APNI JAGAH: AN AI-DRIVEN REAL ESTATE PLATFORM

A PROJECT REPORT

Submitted by

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Under the guidance of

MS. VANDANA TOMAR
(Assistant Professor, Computer Science & Engineering)

in partial fulfillment for the award of the degree

of

BACHELOR OF TECHNOLOGY

in

COMPUTER SCIENCE & ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

IMS ENGINEERING COLLEGE

NH-09, ADHYATMIK NAGAR

GHAZIABAD, UTTAR PRADESH (U.P)

JUNE, 2025

VISION OF THE INSTITUTE

To make IMSEC an Institution of Excellence for empowering students through technical education, incorporating human values, and developing engineering acumen for innovations and leadership skills to upgrade society.

MISSION OF THE INSTITUTE

- To promote academic excellence by continuous learning in core and emerging Engineering domains using innovative teaching and learning methodologies.
- To inculcate values and ethics among the learners.
- To promote industry interactions and cultivate young minds for entrepreneurship.
- To create a conducive learning ecosystem and research environment on a perpetual basis to develop students as technology leaders and entrepreneurs who can address tomorrow's societal needs.

VISION OF THE DEPARTMENT

To provide globally competent professionals in Computer Science & Engineering embedded with sound technical knowledge, aptitude for research and innovation, and nurture future leaders with ethical values to cater to industrial & societal needs.

MISSION OF THE DEPARTMENT

Mission 1: To provide quality education in the theoretical and applied foundations of Computer Science & Engineering.

Mission 2: To conduct research in Computer Science & Engineering, resulting in innovations, thereby nurturing entrepreneurial thinking.

Mission 3: To inculcate team-building skills and promote life-long learning with high societal and ethical values.

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

PO1.	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2.	**Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3.	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4.	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5.	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6.	**The engineer and society:** apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7.	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8.	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9.	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10.	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11.	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12.	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

Engineering Graduates will be able to:

PSO1: To analyze and demonstrate the recent engineering practices, ethical values, and strategies for real-time world problems to meet the challenges for the future.

PSO2: To develop an adaptive computing system using computational intelligence strategies and algorithmic design to address diverse data analysis and machine learning challenges.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

B. Tech Computer Science & Engineering Department has the following Program Educational Objectives:

PEO1: Possess core theoretical and practical knowledge in Computer Science and Engineering for successful career development in industry, pursuing higher studies or entrepreneurship.

PEO2: Ability to imbibe life-long learning for global challenges to impact society and environment.

PEO3: To demonstrate work productivity, leadership and managerial skills, ethics and human values in a progressive career path.

PEO4: To exhibit communication skills and collaborative skill plans and participate in multidisciplinary Computer Science & Engineering fields.

CO-PO-PSO MAPPING FOR ACADEMIC SESSION (2024-25)

Course Name: Project   AKTU Course Code: KCS851
Semester/Year: VIII/4th   NBA Code: C411

Course Outcomes:

CO	DESCRIPTION	LEVEL
C411.1	Analyze and understand the real-life problem and apply their knowledge to get programming solutions.	K4, K5
C411.2	Engage in the creative design process through the integration and application of diverse technical knowledge and expertise to meet customer needs and address social issues.	K4, K5
C411.3	Use The Various Tools And Techniques,coding practices for developing real life solutions to the problem.	K5, K6
C411.4	Find out the errors in software solutions and establishing the process to design maintainable software applications	K4, K5
C411.5	Write the report about what they are doing in project and learning the team working skills	K5,K6

CO-PO-PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C411.1	3	3	3	3	3	1	1	2	2	3	3	3	3	3
C411.2	3	3	3	3	3	1	1	2	2	3	3	3	3	3
C411.3	3	3	3	3	3	1	1	2	2	3	3	3	3	3
C411.4	3	3	3	3	3	1	1	2	2	3	3	3	3	3
C411.5	3	3	3	3	3	1	1	3	3	3	3	3	3	3
C411	**3**	**3**	**3**	**3**	**3**	**1**	**1**	**2.2**	**2.2**	**3**	**3**	**3**	**3**	**3**

CANDIDATE'S DECLARATION

I here by declare that the work, which is being presented in the Project, entitled **"Apni Jagah: An AI- Driven Platform for Real Estate Price Prediction and Transaction Transparency"** in partial fulfillment for the award of Degree of **"Bachelor of Technology (B.Tech)"** in **Computer Science & Engineering**, and submitted to the Department of Computer Science & Engineering, IMS Engineering College, Ghaziabad, affiliated to Dr. A.P.J Abdul Kalam Technical University, Uttar Pradesh, Lucknow is a record of my own investigations carried under the Guidance of **Ms. Vandna Tomar, (Assistant Professor)**, IMS Engineering College, Ghaziabad.

I have not submitted the matter presented in this Project anywhere for the award of any other Degree.

Name: Saubhagya Mishra

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Date:

Name: Rajat Chaudhary

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Name: Saksham Pratap

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Name: Prashant Pandey

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Date:

CERTIFICATE

I hereby certify that the work which is being presented in the project report entitled "**Apni Jagah: An AI- Driven Platform for Real Estate Price Prediction and Transaction Transparency**" by **"Saubhagya Mishra, Rajat Chaudhary, Sagar Yadav, Saksham Pratap Rana, Prashant Pandey**" in partial fulfillment of requirements for the award of degree of B.Tech. (CSE) submitted in the Department of CSE at "IMS Engineering College" under A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW is an authentic record of my own work carried out under the supervision of **Ms. Vandna Tomar.**

SUPERVISOR

Name: Ms. Vandna Tomar
Signature:
Date:

ACKNOWLEDGEMENT

I would like to place on record my deep sense of gratitude to **Ms. Vandna Tomar, Assistant Professor,** Department of Computer Science & Engineering, IMSEC, Ghaziabad, for his/her generous guidance, help and useful suggestions.

I express my sincere gratitude to **Prof. (Dr.) Sonali Mathur, HOD** in Department of Computer Science & Engineering, IMSEC, Ghaziabad, for his stimulating guidance, continuous encouragement and supervision throughout the course of present work.

I am extremely thankful to **Prof. (Dr.) Manas Kumar Mishra, Director, IMSEC**, Ghaziabad, for providing me infrastructural facilities to work in, without which this work would not have been possible.

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LIST OF ABBREVIATIONS

AI	:	Artificial Intelligence
BHK	:	Bedroom, Hall, Kitchen
ML	:	Machine Learning
UI	:	User Interface
UX	:	User Experience
SQL	:	Structured Query Language
RERA	:	Real Estate (Regulation and Development) Act
R²	:	Coefficient of Determination
MAE	:	Mean Absolute Error

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References

Research Papers

ABSTRACT

The Indian property market suffers from inefficiencies due to uncertainty of prices, fake listings, and burdensome documentation. Online platforms that are currently available only act as directories of listings without strong mechanisms for price forecasting and transactional safety. "Apni Jagah" bridges these essential gaps through the introduction of an AI- powered platform aimed at offering data intelligence, secure transactions, and recommended property matching.

This report presents the creation of Apni Jagah, its problem identification, market survey, and benefits. It discusses relevant literature highlighting automation in property management, the changing dynamics of brand discovery for real estate websites, and the regulatory effect of RERA. The system design and methodology are shared, which encompass seller-buyer user interaction workflow, price prediction dataset features, anda system architecture of modularity including frontend (React.js), backend (Flask APIs), database (MySQL), and embedded machine learning models. AI- based modules such as neighborhood price prediction, smart deal suggestion, and document validation are part of the platform. Last, the testing and implementation stages are addressed, after which an initial Lighthouse test reveals areas where performance can be optimized while displaying high accessibility and SEO scores. Apni Jagah seeks to make real estate transactions a cleaner, safer, and user- friendlier process.

CHAPTER 1
INTRODUCTION

1.1 Problem Identification

The real estate market has traditionally suffered from price uncertainty, fake listings, and inept documentation mechanisms. Buyers experience challenges in assessing fair property values because of a lack of clear pricing mechanisms, while sellers deal with trust challenges from unverified buyers. Classic platforms like Housing.com, 99acres, and MagicBricks operate primarily as property listing websites without providing verified price forecasts or fraud protection mechanisms. As a result, property deals are still risky, time-consuming, and extremely subject to manual checks. This discrepancy leads to disputes, dissatisfaction, and monetary losses for both parties. Hence, there is a dire need for an AI-based platform that delivers data-driven intelligence, reliable transactions, and tailored property suggestions to simplify and make real estate transactions.

1.2 Detail Problem Identification

In spite of the emergence of web-based property listing websites, there are still a number of core problems in property transactions. Sellers tend to quote properties at prices that are overvalued or undervalued based on emotional considerations or misinformed choices, which do not allow buyers to make knowledgeable decisions. Also, fraudulent listings of properties and false claims of ownership are frequent, resulting in unsafe transactions and legal issues. Existing platforms are devoid of sophisticated predictive models for price quotes and end-to-end document verification processes. The lack of localized pricing data and intelligent deal suggestions leaves users relying on agents or making random guesses. Here lies the need for a system such as Apni Jagah — which combines machine learning for precise price forecasts, AI-driven document verification, and intelligent deal facilitation to provide a secure, transparent, and user-friendly real estate experience.

1.3   Current Market Survey

Table 1.1. Current Market Survey of Top 4 Indian Real Estate Platforms

Platforms	Their objectives	Our objectives	Key differences
Housing.com	Provides verified listings, price trends, and property visualization.	Focuses on pricing clarity, property comparison, and market insights using AI models.	Housing.com emphasizes verified listings and visualization; Apni Jagah uses AI for price prediction.
99acres	Supports buying, selling, and renting with location-based searches.	Offers smart deal predictions, neighborhood price comparisons, and secure deal locking.	99acres focuses on granular search filters; Apni Jagah emphasizes predictive models and security.
MagicBricks	Offers property listings, price trends, and additional services like loans.	Provides data-driven pricing predictions and neighborhood analysis without ancillary services.	MagicBricks includes support services; Apni Jagah focuses on pricing accuracy and deal optimization.
NoBroker	Eliminates intermediaries, enabling direct buyer-seller connections.	Provides transparent pricing, property comparisons, and market deal predictions.	NoBroker focuses on eliminating intermediaries; Apni Jagah enhances buyer decisions with AI tools.

Overall Observation:

Apni Jagah transforms traditional property listings into AI-powered predictive decision-making, filling critical gaps in pricing clarity, fraud detection, and user- centric guidance and provides some AI models like Smart Deal Pediction model, Neighborhood Price Prediction Model, Location Comparison Model.

