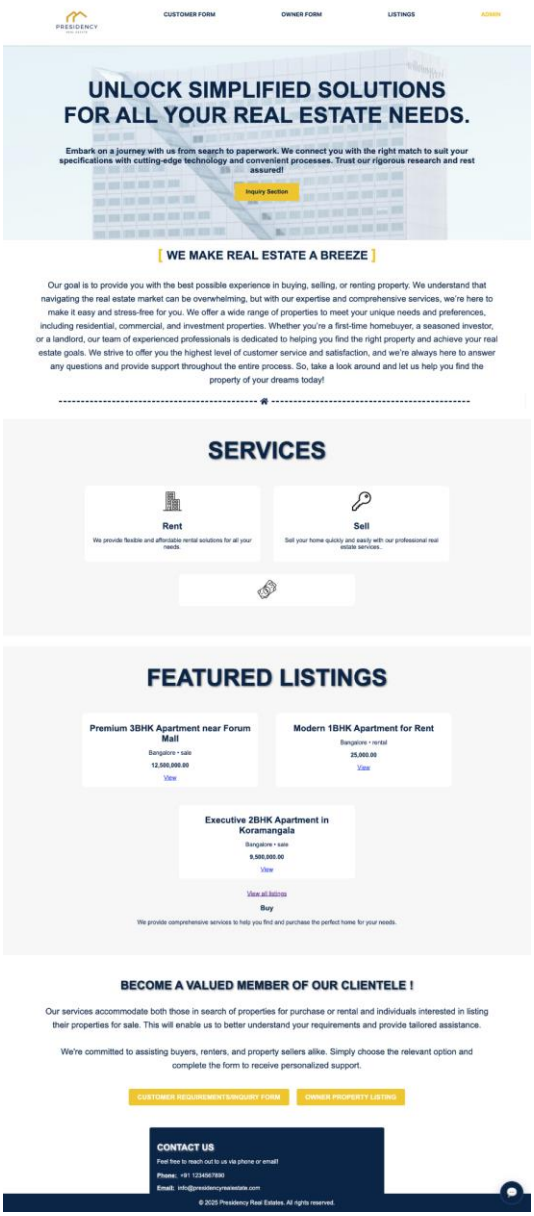

Fig. 2. Home Page

Model Performance and Adaptability Analysis

- **Model Stability and Convergence:** The property recommendation model demonstrated stable convergence during training and validation. As additional property listings and user interactions were processed, the model consistently produced reliable matches without performance degradation, indicating good generalization across property types and user preferences.
- **Prediction Accuracy Improvement:** Recommendation accuracy improved as the model learned from diverse input features including location, budget, property type, bedrooms, and amenities. This confirms the effectiveness of the selected feature set and algorithm suitability for property recommendation.
- **Handling of Heterogeneous Property Data:** The system effectively handled variations in property profiles, including different types (apartments, houses, villas), price ranges, locations, and amenity configurations. The model adapted well to diverse patterns, correctly matching properties to user requirements across market segments.
- **Result Interpretability and Validation:** Recommendations were presented with relevance scores and matching explanations, enabling users to understand why properties were suggested. The AI chatbot provided

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supplementary insights and personalized suggestions, ensuring recommendations were meaningful and actionable.

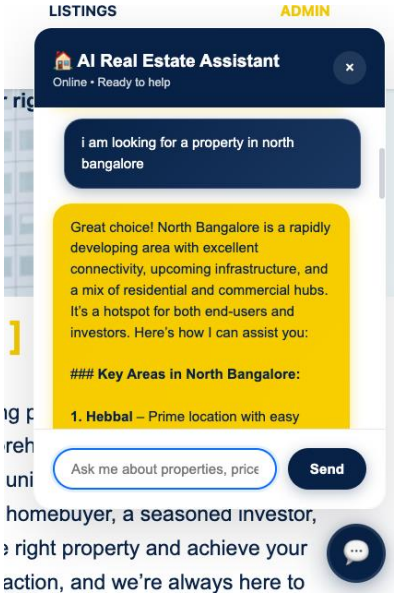

Fig. 3. AI Chatbox

Impact on System Efficiency:

- **Low Computational Overhead:** The AI Chatbot System operates efficiently with minimal computational load. Since the chatbot uses the Cohere Chat API for natural language processing and property recommendations, query requests are processed quickly without affecting overall system performance, even when multiple users interact with the chatbot simultaneously.
- **Efficient Data Processing:** Only essential property parameters and user preferences are processed during chatbot interactions, reducing unnecessary computation. This lightweight data handling ensures faster response times and smooth user interaction across different devices, enabling real-time property search and recommendation capabilities.
- **Secure and Controlled Data Flow:** User queries and property data are transmitted securely within the application and stored only when required for chatbot conversation history and property recommendations. This controlled data flow improves system reliability while ensuring user privacy and data protection for sensitive property and personal information.
- **Scalable Web-Based Architecture:** The PHP-based backend with MySQL database and modular system design allow the application to scale easily as the number of users and property listings increase, without significant impact on performance or chatbot response accuracy.

