REAL ESTATE PRICE PREDICTION

Dissertation submitted to
Shri Ramdeobaba College of Engineering & Management, Nagpur
in partial fulfillment of requirement for the award of degree of

Bachelor of Technology (B.Tech)

In

COMPUTER SCIENCE AND ENGINEERING

(Artificial Intelligence & Machine Learning)

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<u>CERTIFICATE</u>

This is to certify that the project on **"REAL ESTATE PRICE PREDICTION"** is a bonafide work of

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submitted to the Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur in partial fulfillment of the award of a Degree of Bachelor of Technology (B.Tech), in Computer Science and Engineering(Artificial Intelligence & Machine Learning). It was carried out at the Department of Computer Science and Engineering, Shri Ramdeobaba College of Engineering and Management, Nagpur during the academic year 2024-25.

Date:

Place: Nagpur

Mrs. Priya Parkhi	Dr. P. Voditel
Project Guide	H.O.D, CSE
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Dr. M. B. Chandak
Principal

DECLARATION

I, hereby declare that the project titled **"REAL ESTATE PRICE PREDICTION "** submitted herein, has been carried out in the Department of Computer Science and Engineering of Shri Ramdeobaba College of Engineering & Management, Nagpur. The work is original and has not been submitted earlier as a whole or part for the award of any degree/diploma at this or any other institution / University.

Date: 13-11-24

Place: Nagpur

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APPROVAL SHEET

This report entitled " **REAL ESTATE PRICE PREDICTION**" by

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Mrs. Priya Parkhi

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Mr. Sahil Jadhav   **Mr. Raunak Agrawal**

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ABSTRACT

The real estate market is one of the most dynamic and influential sectors in modern economies, particularly in urban centers like Bangalore. This project focuses on developing a robust predictive model for estimating the prices of flats in Bangalore city, leveraging machine learning algorithms such as Linear Regression and Random Forest Regressor.

The application is designed as a user-friendly platform, allowing users to input property features such as square footage, number of bedrooms and bathrooms, and location to receive accurate price predictions. Additionally, the platform integrates real estate news from across the globe, offering users insights into market trends. A comprehensive list of brokers in Bangalore is also included, connecting users with trusted real estate professionals to facilitate property transactions.

By combining predictive analytics, global market insights, and broker information, the project aims to simplify real estate decision-making for buyers, sellers, and investors.

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CHAPTER 1

INTRODUCTION

The real estate market is one of the most dynamic sectors in urban economies. It is influenced by factors such as location, population growth, infrastructure development, and economic conditions. Accurate price prediction in this domain is a valuable tool for buyers, sellers, investors, and policymakers. In a city like Bangalore, known as the "Silicon Valley of India," the rapid urbanization and demand for housing make price estimation more challenging but critical.

Why Real Estate Price Prediction?

- For Buyers and Sellers:
  Buyers can ensure they are paying a fair price, and sellers can set competitive yet profitable rates for their properties.

- For Investors:
  Investors require accurate predictions to identify potential opportunities and maximize returns.

- For Policymakers:
  Accurate price data supports urban planning and the creation of housing policies.

Challenges in the Current Market:

1. Unstructured Data: Real estate data is often fragmented and incomplete, making manual analysis inefficient.

2. Market Fluctuations: Prices can be volatile, influenced by market trends, government policies, and global events.

3. Limited Access to Predictive Tools: Most buyers and sellers rely on brokers or anecdotal evidence instead of data-driven insights.

   This project seeks to address these challenges using machine learning models to predict flat prices in Bangalore while incorporating features like global market news and a directory of trusted brokers.

CHAPTER-2

LITERATURE SURVEY

A thorough literature survey forms the foundation of this project by identifying gaps in existing research and defining the project scope.

Key Research Contributions:
1. "Real Estate Valuation Models" by Smith et al. (2019):
   This study explored traditional and machine learning-based models for predicting real estate prices. Linear Regression was identified as a baseline model, but the authors emphasized the need for more robust techniques like Random Forest for better performance.
2. "Location and Property Valuation" by Kumar et al. (2020):
   The paper analyzed how geographical features, proximity to key facilities, and neighborhood development affect property prices.
3. "Integrating News and Analytics for Real Estate Insights" by Zhao et al. (2021):
   This study highlighted the potential of combining market news with predictive analytics for more accurate and context-aware price predictions.

Gaps Identified:
- Lack of integration between real-time market trends and predictive models.
- Limited user-friendly tools tailored for non-technical audiences.

Relevance of the Current Project:
This project bridges these gaps by developing a multi-functional application that combines machine learning models, global market trends, and broker recommendations in a single platform.