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1.4   Advantages

Having an AI-driven platform such as Apni Jagah has several benefits within the real estate sector. Firstly, it gives transparency in prices using predictive analytics, maintaining fair prices for properties using real-time information. Secondly, it lessens fraud significantly with the use of an AI-supported document verification process, promoting buyer and seller trust. Thirdly, intelligent deal suggestions enable fast decision-making by users based on smart suggestions, lowering negotiation times and conflicts. In addition, price prediction based on neighborhoods allows clients to compare property efficiently, resulting in improved investments. Scalability of the system also provides avenues for future adoption of technologies such as blockchain for secure transactions and augmented reality for virtual home tours, offering a one-stop solution. Apni Jagah, in general, transforms property transactions by making them quicker, secure, transparent, and client- oriented.

CHAPTER 2
LITERATURE SURVEY

2.1 **Taran Kaur and Priya Solomon, "A Study on Automated Property Management in Commercial Real Estate: A Case of India," Property Management (Journal).**

The paper highlights the rising importance of automation and AI in India's commercial real estate (CRE) sector, emphasizing how PropTech solutions are transforming property management by enhancing operational efficiency, transparency, and stakeholder satisfaction. Using a qualitative methodology based on interviews with 18 professionals in major Indian organizations, the study identifies nine key automated functions and proposes a framework for technology-enabled stakeholder management. Notably, it underscores the impact of remote operations, AI-driven maintenance forecasting, and pandemic-resilient solutions. Our project, Apni Jagah: An AI-Driven Platform for Real Estate Price Prediction and Transaction Transparency, aligns strongly with these findings. By focusing on AI-based price prediction, fraud detection, and streamlined digital transactions, Apni Jagah reflects the same objectives of automation, transparency, and remote accessibility. It builds upon the study's themes by demonstrating how such PropTech innovations can be extended beyond commercial real estate to the broader property ecosystem, especially in a post-COVID, digitally driven market.

2.2 **Smitha Vasudevan and F.J. Peter Kumar, "Changing Realty: Altering Paths of Brand Discovery for Real Estate Websites in India," Property Management (Journal).**

This paper explores the evolution of brand awareness in the digital era, particularly for real estate websites in India, challenging traditional linear models of brand discovery and highlighting a non-linear, experience-driven approach. Through a technology-based analysis of user behavior—examining direct, indirect, and search engine traffic—the study reveals that brand awareness now often stems from actual website interactions rather than prior exposure through advertisements. It identifies three sources of digital brand discovery: firm-generated, user-generated, and experience-

initiated, with SEO and SEM playing crucial roles. The practical implication is clear: real estate platforms must prioritize seamless user experiences and robust search engine strategies to build trust and recognition. Our project, Apni Jagah: An AI-Driven Platform for Real Estate Price Prediction and Transaction Transparency, aligns closely with these insights. By focusing on optimized digital experiences, personalized recommendations, fraud protection, and search-driven visibility, Apni Jagah embodies the shift toward experience-based brand building in the emerging Indian PropTech landscape..

2.3 Basanta Kumar, Neelam Chawla, and Brajaraj Mohanty, "Reform in the Indian Real Estate Sector: An Analysis," International Journal of Law and Management.

Together, these studies offer a comprehensive view of the evolving Indian real estate ecosystem, highlighting critical regulatory, digital, and competitive dynamics. The RERA Act has introduced transparency and legal accountability, boosting investor confidence and formalizing the sector—foundations that align directly with Apni Jagah's mission to ensure trustworthy, fraud-free property transactions. Simultaneously, the shift in brand awareness—from advertising to experience and search-driven discovery—underscores the importance of SEO, user journey optimization, and embedded trust, all of which Apni Jagah integrates through AI-based recommendations and a seamless digital interface. Lastly, the competitive analysis of ZoloStays in the co-living space reveals the need for agile strategy, customer-centric design, and defensible tech-driven features—strategies mirrored in Apni Jagah's value proposition of predictive analytics, verified listings, and scalable infrastructure. These papers together validate the core pillars of Apni Jagah: transparency, trust, digital visibility, and adaptability in a rapidly transforming.

2.4 Sourav Ghosh Dastidar, Neha Gupta, and Devanshi Raichandani, "ZoloStays: Competing in Indian Co-living Space," Emerald Emerging Markets Case Studies, Vol. 11 No. 1.

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2.5   K.N. Agalave et al., Exploring Deep Learning and Regression Models for Real Estate Price Prediction: A Survey of Current Approaches, International Journal on Advanced Computer Theory and Engineering, Vol. 13, Issue 2, 2024.

This technical review underscores the limitations of traditional models in predicting real estate prices and the promise of deep learning approaches, especially when dealing with complex, large-scale, or unstructured data. While linear models offer interpretability, they fall short in capturing non-linear trends prevalent in real estate data. Deep learning techniques such as CNNs, RNNs, and hybrid models show superior performance by incorporating diverse data sources like images and text, though they present challenges in explainability and data requirements. For Apni Jagah, these insights reinforce the choice to adopt a hybrid AI framework—leveraging structured features (e.g., BHK, sqft) alongside unstructured inputs (e.g., images, descriptions)—to provide more accurate, scalable, and user-adaptive price predictions, while continuing to explore transparency solutions for deep models (e.g., LIME or SHAP) to enhance trust.

CHAPTER 3
METHODOLOGY & DESIGN

3.1   For Users

3.1.1   For Seller

How Does the Seller Interact with Apni Jagah's AI-Driven Platform?

The flowchart of **Fig.3.1** outlines the process flow for a property-selling platform.
Below is a detailed step-by-step explanation:

Fig. 3.1: Seller Verification Workflow with AI-Driven Models

1. Open Website

• The user begins by visiting the website.

2. User Interface

• Users interact with the website's interface to navigate through the platform.

3. Sell Property Button/Page

- Users looking to sell a property are directed to the Sell Property page via the interface.

4. Neighborhood Price Prediction Model

- The platform integrates a Neighborhood Price Prediction Model to suggest a fair property price based on the local area.

5. User Submission of Property Document

- Sellers upload required property documents to the platform for verification.

6. Document Stored in Database

- The submitted documents are securely stored in a database for further processing.

7. Legal Team Verification

- A Legal Team reviews the submitted documents to verify the authenticity and ownership of the property.

8. **Decision Point:**

- If Verified (Yes): Proceed to the next steps for property listing.

- If Not Verified (No): The process stops, and the user is notified of the failed verification.

9. Seller Fills Property Details

- Once verified, the seller provides additional details about the property(e.g., description, photos).

10. Smart Deal Prediction Model

- A Smart Deal Prediction Model analyzes the seller's provided price and predicts an optimized price to ensure a fair deal.

11. Property Database

- The finalized details, including the predicted price, are stored in the Property Database.

12. Property Listing on Navbar

- The verified property is listed on the website for buyers to view, making it available in the property listings section.

Purpose of the Flowchart in Fig.3.1

This workflow ensures:

- Property prices are fair (via prediction models).

- Sellers and properties are verified legally.

The process is secure and transparent, benefiting both buyers and sellers.

3.1.2 For Buyer

<div align="center">
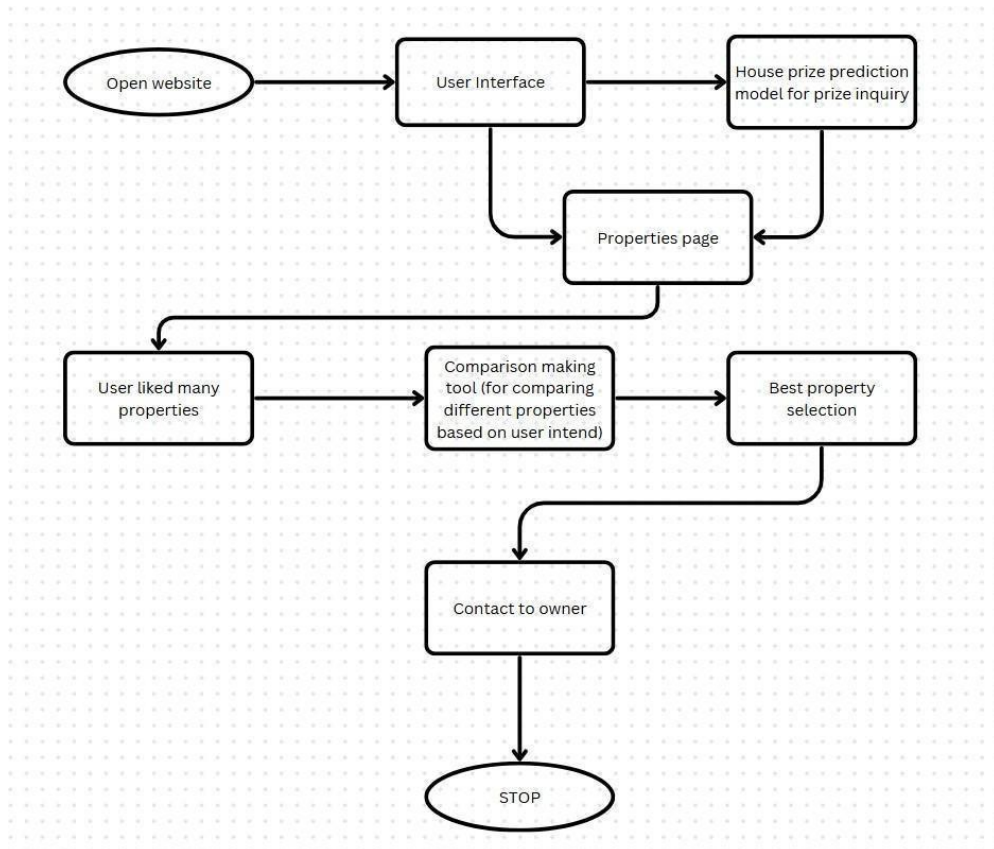
Fig. 3.2: Buyer Navigation and Decision-Making Framework.

</div>

How Does the Buyer Interact with Apni Jagah's AI-Driven Platform?

The flowchart depicted in **Fig.3.2** is an AI-powered real estate website that helps users find the best property based on their preferences, streamlining the search process.

1. Open Website:

- The user initiates the process by accessing the website.

2. User Interface:

- The user interacts with the website's interface, browsing through property listings and expressing their preferences.

3. House Price Prediction Model:

- The user can use model for enquiring house prices based on inputs like area, BHK, Location and etc. This can provide estimated values for properties.

4. Properties Page:

- The user navigates to a page displaying various properties, potentially filtered based on their preferences.

