

Augmented Reality and Machine Learning for Intelligent Real Estate Valuation: A Data-Driven Framework

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Abstract—This paper explores how cutting-edge technologies like Augmented Reality (AR), Machine Learning (ML), and Data Science are revolutionizing the real estate industry. AR allows potential buyers to take engaging virtual tours of properties, giving them a realistic feel for the space without physically being there. At the same time, ML analyses historical and current data to make more accurate predictions about property values, market trends, and investment risks. By bringing these technologies together, we're aiming to make the process of buying, selling, and investing in real estate more efficient and data-driven. Our findings show that integrating AR and ML not only enhances the customer experience but also leads to better decision-making for buyers and investors alike.

Keywords— *Augmented Reality (AR), Machine Learning (ML), Data Science, Real Estate, Simple Regression, Android Studio.*

I. INTRODUCTION

The real estate industry is undergoing significant changes as new technologies reshape traditional approaches. Previously, buying or selling property required numerous in-person visits, subjective opinions, and estimation. However, digital advancements such as Augmented Reality (AR), Machine Learning (ML), Data Science, and enhanced image selection tools are transforming the process, making it faster, more precise, and data-driven. These tools are not only accelerating real estate transactions but also providing buyers, sellers, and investors with a more interactive and informative experience. In the past, potential homebuyers often visited multiple properties in person to evaluate their options, which was time-

consuming and physically demanding. For investors, assessing property value and forecasting market trends required expert insights that relied on limited information. Today, AR, ML, data-driven methods, and advanced image selection tools are changing this process, providing innovative ways to visualize properties, analyze market trends, and assess potential risks—empowering people to make smarter decisions.

AR technology plays a particularly important role in this transformation by enabling virtual property tours. Previously, buyers had to visit each property individually, an especially challenging task for those considering properties in different cities or countries. With AR, buyers can take immersive 3D tours from their own homes, viewing properties from multiple perspectives and even experimenting with different interior designs or furnishings. This not only saves time but also offers buyers a clearer sense of a property's layout and aesthetics, helping them make informed choices, even across long distances.

Alongside AR, ML offers new ways to analyze vast amounts of real estate data for better market predictions and property valuation. Traditionally, property appraisals and market forecasts relied on historical data and professional judgment. However, these methods can be limiting, especially in rapidly changing markets. ML algorithms analyse extensive datasets—such as historical sales, neighbourhood trends, and even local economic indicators—to identify patterns that may

go unnoticed by human analysts. This data-driven approach provides more precise property valuations and forecasts, helping buyers, agents, and investors navigate the market with greater confidence.

Data Science underpins these innovations by processing and organizing the massive volumes of data generated within the real estate sector. From property listings to local economic trends, the industry produces complex data that is often fragmented. Data Science tools clean and structure this information, allowing AR and ML applications to function more effectively. For instance, cleaned and well-organized data enables ML models to make more accurate predictions and allows AR applications to create personalized virtual experiences for buyers.

Furthermore, advanced image selection technology enhances the real estate experience by helping buyers and agents highlight key property features with high-quality, strategically selected images. In the past, buyers had limited visual information, often relying on a few static photographs or brief video tours. Now, image selection technologies enable curated, high-resolution visuals that showcase essential property aspects, such as architectural details, landscaping, and interior finishes. This gives buyers a comprehensive visual understanding before an in-person visit, helping them make more informed decisions. Additionally, these tools allow sellers to showcase properties in their best light, maximizing appeal and helping agents reach potential buyers more effectively.

In combining AR, ML, Data Science, and image selection, the real estate industry is becoming more transparent, efficient, and user-centered. Buyers can explore properties without physical travel through AR, while ML and Data Science provide insights into market trends and property valuations. High-quality image selection tools further improve the buyer's experience by presenting properties in a clear, detailed, and visually appealing manner. Although challenges like data privacy concerns, costs, and infrastructure limitations remain, the benefits of these technologies are likely to outweigh the drawbacks. As these technologies continue to develop, their influence on the real estate industry is expected to grow, making

property transactions more streamlined and data-driven.

