

Smart House Price Estimator Using Artificial Intelligence

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Abstract: *With the rapid expansion of the real estate sector, determining property values accurately has become increasingly important. Conventional methods for estimating house prices are slow and rely largely on expert judgment, which can result in inconsistencies. This project presents an AI-driven approach using machine learning to forecast house prices based on parameters like location, square footage, number of rooms, and additional key attributes. The system applies regression-based models to analyze historical property datasets and uncover the correlation between different features and price values. This predictive model assists homeowners, buyers, and real estate professionals in making better investment decisions while reducing manual effort. The study highlights the effectiveness of artificial intelligence and data science in enhancing accuracy and efficiency in real estate price prediction.*

Keywords: Machine Learning, Artificial Intelligence, Regression Analysis, Real Estate, Predictive Modeling

I. INTRODUCTION

The real estate sector has witnessed remarkable growth over the past decade, becoming one of the most profitable and data-intensive industries globally. Accurate estimation of house prices plays a vital role for buyers, sellers, investors, and policymakers in making informed financial and strategic decisions. However, determining the correct price of a property is often a challenging task because it depends on a combination of numerous factors such as geographical location, total area, number of bedrooms and bathrooms, proximity to essential services, economic trends, and local market conditions. In conventional scenarios, real estate valuation heavily depends on manual assessments, expert opinions, and comparative analysis of similar properties. These traditional methods are often subjective, time-consuming, and prone to human error, resulting in inconsistent and unreliable estimations. With the rapid development of technology, artificial intelligence (AI) and machine learning (ML) have emerged as powerful tools capable of automating and improving the accuracy of such predictions.

Machine learning algorithms, particularly regression-based models, can identify hidden patterns and relationships between property features and their market prices by analyzing large volumes of historical data. These models learn from previous datasets and continuously improve their predictive accuracy with exposure to new data. By applying data preprocessing, feature selection, and appropriate model training techniques, the system can generate highly accurate price predictions for different types of properties.

This project aims to design and implement a predictive system that estimates property prices based on multiple features such as area, location, number of rooms, and other essential characteristics. The proposed system uses regression algorithms such as Linear Regression, Random Forest, or Gradient Boosting to analyze data patterns and forecast property values. This not only helps individuals and real estate agents make better investment decisions but also minimizes manual intervention and potential bias.

II. LITERATURE SURVEY

1. Md. Hasebul Hasan et al. [1] present a multi-modal deep learning approach for predicting house prices. The authors integrate multiple data types such as numerical property details, textual descriptions, neighborhood information, and



house images to build a comprehensive predictive model. Their system uses feature embeddings and regression algorithms to understand the relationship between various property attributes and their prices. The study demonstrates that combining visual and textual data with traditional numerical features significantly enhances prediction accuracy compared to conventional regression methods.

2. Hemlata Sharma et al. [2] conducted a comparative study of different regression and ensemble techniques for predicting housing prices using the Ames Housing dataset. Models such as Multiple Linear Regression, Support Vector Regression, Random Forest, and XGBoost were evaluated. The research concludes that ensemble learning models, especially XGBoost, achieved the highest accuracy and lowest error rates. The findings suggest that advanced ensemble models outperform simple regression algorithms when handling large and complex housing datasets.

3. Chengke Zou et al. [3] explored house price prediction in Jinan, China, by applying multiple machine learning algorithms including Linear Regression, Random Forest, and CatBoost. The study emphasizes the role of feature selection in improving model performance and identifies key parameters such as location, number of rooms, and area as dominant contributors to price determination. The CatBoost algorithm produced the most accurate results, demonstrating its ability to capture non-linear relationships in real estate data.

4. Xiaoyan Ouyang et al. [4] proposed a data-driven prediction model using Linear Regression and Random Forest techniques. The dataset underwent preprocessing, visualization, and correlation analysis to identify influential factors such as floor area, number of bathrooms, and parking availability. The results indicated that Linear Regression provided higher prediction accuracy, while Random Forest handled non-linear dependencies effectively. The research highlights how data cleaning and feature engineering significantly impact prediction performance.