CHAPTER-3

SYSTEM ARCHITECTURE

The system architecture is designed to handle multiple functionalities: price prediction, news updates, and broker listings. It follows a modular and scalable approach.

Overview:

- **Input Layer:**
  - Collects user inputs such as square footage, number of bedrooms, bathrooms, and location.
  - Ensures the user-friendly collection of inputs via a web interface.

- **Processing Layer:**
  - Handles data preprocessing, feature selection, and machine learning model execution.
  - Integrates APIs for real-time news updates.
  - Retrieves broker information from a database.

- **Output Layer:**
  - Displays property price predictions, global news, and broker lists in an interactive dashboard.

Data Flow Diagram:

1. User inputs property details into the web application.
2. The system preprocesses the data and feeds it into the trained machine learning model.
3. The output, including price predictions, is visualized on the dashboard alongside additional features.

Scalability:

The modular design allows for easy expansion to include additional cities, new models, and more features such as personalized property recommendations.

CHAPTER-4

TECHNOLOGY USED

Programming and Tools:

- Python: Backend scripting and ML model development.

- Flask: To build a lightweight and scalable web application.

- HTML, CSS, JavaScript: For frontend development.

Key Libraries and Frameworks:

1. Pandas & NumPy: For data manipulation and numerical computations.

2. Scikit-learn: For training and evaluating machine learning models.

3. Matplotlib & Seaborn: For creating data visualizations during EDA.

Data Storage:

- SQLite Database: Stores broker information and user preferences.

  Data Sources:

- Real estate datasets from publicly available sources.

- APIs for fetching real-time news.

Steps to be followed:-

Step 1: Data Collection

- Collect data on property features such as size, location, amenities, and historical prices from reliable sources.

- Fetch supplementary data like market news using APIs.

Step 2: Data Preprocessing

- Handle missing values using imputation techniques.

- Normalize numerical variables to ensure consistency.

- Remove duplicates and outliers to maintain data integrity.

Step 3: Exploratory Data Analysis (EDA)

- Identify patterns and relationships between features and prices.

- Visualize the data using scatter plots, heatmaps, and box plots.

Step 4: Model Development

- Train models such as Linear Regression and Random Forest.

- Save the best-performing model as a .pkl file for deployment.

Step 5: Application Development

- Use Flask to create a user interface that connects to the backend.

Step 6: Testing and Deployment

- Test the application thoroughly for performance and accuracy.

- Deploy the application on a cloud platform like Heroku.

CHAPTER 5

METHODOLOGY

Phase 1: Problem Definition

Define the key objectives: accurate price prediction, news integration, and broker listing.

Phase 2: Data Analysis and Preprocessing

- Perform EDA to uncover insights.
- Apply feature engineering techniques to improve prediction accuracy.

Phase 3: Model Training and Validation

- Compare multiple models and select the one with the best accuracy.
- Use metrics like R-squared, Mean Absolute Error, and cross-validation scores for evaluation.

Phase 4: Web Application Development

Build an interactive interface with clear sections for predictions, news, and brokers.

Phase 5: Testing and Optimization

Ensure the application performs well under various conditions and optimize for scalability.

CHAPTER 6
APPLICATIONS

Practical Applications:

1. For Buyers and Sellers: Accurate pricing helps negotiate better deals.

2. For Brokers: Provides a platform to connect with clients.

3. For Investors: Identifies profitable investment opportunities based on market trends.

Extended Applications:

- Real-time market insights support financial planning and risk assessment.

- Future expansions can enable rental price predictions or commercial property analysis.

CHAPTER 7

RESULT AND DISCUSSION

Key Outcomes:

1. Model Performance:
   - Random Forest achieved an R-squared of 0.85 and outperformed Linear Regression.
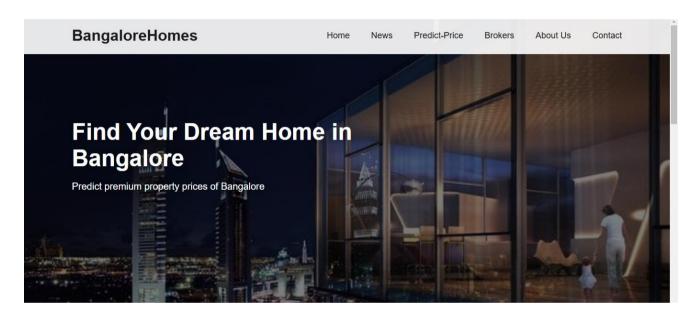
2. User Feedback:
   Test users praised the application's ease of use and accuracy.

Discussion:

- The integration of news and broker lists enhanced user engagement.
- Including more detailed features such as proximity to schools and hospitals could further improve prediction accuracy.