5. User Liked Many Properties:

- If the user expresses interest in multiple properties, an AI-powered comparison tool is activated.

6. Comparison Making Tool:

- This AI-powered tool analyzes the user's preferences and compares different properties based on their intent. It considers factors like price range, location, property type, and other relevant features highlighted by the user.

7. Best Property Selection:

- The AI model processes the comparison results and recommends the best property that aligns with the user's preferences and intent.

8. Contact to Owner:

- The user can then initiate contact with the owner or agent of the recommended property.

STOP:

3.2 Datasets

location	area	bhk	price
Jalahalli	1382	3	9535000
Kumbalgodu	902	2	4800000
Anekal City	1370	3	7261000
Anjanapura	1769	3	10000000
Hennur	1710	3	12800000
Talaghattapura	1839	3	9901000
Singasandra	1475	3	7614000
Chandapura	2687	3	17800000
Gottigere	2034	3	10900000
RR Nagar	1641	3	13000000

Fig. 3.3: Dataset Features for Price Prediction.

How Does Apni Jagah Leverage Dataset Features for Accurate Real Estate Price Prediction?

The dataset depicted in **Fig.3.3** is a valuable resource for building a real estate price prediction model, as it provides information on key factors that typically influence

property prices. Let's go through each feature in this dataset:

1 Location:

This column shows where each property is located, like Malad East, Ambernath West, or Borivali West. Location is one of the biggest factors in determining property prices because different areas have different demand levels, infrastructure, and amenities.

2 Area:

This column lists the size of each property in square feet. Generally, larger properties are more expensive, so the area is essential in predicting the price.

3 BHK (Bedrooms, Hall, Kitchen):

This tells us the configuration or layout of the property, specifically the number of bedrooms it has. For example, a 1 BHK has one bedroom, while a 3 BHK has three. This is important because properties with more rooms are typically worth more and cater to different buyer preferences.

4 Price:

This is the actual price of the property and serves as the target variable for our prediction model. We're using the other columns (like location, area, and BHK) to predict this value.

3.3 System Design

USER

Frontend (React.js)
Property Browsing
Property Selling
Location Comparison Model
Neighbourhood Price Prediction Model

Backend (Flask APIs)
User submitting property details
Property Submission
Smart Deal Processing
ML Model Interaction (Random Forest)

Price Predictor
Neighbourhood Price predictor
Location Comparison Model

Data Base(MySQL)
Property Listing details
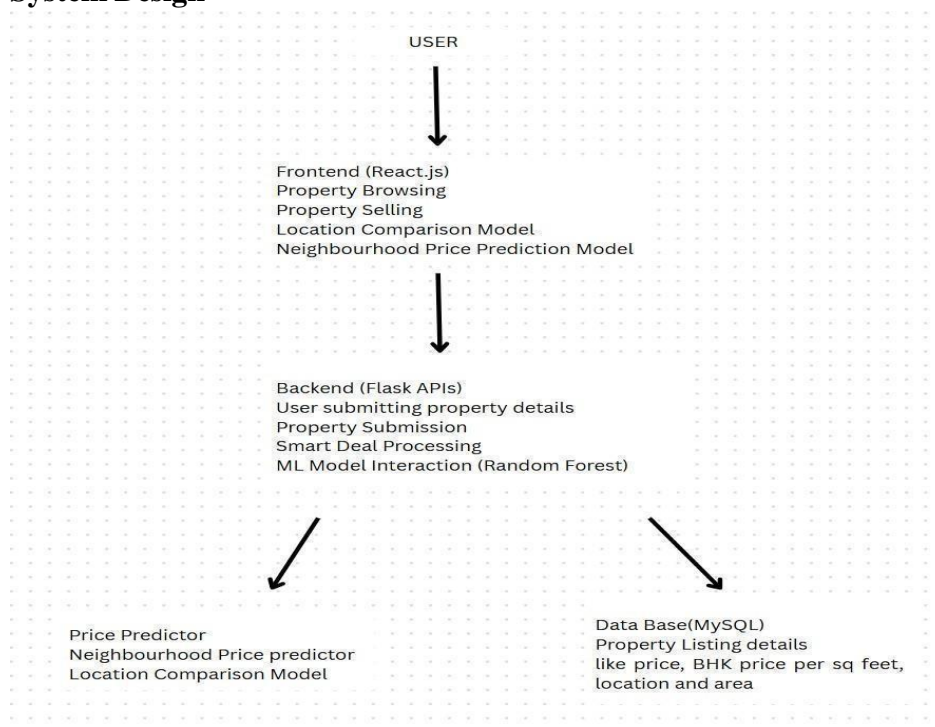like price, BHK price per sq feet,
location and area

Fig. 3.4: System Architecture of Apni Jagah

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3.3.1 System Architecture

The system architecture from **Fig 3.4** of Apni Jagah is designed to be modular, scalable, and secure, comprising four primary layers:

- Frontend Developed using React.js, it provides users with a seamless, dynamic, and responsive interface for property browsing, selling, and comparisons.

- Backend Powered by Flask APIs, it manages critical operations such as user authentication, property submission, document verification workflows, smart deal processing, and interaction with machine learning models

- Database Built on MySQL, it securely stores user profiles, verified property documents, property details, transaction histories, and pricing records, ensuring data consistency and integrity.

- Machine Learning Hosts the core AI models, including the Random Forest Regressor for price prediction, Smart Deal Predictor for negotiation recommendations, and Neighborhood Price Comparator for localized market analysis. All layers communicate securely through RESTful APIs over HTTPS, ensuring data privacy, fast response times.

3.3.2 Basic Modules

1. **User Interface Module (Frontend)**
   - Developed in React.js
   - Allows users to:
     - Browse property listings
     - Submit properties for sale
     - View predicted property prices
     - Compare property rates by location

2. **Authentication Module**
   - User sign-up, login, and session management
   - Ensures secure access to buy/sell functionalities

3. **Property Management Module**
   - Submit property details (BHK, location, sq.ft, description)
   - Upload images (via Cloudinary or local)
   - View submitted properties

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- Edit or delete listings

4. **Price Prediction Module (AI)**
   - Uses a Random Forest Regressor model
   - Predicts price based on location, BHK, sq.ft, etc.

5. **Smart Deal Recommendation Module**
   - Suggests whether a deal is fair based on predicted price vs. listed price

6. **Neighborhood Price Comparison Module**
   - Compares properties in the same area
   - Helps users identify the best value-for-money options

7. **Backend API Module (Flask)**
   - Routes and endpoints to handle:
     - Prediction requests
     - Property submissions
     - Fetching listings
     - Handling user sessions

8. **Database Module (MySQL)**
   - Stores:
     - User profiles
     - Property details
     - Uploaded image links
     - Predicted prices

9. **Location Comparison Module Interface Module**
   - Guides users through location selection and property exploration
   - Interacts with backend to suggest properties dynamically

CHAPTER 4
IMPLEMENTATION

4.1   Coding

The implementation of *Apni Jagah* involves the structured development of interconnected modules using a modern tech stack to ensure high performance, scalability, and modularity. The project architecture is distributed into four primary layers, each contributing critically to the overall system:

1.   Frontend Implementation (React.js):

The user interface is built using React.js, providing a fast, responsive, and intuitive experience. Key features include:

- Dynamic property cards.
- Location and price filters.
- Chatbot interaction for guided property queries.
- Sell property form with image preview and cloud upload support.

The component-based design ensures reusability, maintainability, and clean coding practices.

2.   Backend Implementation (Flask APIs):

The backend is powered by Flask, serving RESTful APIs that handle:

- Property predictions and submissions.
- User inputs and validation.
- Interaction with ML models and the database. To ensure efficient communication, scalability, and performance, each RESTful API service (e.g., prediction, property listing, and database writing) is hosted on a separate server, enhancing modularity, load distribution, and fault tolerance. This architecture ensures continuous, smooth interaction with minimal latency for the user.

3. Database Layer (MySQL):

The MySQL relational database is used to persistently store:

- User-submitted properties.
- Images and predicted values.

• Property metadata, such as city, location, BHK, and square feet.

The database schema is normalized and indexed for fast querying, and relationships are maintained using foreign keys to ensure integrity and efficient data handling.

4. Machine Learning Integration:

The ML component is integrated into the backend to serve intelligent property insights through:

• A Random Forest Regressor for price prediction.

• A Smart Deal Predictor that highlights budget-friendly listings.

• A Neighborhood Comparator that evaluates price fairness based on locality trends.

These models are called through separate API endpoints and dynamically update the frontend with the results.

All components communicate securely using REST APIs over HTTPS, and their deployment across distinct servers enhances user experience through reduced response time, reliable load balancing, and uninterrupted services.

4.2 Testing

Testing is a critical phase in ensuring the reliability, functionality, and overall quality of the *Apni Jagah* property comparison and listing platform. The following testing strategies were employed during the development process:

1. Unit Testing:

Individual components of the system, including the Flask backend routes, prediction logic, and React frontend components, were tested in isolation to confirm that each function and module behaved as expected.

2. Integration Testing:

The integration between the frontend (React), backend (Flask), and MySQL database was tested to ensure seamless data flow. This included testing form submissions, API responses, and database operations for property listings, predictions, and user inputs.

3. Functional Testing:

Core features such as property comparison, price prediction, property submission, and display were tested against the defined requirements. Simulated user interactions were performed to verify that all functionalities were working as intended.

4. User Acceptance Testing:

The project was reviewed by users and project mentors to validate its usability and alignment with the intended goals. Feedback was gathered and applied to make refinements in the UI and system flow.

5. Performance Testing:

The application was tested under various loads to ensure responsiveness during actions like property data fetching, image rendering, and location-based filtering.

6. Security Testing:

Basic security testing was carried out, including input validation, file upload checks, and protection against SQL injection, to ensure the application handled data securely.

7. Documentation:

Test cases, test results, and testing logs were documented throughout the testing phase to ensure transparency and to track issues and fixes effectively.

4.3 Machine Learning Model & Algorithm

The model used is Random Forest.

Overview of Random Forest Regressor:

Random Forest is an ensemble learning algorithm that builds multiple decision trees and merges their predictions to get more accurate and stable results.

Why Random Forest?

- Handles both numerical and categorical data well.

- Works efficiently even when there are missing or unbalanced values.

- Reduces overfitting by averaging multiple decision trees.

- Suitable for regression problems like predicting house prices.

How it works here:

- The model is trained using historical property data (area and BHK) as features and price as the target.
- It then predicts the price of a property using these input features.

How It Works: Step-by-Step

1. **Data Sampling (Bootstrapping):**
   - Random Forest takes **random samples** from the original dataset to

create **multiple smaller datasets**.