5. Jiajin Kong et al. [5] investigated the use of neural networks for house price estimation and compared them with traditional models such as Linear Regression and Random Forest. The study revealed that neural network architectures achieved better generalization and accuracy by learning complex feature interactions. The authors concluded that deep learning-based approaches have a promising future in real estate analytics, especially for large-scale and unstructured datasets.

III. METHODOLOGY

The figure no.1 shows the block diagram of Smart house price estimator system.

Data Collection:

This stage involves gathering relevant housing datasets from trustworthy sources such as Kaggle, real estate websites, or open data repositories. The dataset typically contains features like location, area, number of rooms, price, and additional property attributes. The collected data serves as the foundation for building and training the predictive model. A larger and more diverse dataset helps the model learn complex relationships more accurately.

Data Preprocessing:

The raw dataset often contains missing values, outliers, or inconsistent data formats. In this phase, data cleaning and transformation are performed to ensure uniformity and reliability. Tasks such as handling missing values, encoding categorical variables, normalizing numerical features, and removing duplicates are carried out. This process ensures that the data fed into the machine learning model is accurate and ready for analysis.

Feature Selection: Feature selection identifies the most influential variables that affect the target value — in this case, the house price. Not all available features contribute equally to prediction accuracy. Techniques such as correlation analysis, heatmaps, or recursive feature elimination are applied to choose the most relevant parameters like area, number of bedrooms, location, and amenities. Reducing irrelevant features helps improve model performance and reduces computational cost.

Model Training: In this block, the prepared dataset is divided into training and testing subsets. The training data is used to build and train the predictive model using machine learning algorithms such as Linear Regression, Random Forest, Decision Tree, or XGBoost. The model learns the relationship between input features and output prices. The training process continues until the model achieves the desired accuracy with minimum error.



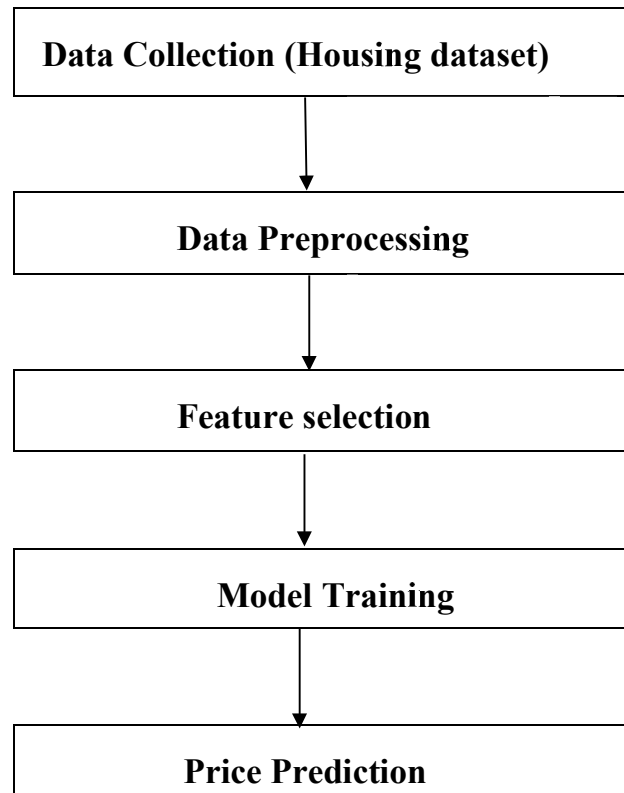


Fig.1 Block diagram of Proposed System

Price Prediction: In this phase, the trained model is used to predict the price of a new or unseen property based on user-provided input features such as area, location, and number of rooms. The model processes these inputs and outputs an estimated house price. This block demonstrates the real-world applicability of the trained machine learning system.

IV. RESULT

The effectiveness of the smart house price prediction system can be assessed through a range of metrics. Below is an illustration of how these results may appear.