In this paper, we explore how AR enables virtual tours, ML aids in market and property analysis, Data Science enhances data organization, and image selection optimizes property visualization. Through these advancements, we illustrate how technology can reshape the real estate industry to be more efficient, data-driven, and customer-focused.

II. LITERATURE REVIEW

Influence of Daylight on Real Estate Housing Prices ^[1] examines the impact of daylighting on real estate prices within Turin, Italy, leveraging multiple regression analysis. The study highlights that daylight not only enhances aesthetic and energy efficiency in residential spaces but also significantly influences market values. Researchers utilized daylight metrics like Annual Sunlight Exposure (ASE) and Useful Daylight Illuminance (UDI) across 100 sample units to understand their correlation with listing prices. Key findings include the positive effect of daylight exposure on property values, with ASE and UDI emerging as crucial indicators in real estate valuation, emphasizing a growing awareness and demand for natural lighting post-COVID-19.

This study by Anand G. Rawool, Dattatray V. Rogye, Sainath G. Rane ^[2] introduces a machine learning model for predicting house prices based on various factors such as location, number of rooms, and proximity to amenities. By employing algorithms like Linear Regression, Decision Tree Regression, K-Means, and Random Forest Regression, the authors aim to provide a more accurate and automated prediction of real estate prices. The model demonstrated that Random Forest Regression achieved the highest accuracy, outperforming other algorithms. The research offers insights into the role of machine learning in enhancing real estate valuation by reducing errors compared to traditional manual estimations.

In Boston House Price Prediction ^[3], various regression models, including Simple Linear Regression, Polynomial Regression, Ridge Regression, and Lasso Regression, are applied to the Boston housing dataset for predicting property

prices. The study emphasizes that Lasso Regression provided the best performance metrics compared to others, indicating its effectiveness in handling sparse data with outliers. The authors also used correlation analysis via a heat map to identify influential factors on pricing, such as property size, neighborhood, and access to highways. This study underscores the utility of advanced regression techniques in achieving accurate real estate pricing predictions.

The study by Vedika Patil, Sonali Sathe, Aprajita, Milind Kamble ^[4], explores the integration of Augmented Reality (AR) in the real estate sector to enhance the buying and selling experience. It discusses a mobile application that offers virtual 3D property tours, allowing users to explore properties without physical visits. This innovation aims to address common challenges faced by real estate developers, such as inefficiencies in client engagement and marketing. The use of AR transforms traditional property showcasing, providing a memorable and efficient customer experience.

This paper applies various regression techniques, including Ridge, Lasso, and Elastic Net, to predict house prices. The Fadhil M. Basysyar, Gifthera Dwilestari utilize ^[5] a Kaggle dataset containing 81 features and 1,460 records to train models and assess their performance. Through feature selection and hyperparameter tuning, the study achieves accurate house price forecasts. The research highlights the importance of exploratory data analysis and feature engineering in improving prediction accuracy.

The Yanbo Chen, Chao Wu, and Junjian Qi ^[6] introduces a novel data-driven power flow (DDPF) method tailored for smart grids. Unlike traditional methods like Newton-Raphson, the proposed approach leverages historical and simulated data for power flow analysis, utilizing exact linear regression equations. This method improves computational efficiency and avoids convergence issues typical of non-linear iterative calculations. The results show that DDPF provides high accuracy and reliability in dynamic grid environments.

This study of House Price Prediction ^[7] presents a comprehensive framework for predicting house prices using machine learning algorithms such as Linear Regression, Decision Trees, and Lasso Regression. The authors emphasize the significance of data preprocessing, feature selection, and hyperparameter tuning to enhance model accuracy. The research showcases a practical application using a Bangalore-based dataset, demonstrating a robust prediction system integrated with a user-friendly interface.

Estimating the Value of Apartment Buildings by James Frew and G. Donald Jud ^[8] presents a detailed application of hedonic modeling to determine the value of apartment properties in Portland, Oregon. The authors establish a regression model that explains about 95% of price variation based on factors such as location, size, and age. They found that values decrease with distance from the city center, and while project size and the number of units increase property values, the rate of increase is less than proportional. Project age negatively affects value, though the impact is marginal. This study is significant for investors and appraisers looking for empirical methods of property valuation in urban settings.