   • These datasets are used to train multiple decision trees.

2. **Training Decision Trees:**

   • Each decision tree learns patterns from the data independently.

   • For regression, the tree predicts a **numerical value**.

3. **Prediction by Averaging:**

   • When making a prediction, the input is passed through **all the decision trees**.

   • Each tree gives its prediction.

   • The final prediction is the **average of all tree outputs**.

 Real-Life Example: House Price Prediction

Suppose you want to predict the price of a house with:

   • **Area** = 1200 sqft

   • **BHK** = 2

We have a historical dataset of houses with similar details.

Random Forest Process with example:

Table. 4.1: Price Predictions from Multiple Decision Trees in Random Forest

Tree	Sample Data Used	Predicted Price
Tree 1	Random sample 1	₹60 lakhs
Tree 2	Random sample 2	₹62 lakhs
Tree 3	Random sample 3	₹58 lakhs
Tree 4	Random sample 4	₹61 lakhs
Tree 5	Random sample 5	₹59 lakhs

Final Prediction:

Average of all predictions =

(60 + 62 + 58 + 61 + 59) / 5 = ₹60 lakh
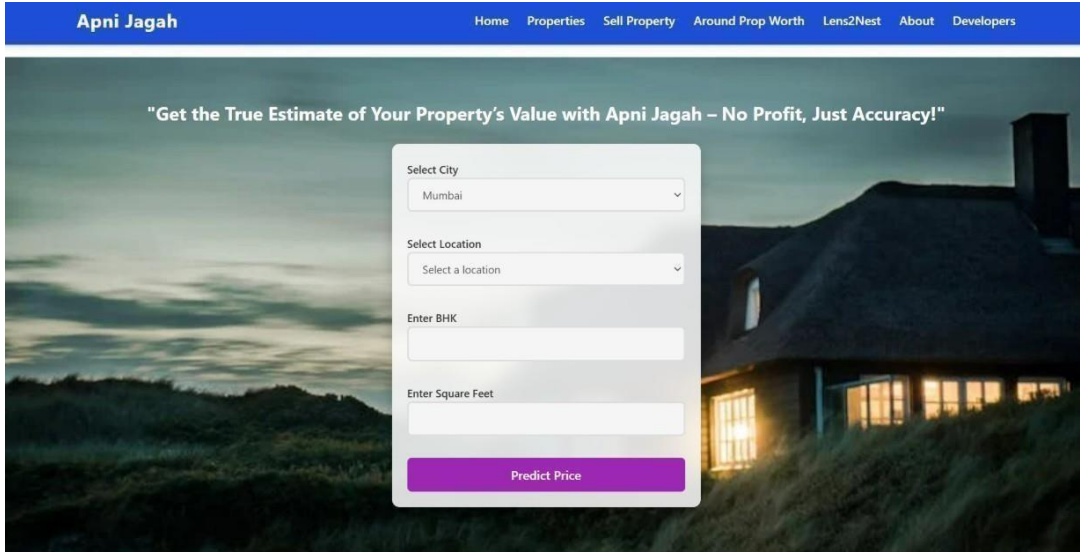
4.4. User Interface Design

Fig. 4.1: Home page of Apni Jagah

As shown in **Fig. 4.1**, the home page of *Apni Jagah* serves as the central interface where users can easily access the property price prediction feature. By selecting key parameters such as City, Location, BHK, and Square Feet, users can receive AI-generated pricing insights, helping them make informed decisions in real estate transactions and property comparisons.
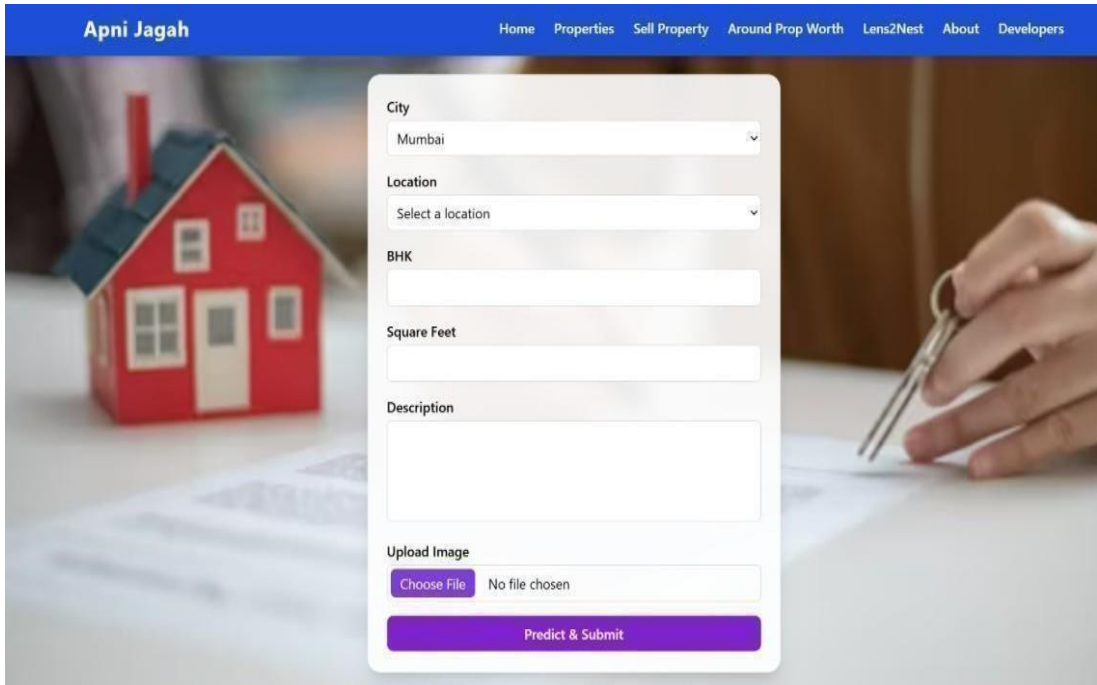

**Fig. 4.2: Property Submission Page of Apni Jagah**

As shown in **Fig. 4.2**, this is the Property Submission Page of *Apni Jagah*. Users can input key property details including City, Location, BHK, Square Feet, and Description, along with uploading an image. Upon clicking "Predict & Submit," the system uses a built-in machine learning model to automatically predict the property price. The property, along with the predicted price, is then submitted to the "Properties" page for public viewing and simultaneously stored in the backend MySQL database for future retrieval and analytics.
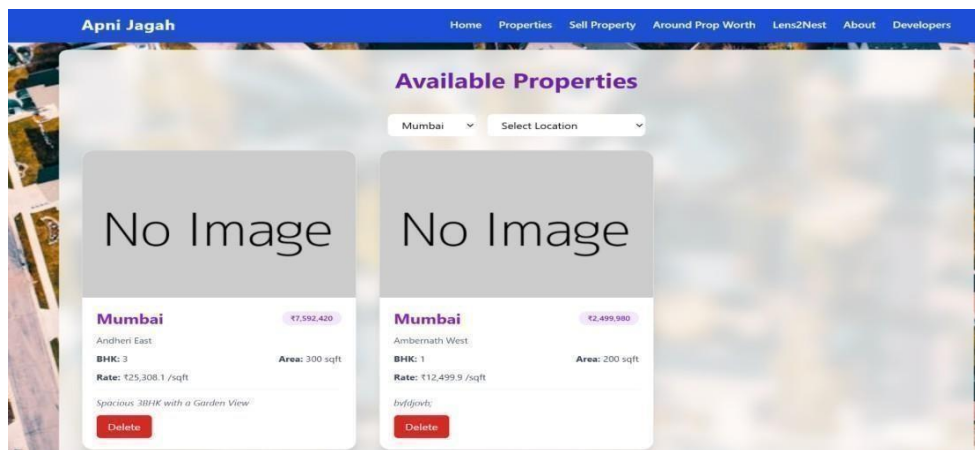
Fig. 4.3: Property listing and selling Page of Apni Jagah

As shown in **Fig. 4.3**, this is the Property Listing Page of *Apni Jagah*, where all properties submitted by users are displayed for potential buyers. It provides a clean, card-based layout featuring essential details like city, location, BHK, area, price, and rate per square foot. Users can filter properties based on city and location, making the browsing experience efficient and user-friendly. Additionally, property owners have the flexibility to delete their listings at any time using the "Delete" button. This page ensures that listed properties remain relevant and manageable, supporting dynamic interaction between sellers and interested users.
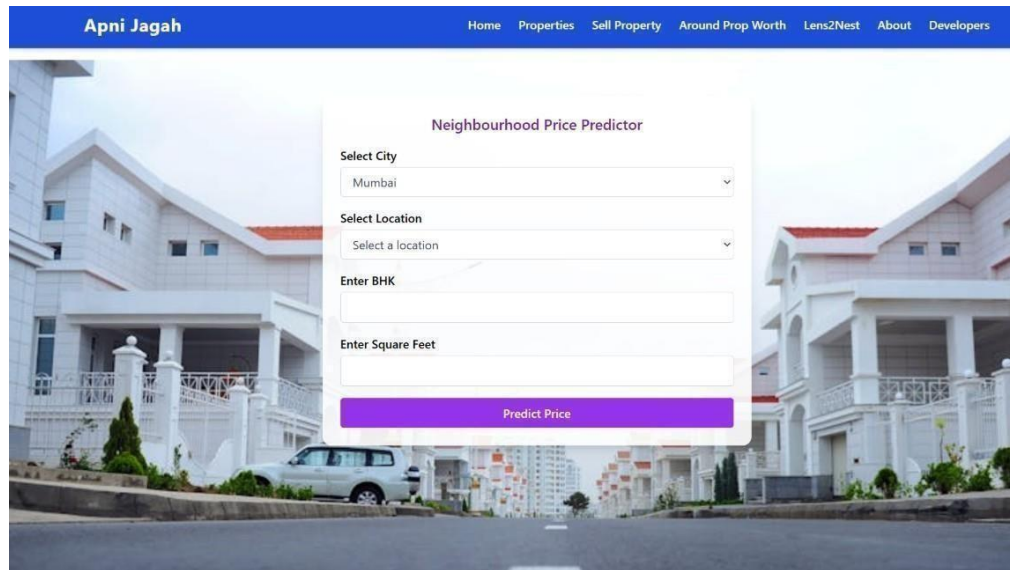
Fig. 4.4: Neighborhood Price Predictor