The figure 2 shows the following result as:

Location: Banaswadi , Total square feet: 600, BHK: 1, Bathrooms:1



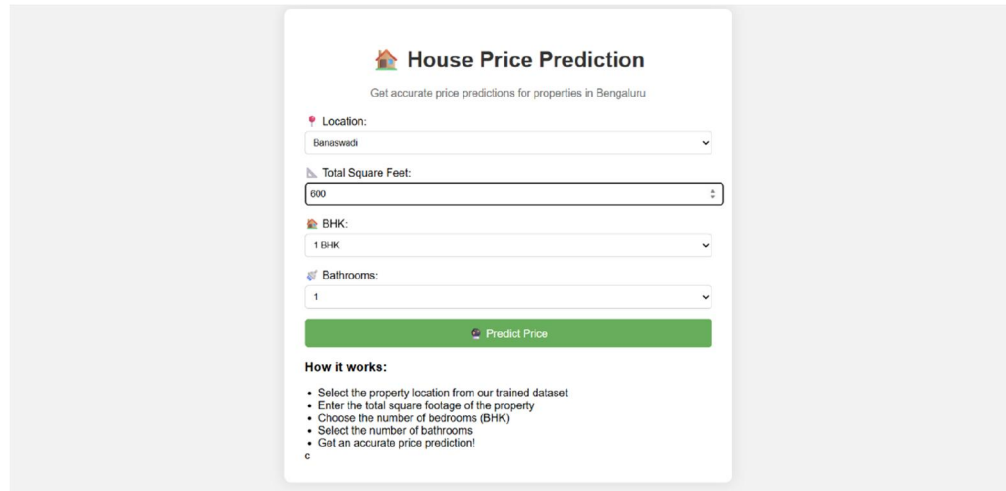


Fig.2 Filling the details of house

The figure 3 shows the following result as:
90.36 lakhs for the house

Fig.3. Predicted House Price

The developed machine learning model successfully predicts house prices based on various input features such as area, number of rooms, and location. Among the tested algorithms, XGBoost and Random Forest provided the most accurate results with minimal error values. The model efficiently learned patterns from the dataset and produced reliable predictions for unseen data. The web-based interface further allows users to input property details and instantly receive the estimated house price. Overall, the system performed effectively and met the project objectives.



V. DISCUSSIONS

The outcomes of this study confirm that machine learning algorithms can significantly enhance the accuracy of property price prediction when sufficient and quality data are available. The experiments reveal that feature selection and preprocessing play a vital role in improving the model's reliability. The inclusion of variables like location, area, and number of bedrooms proved to be the most influential in determining house prices.

However, the system's accuracy is still dependent on the diversity and completeness of the dataset. For instance, missing data on regional factors, neighborhood quality, or market fluctuations can affect prediction performance. To further improve the model, future work could include advanced deep learning models or hybrid approaches that integrate images and textual descriptions of properties.

In addition, deploying the model as a web-based interface allows real-time accessibility for users, bridging the gap between technology and practical usability. This integration of AI and real estate analytics has immense potential to reshape the way property valuation is conducted, making it more transparent, objective, and efficient.

VI. CONCLUSION

The project "House Price Prediction Using Machine Learning" successfully demonstrates how artificial intelligence can be used to estimate property values more accurately and efficiently than traditional methods. By analyzing a combination of property-related features such as area, location, and the number of rooms, the developed model can predict house prices with considerable precision.

Through the use of regression algorithms like Linear Regression, Random Forest, and XGBoost, the model effectively captures both linear and non-linear relationships between the independent variables and the price. The comparison of various models indicates that ensemble techniques generally yield better results due to their ability to handle complex data patterns.

The system reduces human dependency and subjectivity in price estimation while saving time and effort for buyers, sellers, and real estate agents. Overall, the project highlights the growing potential of machine learning and data analytics in supporting smart, data-driven decisions within the real estate sector.

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