Real Estate Price Prediction by Anil Nahak, Deepika Yadav, Shashikant Gupta ^[9], explores the use of various machine learning algorithms, including hedonic regression, random forests, and artificial neural networks, to predict housing prices. The study emphasizes improving prediction accuracy by employing advanced data mining tools like Weka and Rapid Miner. The authors highlight the importance of preprocessing data for effective model training and demonstrate how ensemble models can outperform individual algorithms in predicting real estate prices. The study is notable for combining multiple machine learning techniques to enhance prediction accuracy.

Internet Geography and Real Estate Market by Dan Komosny, Martin Bulin, And Petr Ilgner ^[10] introduces a novel approach that merges internet geography and the real estate market. The paper discusses how real estate data can serve as a new spatial data resource for mapping internet infrastructures, linking physical property data with cyber space. The authors implement this concept

by analyzing geographical distances between real estate locations and the physical placement of web servers, emphasizing how proximity affects internet performance and real estate market dynamics. This interdisciplinary study sheds light on the intersection of physical and digital geographies.

The paper *Vision-based Housing Price Estimation Using Interior, Exterior & Satellite Images* by Ali Nouriani and Lance Lemke ^[11] introduces a comprehensive method for estimating housing prices that integrates visual features from interior, exterior, and satellite images alongside traditional textual data. The authors utilize deep convolutional neural networks (CNNs) to extract relevant visual attributes, addressing limitations in existing models that often neglect aesthetic and contextual factors influencing property values. By training classifiers for room types and luxury levels, and combining these with textual data in regression models, the proposed method significantly enhances pricing accuracy compared to conventional approaches, demonstrating a promising advancement in real estate valuation methodologies.

The research paper by Thangaraja Arumugam, P. L. Swerna, R. Arun, R. Anitha, Vimala Kadiresan ^[12], provides a comprehensive examination of the integration of artificial intelligence (AI) and socially responsible marketing in the real estate industry. The authors highlight the profound transformation the sector is undergoing, with evolving consumer values and environmental consciousness reshaping the industry. The literature review showcases the growing body of research on the applications of AI, machine learning, and corporate social responsibility in real estate, underscoring the transformative potential of this digital approach.

The paper by Hromada ^[13] describes an innovative software that collects, analyzes, and assesses data about changes in the real estate market in the Czech Republic. The software systematically gathers over 650,000 price quotations twice a year and provides objective and unbiased evaluation of price development in the real estate market, which is often manipulated by various interest groups.

The paper presents a real estate price prediction model using supervised learning ^[14] techniques like Linear Regression, Lasso Regression, and Decision Tree. The authors aim to enable individuals to determine the appropriate timeline for home acquisition and sellers to assess the cost of a home sale. The model achieves an accuracy of 83.54% using Linear Regression, outperforming the other techniques explored.

Real estate price estimation through a fuzzy partition-driven genetic algorithm ^[15] presents an innovative approach to real estate price estimation that combines genetic algorithms and fuzzy logic. The model encodes both intrinsic (e.g., property condition) and extrinsic (e.g., proximity to services) property features as genes within a genetic algorithm framework. Fuzzy partitions are used to represent qualitative evaluations, enhancing interpretability. The fitness function minimizes discrepancies between assessed and market prices while incorporating a reliability measure based on fuzzy entropy. Case studies in Italy demonstrated the model's ability to balance customer preferences with market conditions, outperforming traditional models in adapting to fluctuating market dynamics.

This study by Fahim Ullah, Fadi Al-Turjman ^[16] explores the potential of blockchain-based smart contracts for real estate management in smart cities, proposing a layered conceptual framework. It highlights six layers encompassing functionalities like transaction automation and decentralized data management using Ethereum Virtual Machine (EVM). The framework facilitates secure, transparent, and efficient real estate transactions while addressing technical and legal challenges. The study aims to transform conventional real estate processes, aligning them with Industry 4.0 standards, and improving user experience, trust, and operational efficiency in property dealings.