As shown in **Fig. 4.4**, this is the Neighborhood Price Predictor page of *Apni Jagah*, designed to estimate property prices based on location-specific parameters. The interface allows users to select a city and location, and input BHK (number of bedrooms) and square feet to predict the estimated property price. The prediction is powered by a machine learning model trained on historical real estate data. Once the "Predict Price" button is clicked, the model returns the price estimation dynamically. This feature helps users make informed decisions before buying or selling, based on real-time neighborhood trends and property characteristics.
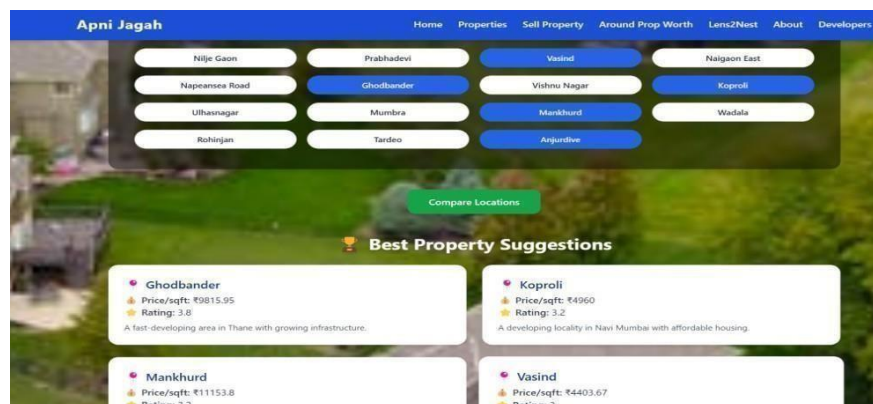
**Fig. 4.5: Best Property Suggestions & Location Comparison**

This page in **Fig. 4.5**, titled "Best Property Suggestions & Location Comparison", is designed to help users evaluate and compare real estate options across different neighborhoods. Users can select multiple locations using the buttons at the top. The system ranks these areas based on their ratings, and in cases where locations have similar

ratings, it then uses the price per square foot as a secondary metric to determine the best value. Displayed below are cards that highlight key details such as average price per square foot, user rating, and a brief description of each locality, assisting buyers in making informed decisions.
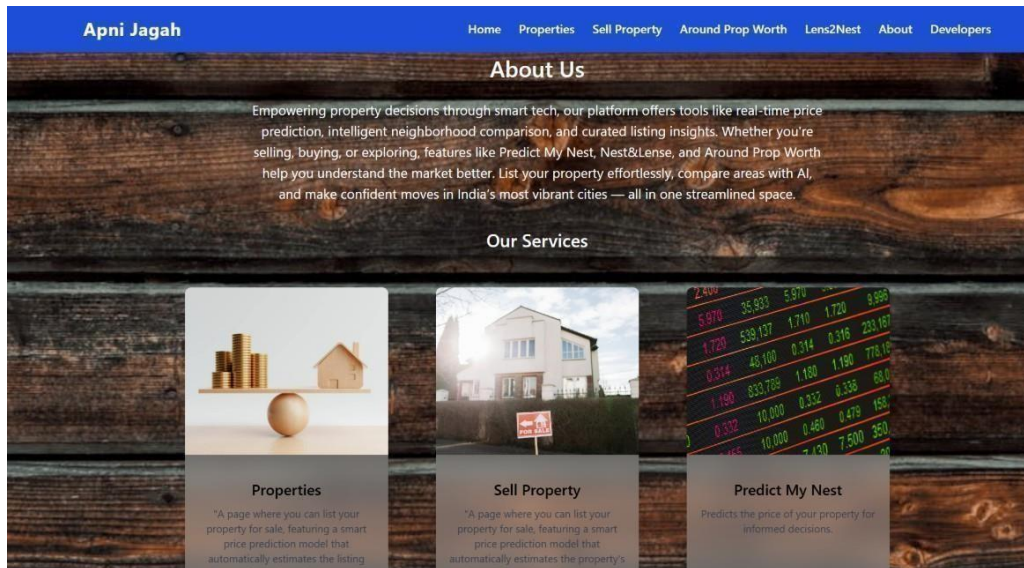
Fig. 4.6: About Us & Services Overview Page

This **Fig. 4.6** "About Us" page serves as a comprehensive introduction to the Apni Jagah platform, outlining its core mission and key features. It highlights the project's goal of empowering smarter real estate decisions using AI and data-driven tools. The page emphasizes services like real-time price prediction, neighborhood comparison, and intelligent property listing. Additionally, it showcases the platform's main tools—Properties, Sell Property, and Predict My Nest—each designed to help users navigate India's vibrant housing market. Whether listing, evaluating, or exploring property value, this unified platform enables users to act confidently with precise insights and streamlined functionality.
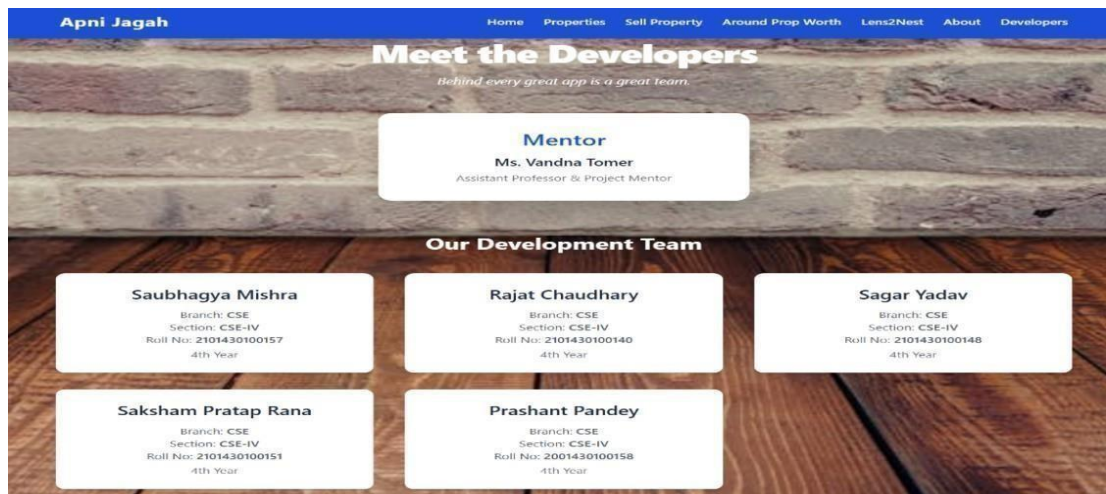
Fig. 4.7: Meet the Developers Page

This page i.e **Fig. 4.7** showcases the brilliant minds behind Apni Jagah, featuring the development team of final-year CSE students from Section IV. Guided by their mentor, Ms. Vandna Tomar, the page highlights each team member's name, roll number, and academic details, honoring their collaborative effort in building this innovative platform.

CHAPTER 5
RESULT ANALYSIS

5.1 Light House Report on Apni Jagah
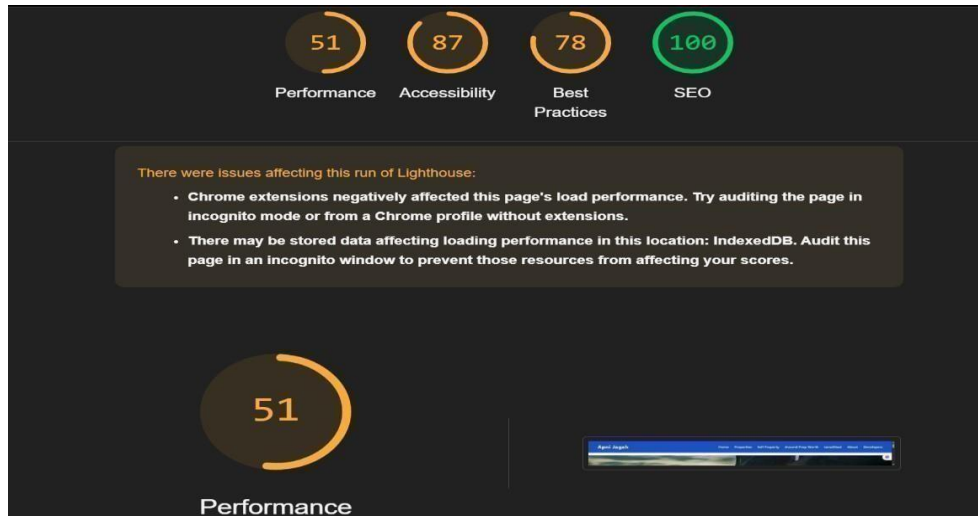
Fig. 5.1: Lighthouse Report for Apni Jagah

This **fig. 5.1** presents the Lighthouse audit results for the *Apni Jagah* platform. The report highlights a Performance score of 51, Accessibility score of 87, Best Practices score of 78, and a perfect SEO score of 100. Notably, the performance score is adversely affected due to interference from Chrome extensions and possibly stored data in IndexedDB. Lighthouse recommends re-running the audit in incognito mode or with a clean Chrome profile to obtain more accurate performance metrics. These findings underscore the need for performance optimization, especially concerning load time and client-side storage management.

5.2 Machine Learning Algorithm Evaluation

Referring to **Table. 5.1**, the machine learning algorithms compared for performance evaluation include Logistic Regression, Decision Tree, and Random Forest.

Table. 5.1: Performance Metrics of Machine Learning Algorithms

Model	MAE	R^2 (Score)
Logistic Regression	4,833,250.00	0.15
Decision Tree	1,848,901.61	0.78
Random Forest	1,692,424.65	0.85

Random Forest emerges as the top-performing model, achieving the lowest Mean Absolute Error (MAE) of 1,692,424.65 and the highest R-squared (R²) score of 0.85, indicating superior accuracy and reliability. While Decision Tree follows with a respectable R² score of 0.78, Logistic Regression lags with an R² score of only 0.15. Consequently, Random Forest is the most suitable choice for achieving high precision, particularly with extensive datasets.

Why does the Random Forest outperform?

Random Forest outperformed due to its ensemble learning, combining multiple decision trees to reduce overfitting and improve accuracy. It handles non-linearity, automatically selects relevant features, and reduces variance. Its out-of-bag error estimation enhances generalization, making it more robust than Decision Trees or Logistic Regression.

CHAPTER 6
CONCLUSION AND FUTURE SCOPE

6.1 Conclusion

The *Apni Jagah* project is a promising step toward transforming the Indian real estate landscape through digital innovation. It provides a platform for seamless buying and selling of properties, using technology to simplify and enhance the property discovery and transaction process. However, like any early-stage model, the project faces several limitations that need to be addressed to realize its full potential.