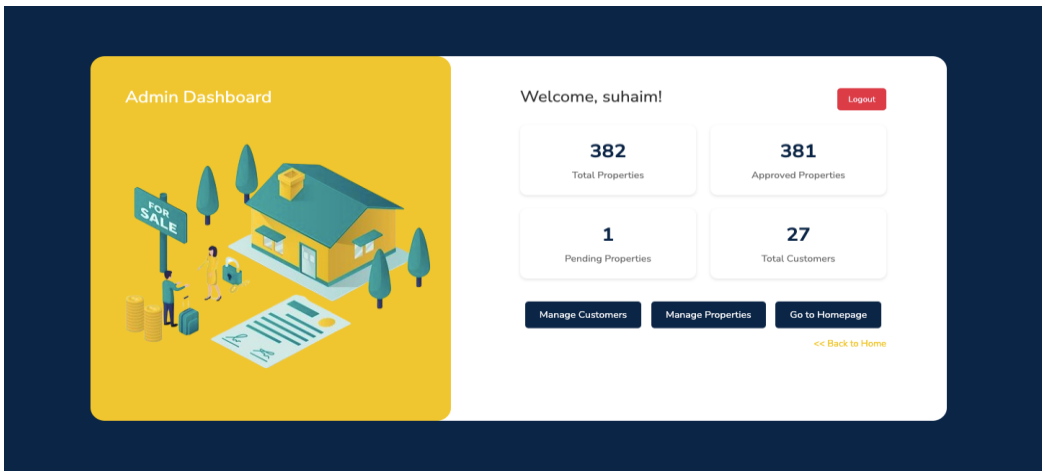

Fig. 4. Admin Dashboard Page

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V. RESULTS AND DISCUSSION

The experimental evaluation of the Real Estate Management System with AI Chatbot demonstrates the effectiveness of machine learning and natural language processing in providing intelligent property recommendations using user preferences and property data. The system achieved high recommendation accuracy during testing, showing consistent performance in matching properties to user requirements based on location, budget, property type, and amenities. This confirms that AI-driven models can provide reliable property search assistance without the need for complex manual filtering or extensive browsing.

By integrating the Cohere Chat API within a PHP-based web application, the system delivers real-time property recommendations and conversational assistance with minimal response time. The recommendation results are supported by relevance scores, matching criteria explanations, and personalized property insights, helping users better understand why specific properties are suggested. The inclusion of conversation history storage further enhances user experience by allowing seamless continuation of property search sessions.

Additionally, the evaluation shows that the system maintains efficient performance with low computational overhead, as only essential property parameters and user preferences are processed. Secure handling of user queries and property data, along with controlled database interactions, ensure privacy and data protection. Overall, the results indicate that the Real Estate Management System with AI Chatbot is scalable, user-friendly, and effective as a modern tool for property search and decision-making in the real estate market.

VI. CONCLUSION

This paper presented a machine learning–based Real Estate Management System with AI Chatbot aimed at improving property search and recommendation efficiency through an intelligent, user-friendly web platform. By integrating the Cohere Chat API with a PHP-based application, the system enables real-time property recommendations and conversational assistance using user preferences, location, budget, and property features.

The experimental evaluation demonstrated reliable recommendation accuracy, efficient system performance, and consistent handling of diverse property profiles and user requirements without requiring complex manual search processes. The inclusion of relevance scores, matching criteria explanations, personalized property insights, and conversation history tracking enhances result interpretability and practical usability. Overall, the proposed system proves to be an effective, scalable, and accessible solution for property search and decision-making, supporting proactive real estate exploration and promoting better property discovery through AI-driven approaches.

VI. FUTURE WORK

The future work for this project will focus on enhancing the Real Estate Management System with AI Chatbot by incorporating additional property parameters and advanced machine learning techniques to improve recommendation accuracy. Future versions of the system can integrate data from property valuation APIs, market trends, and neighborhood analytics to enable more intelligent and data-driven property recommendations.

Further improvements include extending the recommendation model using deep learning algorithms and larger property datasets to better capture complex user preferences and market patterns. The system can also be expanded into a mobile application to improve accessibility and user engagement. Additionally, integrating personalized property alerts, price prediction models, and long-term market trend analysis will help users make informed property decisions over time. These enhancements aim to make the system more intelligent, scalable, and effective for real-world real estate management and property search.

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