Snapshot of Project:

Fig 7.1 : Home Page

BangaloreHomes   Home   News   Predict-Price   Brokers   About Us   Contact
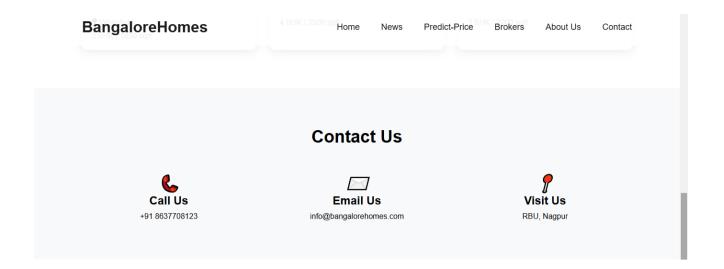
Contact Us

Call Us
+91 8637708123

Email Us
info@bangalorehomes.com

Visit Us
RBU, Nagpur

Fig 7.2 : News Page

Real Estate News Daily

$425,000	6.5%	+2.4%	128.5
Average Home Price	Current Mortgage Rate	Monthly Listing Change	Real Estate Market Index

Brunswick Bancorp (OTCMKTS:BRBW) and

Reviewing The Baldwin Insurance Group

Contrasting Alerus Financial (NASDAQ:ALRS) and First

Q4 EPS Estimates for CNA Financial Cut by Zacks
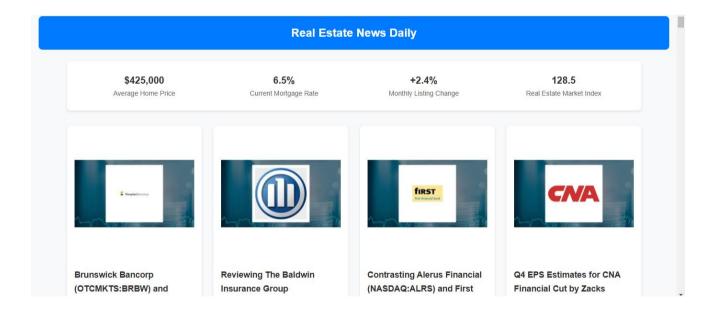
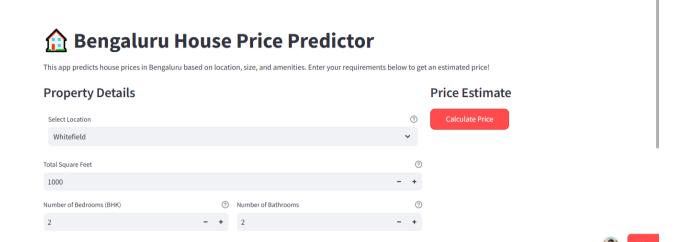## Fig 7.3 : Price Prediction Page

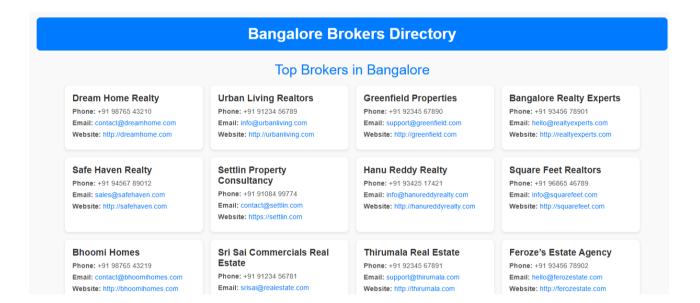## Fig 7.4 : Brokers List Page

Fig 7.5 : About Us Page

About Us

Welcome to Bangalore Homes

Bangalore Homes is your ultimate destination for real estate solutions in Bangalore. Our platform provides a seamless experience for individuals looking to explore real estate news, find brokers in Bangalore, and predict property prices with the help of advanced machine learning models.

Our Mission

We aim to simplify the real estate journey for everyone by providing accurate price predictions, up-to-date news from the real estate world, and a curated list of trusted brokers in Bangalore. Our platform is designed to empower users with data-driven insights and trusted information.

The Team

This project was created by a passionate team of developers dedicated to revolutionizing the real estate experience:

CHAPTER 8
CONCLUSION AND FUTURE SCOPE

☐ Conclusion:

This project demonstrates the feasibility of using machine learning for real estate price prediction in Bangalore. The integration of additional features like global news and broker listings enhances the user experience.

☐ Future Scope:

- Expand the model to other cities.
- Incorporate advanced models like Gradient Boosting and Neural Networks.
- Develop a mobile application for broader accessibility.

CHAPTER 9

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