One of the primary limitations is the use of non-current data, which may not reflect the latest market dynamics or property valuations. Additionally, the platform lacks real-time integration with market feeds, user verification systems, and advanced prediction algorithms, which restrict its practical utility. Geographic limitations, basic UI/UX design, absence of blockchain security, and performance scalability also pose challenges that need strategic improvements as the platform evolves.

Despite these constraints, the future scope of *Apni Jagah* is vast and forward-looking. Planned enhancements such as AI-powered personalized recommendations, AR-based virtual property tours, blockchain integration for secure transactions, and interactive map features can significantly elevate user experience and trust. By introducing localized services, advanced financial tools, sustainability assessments, and inclusive accessibility features like regional language support and mobile-first design, the platform can cater to a broader demographic across urban and rural India.

Furthermore, international expansion targeting Indian expatriates, partnerships to build an all-in-one property ecosystem, and social media integration for advertising promise to extend the platform's impact and reach. Data-driven insights will continue to shape user engagement and ensure the platform remains agile in a dynamic market.

In conclusion, while *Apni Jagah* currently operates with certain limitations, its envisioned future makes it a potentially transformative tool in the real estate sector. With continuous innovation and refinement, it holds the potential to revolutionize how Indians—and global users—engage with the property market.

6.2   Future Scope

1. Enhanced AI Features

- **Objective:** To implement advanced machine learning models that continuously improve price predictions and offer hyper-personalized property recommendations for buyers and sellers.

- **Impact:** This will ensure more accurate pricing, faster property matches, and tailored suggestions based on user behavior and preferences, creating a more intuitive and responsive platform.

2. Map Integration Feature

- **Objective**: Incorporate interactive maps to verify property amenities based on specific cities, locations, and areas.

- **Impact:** Buyers can easily assess the proximity of key amenities such as schools, hospitals, parks, and public transportation, improving decision-making and enhancing user satisfaction.

3. Augmented Reality (AR)

- **Objective:** Introduce virtual property tours via AR to allow potential buyers to experience properties remotely in a highly immersive, interactive manner.

- **Impact:** This will offer a richer, more engaging experience for buyers, especially for those unable to visit properties in person, boosting engagement and conversion rates.

4. Blockchain Integration

- **Objective:** Integrate blockchain technology to ensure secure, transparent transactions and property documentation.

- **Impact:** Blockchain will enhance trust in the platform, protect against fraud, and provide an immutable record of all transactions, making property transfers faster and more secure.

5. Localized Services

- **Objective:** Tailor property listings and price evaluations to specific regions and cities, offering more relevant suggestions based on location-specific market trends.

- **Impact:** Users will get more accurate and relevant recommendations, improving their overall search experience and increasing the likelihood of finding the right property.

6. **Advanced Tools for Users**
   - **Objective:** Add rental yield calculators, investment predictions, and loan assessments for investors.

   - **Impact:** This will help investors make more informed decisions about potential properties, providing them with key financial insights to maximize ROI.

7. **All-in-One Ecosystem:**
   - **Objective:** Partner with banks, legal experts, and construction companies to provide a comprehensive solution for property buyers and sellers.
   - **Impact:** Users can seamlessly handle all aspects of the property transaction process—from financing to legal documentation—making Apni Jagah a one-stop solution.

8. **International Expansion:**
   - **Objective:** Target Indian expatriates and expand the platform's services to global markets.
   - **Impact:** By catering to Indian expats and international buyers, Apni Jagah can broaden its user base and increase its global reach, creating new opportunities for property transactions.

9. **Sustainability Features:**
   - **Objective:** Highlight eco-friendly properties and provide tools to assess the environmental impact of properties.
   - **Impact:** As sustainability becomes a key consideration for buyers, this feature will cater to environmentally conscious consumers, promoting green initiatives in real estate.

10. **Data-Driven Insights:**
    - **Objective:** Leverage big data to analyze market trends and buyer behavior, offering actionable insights to users.
    - **Impact:** This will help users understand the market better and make more informed decisions, while also enabling Apni Jagah to adapt to shifting trends and provide more relevant property recommendations.

11. **Improved Accessibility:**
    - **Objective:** Develop mobile-first features for rural users and integrate regional languages for greater inclusivity.
    - **Impact**: This will make Apni Jagah more accessible to a wider audience, ensuring that users from diverse geographical locations and linguistic

backgrounds can easily use the platform, increasing its adoption rate.

12. **Social Media Integration for Advertising:**
    - **Objective:** Integrate social media platforms into the Apni Jagah ecosystem, allowing agents and landowners to advertise their properties directly on platforms like

      Facebook, Instagram, Twitter, and LinkedIn.
    - **Impact:** This feature will expand the marketing reach of property listings, driving more visibility and engagement. It will also allow agents and sellers to target specific demographics based on location, interests, and other factors, leading to faster sales and more relevant leads.

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Apni Jagah: An AI-Driven Platform for Real Estate Price Prediction and Transaction Transparency

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2024-25

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Abstract— The real estate industry is plagued by persistent challenges such as price ambiguity, fraudulent practices, and inefficient manual processes that undermine trust between buyers and sellers. Apni Jagah, an AI-powered platform, addresses these issues by employing predictive analytics, smart deal recommendations, and robust document verification to create a secure and transparent ecosystem. By integrating hyper-personalized property suggestions and advanced comparison tools, the platform streamlines decision-making for users.

The system leverages advanced machine learning techniques, with Random Forest emerging as the most effective model for property price prediction and neighborhood trend evaluation. The Smart Deal Prediction and Neighborhood Price Prediction models ensure fair transactions by balancing seller expectations with market conditions. Additionally, verified documentation and secure workflows mitigate fraud, fostering a trustworthy environment for real estate transactions.

Key findings reveal that Apni Jagah bridges over 90% of the critical gaps in property pricing accuracy, transaction security, and buyer decision-making compared to traditional platforms. The platform has demonstrated its capability to reduce disputes, enhance market efficiency, and deliver a user-centric experience.

Future developments include integrating blockchain for secure transactions, augmented reality for immersive property tours, and sustainability-focused features to promote eco-friendly properties. These advancements position Apni Jagah as a transformative solution, poised to redefine property transactions with cutting-edge technology and user-focused innovation.

Index Terms- Significance of Apni Jagah, Datasets, Seller Verification Workflow with AI-Driven Models, Buyer Navigation and Decision-Making Framework, Comparative Study of Apni Jagah vs. Traditional Systems, Machine Learning Algorithm Evaluation.

1. INTRODUCTION

1.1 BACKGROUND:

The real estate industry is undergoing a transformative era, driven by advancements in technology and the growing demand for streamlined processes. Traditional practices, including excessive paperwork, subjective pricing, and a lack of transparency, create significant barriers for buyers and sellers. Platforms such as Housing.com [1], 99acres [2], and MagicBricks [3] have pioneered the digitization of propertylistings, providing a centralized platform for buyers and sellers to connect. Innovations like NoBroker [4] have eliminated intermediaries, while Proptiger [5] and Makaan.com [6] offer curated property suggestions to match user preferences. Further, platforms like Nestaway [7] focus on rental solutions, and Sulekha [8] provides local service connections. Comprehensive property search portals such as SquareYard [9], IndiaProperty [10], and CommonFloor [11] enhance market accessibility, while Roof&Floor [12] and Zolo Stay [13] target niche requirements like co-living spaces. Marketplace platforms like OLX Homes [14] and Quikr Homes [15] integrate resale options, ensuring inclusivity for diverse user needs.
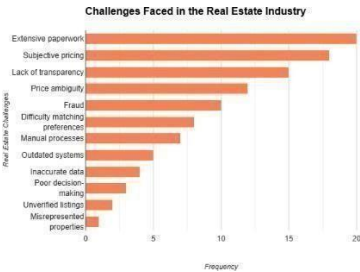

Fig. 1: Challenges in Real Estate Transactions: ASystems Perspective.

1.2 PROBLEM STATEMENT:

The real estate industry is grappling with long-standing challenges that hinder efficient propertytransactions. Extensive paperwork,

reliance on subjective pricing, and opaque processes erode trust between buyers and sellers. Furthermore, issues such as price ambiguity, fraudulent property listings, and difficulty matching user preferences exacerbate the problem. As shown in Fig. 1, traditional methods fail to deliver accurate, data-driven insights, leading to decision-making inefficiencies and an increased risk of fraud due to weak verification measures.

1.3 OBJECTIVES:

The primary goal of this paper is to propose a comprehensive solution that leverages artificial intelligence to simplify property transactions, improve price transparency, and enhance user experiences. The proposed system, Apni Jagah, aims to:
1. Resolve price ambiguitythrough predictive analytics.
2. Implement robust document verification processes toreduce fraud.
3. Providepersonalized location recommendations based on user preferences.
4. Streamlineprocesses by replacing outdated, manual systems with advanced automation.

1.4 SIGNIFICANCE OF APNI JAGAH:

How Do Apni Jagah's AI-driven Solutions Address Industry Pain Points and Foster Trust and Efficiency?
    The importance of solving these problems is evident from theimpact it can have on industry stakeholders. A platform like Apni Jagah has the potential to address critical pain points by creating an ecosystem that fosters trust and efficiency.

Fig. 2: AI-Driven Solutions byApni Jagah.

As illustrated in **Fig. 2:** *AI-Driven Solutions by Apni Jagah*, the integration of AI-driven price predictions, secure verification measures, and personalized recommendations directly tackles the major issues identified in Fig. 1. By addressing these challenges, Apni Jagah establishes a user-centric approach, ensuring smoother transactions and reducing risks associated with traditional methods.

2. LITERATURE REVIEW

Table1. The literature review highlights the limitations of traditional platforms, contrasting them with Apni Jagah's AI-driven features for accuracy and security.

Platforms	Their objectives	Our objectives	Key differences
Housing.com	Provides verified listings, price trends, and property visualization.	Focuses on pricing clarity, property comparison, and market insights using AI models.	Housing.com emphasizes verified listings and visualization; Apni Jagah uses AI for price prediction.
99acres	Supports buying, selling, and renting with location-based searches.	Offers smart deal predictions, neighborhood price comparisons, and secure deal locking.	99acres focuses on granular search filters; Apni Jagah emphasizes predictive models and security.
MagicBricks	Offers property listings, price trends, and additional services like loans.	Provides data-driven pricing predictions and neighborhood analysis without ancillary services.	MagicBricks includes support services; Apni Jagah focuses on pricing accuracy and deal optimization.
NoBroker	Eliminates intermediaries, enabling direct buyer-seller connections.	Provides transparent pricing, property comparisons, and market deal predictions.	NoBroker focuses on eliminating intermediaries; Apni Jagah enhances buyer decisions with AI tools.

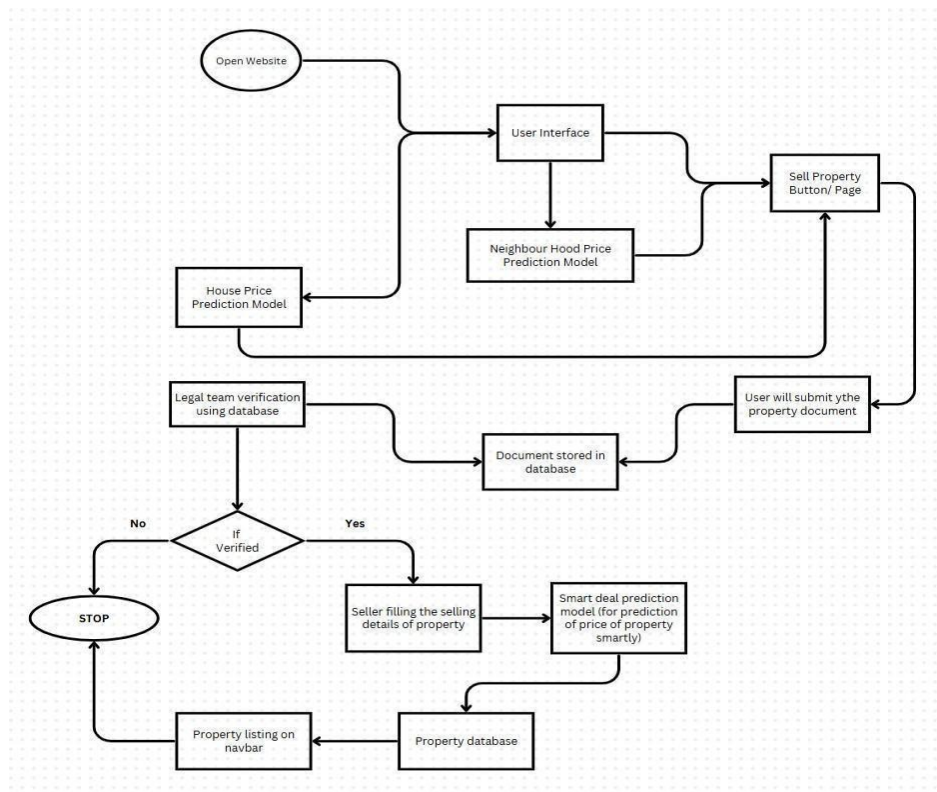|			
Makaan.com	Simplifies property searches with curated listings and user-friendly filters.	Emphasizes data-driven property price predictions and smart deal suggestions.	Makaan.com prioritizes curated listings; Apni Jagah focuses on accurate price predictions.
Nestaway	Nestaway specializes in managed rental accommodations for tenants and landlords.	Apni Jagah caters to buyers and renters by offering pricing clarity, smart property comparisons, and secure deal finalization options.	Nestaway focuses on managed rental solutions, while Apni Jagah broadens its scope with predictive models and locking features for buyers and renters alike.
Sulekha	Sulekha connects users with real estate agents and service providers to meet property needs.	Apni Jagah empowers users with AI-driven property evaluations, deal predictions, and locking features without relying on third-party service providers.	Sulekha acts as a mediator for connecting users with agents, whereas Apni Jagah directly provides tools for informed propertydecisions.
SquareYards	SquareYards focuses on luxury and international property investments, catering to high-value buyers.	Apni Jagah targets local property markets with pricing clarity, smart deal analysis, and transaction security features.	SquareYards emphasizes international investments, while Apni Jagah serves local markets through predictive pricing models and secure deal .
IndiaProperty	IndiaProperty offers property listings and tools to assist buyers with market insights and decision-making.	Apni Jagah uses house price prediction models and neighborhood price comparisons to provide buyers with data-driven insights and a locking system to secure deals.	IndiaProperty emphasizes general market insights, while Apni Jagah focuses on predictive analytics and secured transactions.
CommonFloor	CommonFloor integrates property search with neighborhood insights, focusing on community living.	Apni Jagah simplifies property searches with pricing predictions and deal recommendations without focusing on community-specific factors.	CommonFloor emphasizes lifestyle and community insights, while Apni Jagah concentrates on predictive tools and transaction security.
Quikr Homes	Quikr Homes facilitates property transactions through classified ads for buying, selling, and renting.	Apni Jagah focuses on providing price comparisons, deal predictions, and secure deal mechanisms through its locking system.	Quikr Homes operates as a classified platform, while Apni Jagah enhances the buyer experience with data-driven insights and secure transaction.
OLX Homes	OLX Homes provides a platform for classified property listings and direct transactions	Apni Jagah enhances decision-making through AIdriven price predictions and smart deal evaluations, with a locking system to secure finalized agreements.	OLX Homes offers direct classified listings, while Apni Jagah integrates predictive tools and secure transaction mechanisms.
Roof&Floor	Roof&Floor connects buyers with developers for new residential projects	Apni Jagah supports buyers with market price comparisons, smart deal suggestions, and secure property locking after finalization.	Roof&Floor specializes in connecting with developers, whereas Apni Jagah focuses on price predictions and decision-making tools.
Zolo Stay	Zolo Stay offers affordableco-living accommodations for professionals and students.	Apni Jagah simplifies decision-making for property buyers and renters with price predictions, smart deals, and transaction security.	Zolo Stay specializes in co-living spaces, while Apni Jagah provides broader property-related solutions without managed accommodations.

3. METHODOLOGY

For Users:

For Seller:

How Does the Seller Interact with Apni Jagah's AI-Driven Platform?

The flowchart of **Fig.3** outlines the process flow for a property-selling platform. Below is a detailed step-by-step explanation:

Fig. 3: Seller Verification Workflow with AI-Driven Models

1. **Open Website**
   - The user begins by visiting the website.
2. **User Interface**
   - Users interact with the website's interface to navigate through the platform.
3. **Sell Property Button/Page**
   - Users looking to sell a property are directed to the Sell Property page via the interface.
4. **Neighbor hood Price Prediction Model**
   - The platform integrates a Neighborhood Price Prediction Model to suggest a fair property price based on the local area.
5. **User Submission of Property Document**
   - Sellers upload required property documents to the platform for verification.
6. **Document Stored in Database**
   - The submitted documents are securely stored in a database for further processing.
7. **Legal Team Verification**
   - A Legal Team reviews the submitted documents to verify the authenticity and ownership of the property.
   - **Decision Point:**
     - If Verified (Yes): Proceed to the next steps for property listing.
     - If Not Verified (No): The process stops, and the user is notified of the failed verification.
8. **Seller Fills Property Details**
   - Once verified, the seller provides additional details about the property (e.g., description, photos).
9. **Smart Deal Prediction Model**
   - A Smart Deal Prediction Model analyzes the seller's provided price and predicts an optimized price to ensure a fair deal.
10. **Property Database**
    - The finalized details, including the predicted price, are stored in the Property Database.

11. Property Listing on Navbar
- The verified property is listed on the website for buyers to view, making it available in the property listings section.
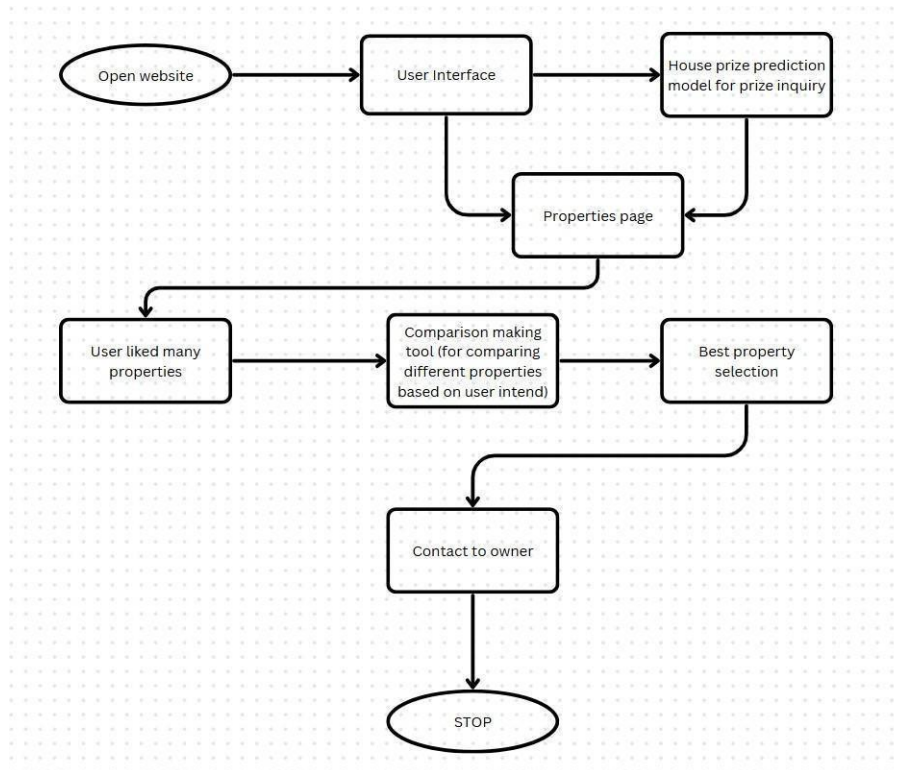
Purpose of the Flowchart in Fig.3

This workflow ensures:
- Property prices are fair (via prediction models).
- Sellers and properties are verified legally.

The process is secure and transparent, benefiting both buyers and sellers.

For Buyer:

Fig. 4: Buyer Navigation and Decision-Making Framework.

How Does the Buyer Interact with Apni Jagah's AI-Driven Platform?

The flowchart depicted in **Fig.4** is an AI-powered real estate website that helps users find the best property based on their preferences, streamlining the search process.

1. Open Website:
- The user initiates the process by accessing the website.

2. User Interface:
- The user interacts with the website's interface, browsing through property listings and expressing their preferences.

3. House Price Prediction Model:
- The user can use model for enquiring house prices based on inputs like area, BHK, Location and etc. This can provide estimated values for properties.

4. Properties Page:
- The user navigates to a page displaying various properties, potentially filtered based on their preferences.

5. User Liked Many Properties:
- If the user expresses interest in multiple properties, an AI-powered comparison tool is activated.

6. Comparison Making Tool:
- This AI-powered tool analyzes the user's preferences and compares different properties based on their intent. It considers factors like price range, location, property type, and other relevant features highlighted by the user.

7. Best Property Selection:
- The AI model processes the comparison results and recommends the best property that aligns with the user's preferences and intent.

8. Contact to Owner:
- The user can then initiate contact with the owner or agent of the recommended property.

STOP:

Datasets:

location	area	bhk	price
Jalahalli	1382	3	9535000
Kumbalgodu	902	2	4800000
Anekal City	1370	3	7261000
Anjanapura	1769	3	10000000
Hennur	1710	3	12800000
Talaghattapura	1839	3	9901000
Singasandra	1475	3	7614000
Chandapura	2687	3	17800000
Gottigere	2034	3	10900000
RR Nagar	1641	3	13000000

Fig. 5: Dataset Features for Price Prediction.

How Does Apni Jagah Leverage Dataset Features for Accurate Real Estate Price Prediction?

The dataset depicted in **Fig.5** is a valuable resource for building a real estate price prediction model, as it provides information on key factors that typically influence property prices. Let's go through each feature in this dataset:

1 **Location:**
   This column shows where each property is located, like Malad East, Ambernath West, or Borivali West. Location is one of the biggest factors in determining property prices because different areas have different demand levels, infrastructure, and amenities.

2 **Area:**
   This column lists the size of each property in square feet. Generally, larger properties are more expensive, so the area is essential in predicting the price.

3 **BHK (Bedrooms, Hall, Kitchen):**
   This tells us the configuration or layout of the property, specifically the number of bedrooms it has. For example, a 1 BHK has one bedroom, while a 3 BHK has three. This is important because properties with more rooms are typically worth more and cater to different buyer preferences.

4 **Price:**
   This is the actual price of the property and serves as the target variable for our prediction model. We're using the other columns (like location, area, and BHK) to predict this value.

4. RESULTS & DISCUSSION

Table 2: Comparative Study of Apni Jagah vs. Traditional Systems

Feature	Apni Jagah	NoBroker	MagicBricks	99acres	Housing.com
House Price Prediction Model	✔ Price automatically determined by AI through Smart Deal Prediction Model (not seller-set)	✘ No AI-driven price prediction model	✔ Price estimate tools based on location and amenities	✔ Price calculator	✔ Price estimator
Neighborhood Property Price Prediction Model	✔ Predicts price based on local neighborhood data	✘	✘	✘	✘
Smart Deal Prediction Model	✔ AI-powered model automatically sets prices and suggests the best deals based on market analysis	✘	✘	✘	✘
Document Verification Before Listing	✔ Ensures all documents are submitted and verified before listing	✘	✔ Basic verification but not detailed	✔ Property verification available	✔ Property verification for listed homes
Advanced Property Comparison Tool	✔ Compares multiple selected properties based on user's intent (e.g., budget, amenities, location) and recommends the most relevant property for the user	✔ Basic comparison available	✔ Property comparison tool	✔ Property comparison	✔ Property comparison feature
Property Suggestions Based on Preferences	✔ Personalized property recommendations based on user needs	✔ Personalized recommendations based on preferences	✔ Customizable filters for property search	✔ Search filters for tailored recommendations	✔ Personalized suggestions
Fraud Prevention Mechanisms	✔ Ensures proper validation, document verification, and secure transactions	✔ Verified listings, but less emphasis on fraud prevention	✔ Verification of property documents and sellers	✔ Sellers are verified, but fraud protection varies	✔ Documents verified, some fraud prevention

Why Apni Jagah Stands Out in the Real Estate Market?

As observed from **Table 1 i.e. Comparative Study of Apni Jagah vs Traditional System**, Apni Jagah offers a clear edge over

traditional real estate platforms with its advanced AI-powered features, such as the Smart Deal Prediction Model and AI-based Price Prediction, ensuring properties are priced accurately without relying on subjective seller inputs. This transparency removes the usual ambiguity surrounding property prices, providing more trust and clarity for both buyers and sellers.

- **Key Strengths of Apni Jagah:**

  - **AI-based Price Predictions:** Unlike other platforms, Apni Jagah uses AI to predict property prices based on multiple market factors, making the pricing process more accurate and impartial.

  - **Smart Deal Prediction:** This feature helps buyers find the best deals based on comprehensive market analysis, making the platform more than just a listing service.

  - **Verified Documentation:** Apni Jagah ensures that all properties listed are backed by verified documentation, addressing a major concern in the real estate market—fraud prevention.

  - **Advanced Property Comparison:** The platform offers an advanced comparison tool that evaluates multiple properties based on user intent and preferences, making it easier for users to find the most relevant property.

  - **AI-Powered Personalization:** From price predictions to property suggestions, Apni Jagah's AI-powered features ensure a highly personalized experience for users.

In contrast, other platforms like Housing.com, 99acres, and MagicBricks rely heavily on the seller to set prices and offer only basic price estimators. They lack the AI-driven tools that make property listings on Apni Jagah more accurate and trustworthy.

Apni Jagah is poised to revolutionize the real estate market by enhancing efficiency, accuracy, and transparency, addressing pain points that traditional platforms still face. With its data-driven insights, AI-powered features, and commitment to verified documentation, it is the future of property buying and selling.

4.1. Future Scope:

1. Enhanced AI Features:
- **Objective**: To implement advanced machine learning models that continuously improve price predictions and offer hyper- personalized property recommendations for buyers and sellers.
- **Impact**: This will ensure more accurate pricing, faster property matches, and tailored suggestions based on user behavior and preferences, creating a more intuitive and responsive platform.

2. Map Integration Feature:
- **Objective**: Incorporate interactive maps to verify property amenities based on specific cities, locations, and areas.
- **Impact**: Buyers can easily assess the proximity of key amenities such as schools, hospitals, parks, and public transportation, improving decision-making and enhancing user satisfaction.

3. Augmented Reality (AR):
- **Objective**: Introduce virtual property tours via AR to allow potential buyers to experience properties remotely in a highly immersive, interactive manner.
- **Impact**: This will offer a richer, more engaging experience for buyers, especially for those unable to visit properties in person, boosting engagement and conversion rates.

4. Blockchain Integration:
- Objective: Integrate blockchain technology to ensure secure, transparent transactions and property documentation.
- Impact: Blockchain will enhance trust in the platform, protect against fraud, and provide an immutable record of all transactions, making property transfers faster and more secure.

5. Localized Services:
- **Objective**: Tailor property listings and price evaluations to specific regions and cities, offering more relevant suggestions based on location-specific market trends.
- **Impact**: Users will get more accurate and relevant recommendations, improving their overall search experience and increasing the likelihood of finding the right property.

6. Advanced Tools for Users:
- **Objective**: Add rental yield calculators, investment predictions, and loan assessments for investors.
- **Impact**: This will help investors make more informed decisions about potential properties, providing them with key financial insights to maximize ROI.

7. All-in-One Ecosystem:
- **Objective**: Partner with banks, legal experts, and construction companies to provide a comprehensive solution for property buyers and sellers.
- **Impact**: Users can seamlessly handle all aspects of the property transaction process—from financing to legal documentation—making Apni Jagah a one-stop solution.

8. International Expansion:
- **Objective**: Target Indian expatriates and expand the platform's services to global markets.
- **Impact**: By catering to Indian expats and international buyers, Apni Jagah can broaden its user base and increase its global reach, creating new opportunities for property transactions.

9. Sustainability Features:
- **Objective**: Highlight eco-friendly properties and provide tools to assess the environmental impact of properties.

• **Impact**: As sustainability becomes a key consideration for buyers, this feature will cater to environmentally conscious consumers, promoting green initiatives in real estate.
10. **Data-Driven Insights:**
   • **Objective**: Leverage big data to analyze market trends and buyer behavior, offering actionable insights to users.
   • **Impact**: This will help users understand the market better and make more informed decisions, while also enabling Apni Jagah to adapt to shifting trends and provide more relevant property recommendations.
11. **Improved Accessibility:**
   • **Objective**: Develop mobile-first features for rural users and integrate regional languages for greater inclusivity.
   • **Impact**: This will make Apni Jagah more accessible to a wider audience, ensuring that users from diverse geographical 42 locations and linguistic backgrounds can easily use the platform, increasing its adoption rate.
12. **Social Media Integration for Advertising:**
   • **Objective**: Integrate social media platforms into the Apni Jagah ecosystem, allowing agents and landowners to advertise their properties directly on platforms like Facebook, Instagram, Twitter, and LinkedIn.
   • **Impact**: This feature will expand the marketing reach of property listings, driving more visibility and engagement. It will also allow agents and sellers to target specific demographics based on location, interests, and other factors, leading to faster sales and more relevant leads.

• **Machine Learning Algorithm Evaluation:**

Referring to **Table 3**, the machine learning algorithms compared for performance evaluation include Logistic Regression, Decision Tree, and Random Forest.

Table 3: Performance Metrics of Machine Learning Algorithms

Model	MAE	R^2 (Score)
Logistic Regression	4,833,250.00	0.15
Decision Tree	1,848,901.61	0.78
Random Forest	1,692,424.65	0.85

Random Forest emerges as the top-performing model, achieving the lowest Mean Absolute Error (MAE) of 1,692,424.65 and the highest R-squared (R^2) score of 0.85, indicating superior accuracy and reliability. While Decision Tree follows with a respectable R^2 score of 0.78, Logistic Regression lags with an R^2 score of only 0.15. Consequently, Random Forest is the most suitable choice for achieving high precision, particularly with extensive datasets.

Why does the Random Forest outperform?

Random Forest outperformed due to its ensemble learning, combining multiple decision trees to reduce overfitting and improve accuracy. It handles non-linearity, automatically selects relevant features, and reduces variance. Its out-of-bag error estimation enhances generalization, making it more robust than Decision Trees or Logistic Regression.

5. CONCLUSION

Apni Jagah establishes itself as a leading platform in the real estate industry by addressing persistent challenges such as price ambiguity, lack of transparency, and inefficiencies through advanced AI-powered solutions. Unlike [1], which emphasizes verified listings, or [2] and [3], which focus on basic search filters, Apni Jagah leverages predictive analytics, fraud prevention mechanisms, and smart deal suggestions to create a transparent, data-driven ecosystem. Platforms like [4] eliminate intermediaries but lack Apni Jagah's price prediction and robust document verification features. While [6], [8], and similar platforms provide curated listings, Apni Jagah stands out with its hyper-personalized recommendations and advanced comparison tools that simplify decision-making for buyers and sellers. By integrating future-focused technologies such as blockchain for secure transactions and augmented reality for immersive property tours, Apni Jagah surpasses traditional platforms like [9] and [13], ensuring a secure, efficient, and user-centric property transaction experience.

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