This *Prototype-Based Learning for Real Estate Valuation* ^[17] paper introduces a prototype-based learning model for real estate valuation that integrates explainability with predictive accuracy. Unlike traditional methods such as OLS or black-box ML models, this approach incorporates direct comparison, a fundamental human heuristic for

price estimation. The model identifies representative "prototypes" within the dataset and uses them to interpolate property prices. Experimental results on a public real estate dataset showed that the model outperformed existing methods in accuracy and provided interpretable insights, making it suitable for practical and regulatory contexts.

Real Estate Price Prediction with Regression and Classification" by Hujia Yu, Jiafu Wu ^[18] focuses on predictive modeling for housing prices using various machine learning techniques. They employed regression models, such as Lasso and Random Forest, and classification methods like Support Vector Machines (SVM) and Naive Bayes, to predict housing prices based on historical data from Ames, Iowa. Among these, the SVM with a Gaussian kernel demonstrated the highest predictive accuracy. The study shows how these models provide insights into the significant factors affecting housing prices, like living area and roof material, and underscores the potential for advanced data analytics in real estate forecasting.

The Implementation of Virtual Reality (VR) Technology in Real Estate Industry by Kholim Sahray, Anis Syazwani Sukereman, Siti Hasniza Rosman, Fatin Nur Hanis Jaafar ^[19], investigates the role of VR in the Malaysian real estate market, particularly following the COVID-19 pandemic. The study found that VR facilitates virtual property tours, 360-degree visualizations, and detailed property staging, significantly improving real estate marketing. Data from industry professionals indicated that VR enhances customer engagement by offering detailed visuals and saving time and costs associated with traditional property tours. The study concludes that VR is a valuable tool for real estate agents, helping them remain competitive in a rapidly evolving industry.

AI: Real Estate's New Roommate - The Good, the Bad, and the Algorithmic by Nikodem Szumilo and Thomas Wiegelmann ^[20], explores the transformative role of artificial intelligence (AI), especially large language models (LLMs), in the real estate industry. The paper evaluates AI's ability to enhance decision-making, improve predictive analytics, and streamline operations within real estate. Despite these benefits, the

authors highlight concerns such as algorithmic bias and potential depersonalization in customer interactions. Their concept of a "jagged technological frontier" underscores the varying utility of AI across different real estate tasks, suggesting a balanced integration of human expertise with AI to optimize results in the sector.

III. METHODOLOGY

This study develops an intelligent real estate valuation system, integrating Augmented Reality (AR) and Machine Learning (ML) to enhance user engagement and offer data-driven property valuations. Developed using Android Studio, the app combines XML for the frontend and Java for the backend, enabling an intuitive interface. The app's functionalities are split between AR-based property visualization and ML-driven price prediction, creating a seamless experience that supports users in assessing properties remotely and confidently.

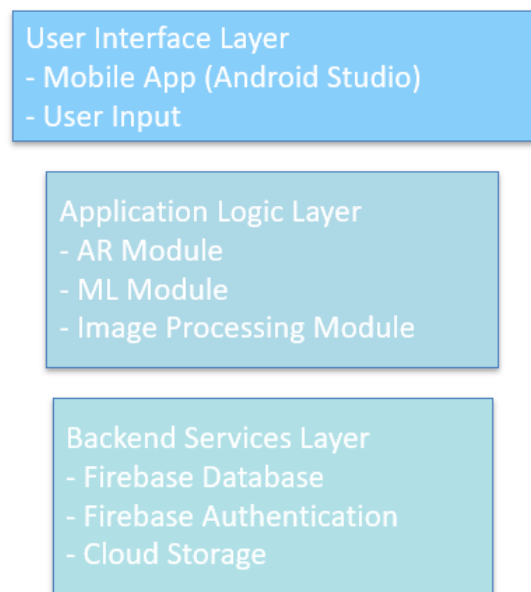


Fig. 1 Architecture of Proposed System

System Architecture:

The system architecture for the real estate price prediction app is structured into three key layers: the User Interface Layer, the Application Logic Layer, and the Backend Services Layer. These layers interact seamlessly to deliver an intuitive, interactive, and predictive real estate experience. The User Interface (UI) layer is the front-end of the application, developed using Android Studio. This layer consists of Login/Signup Pages which is

managed by Firebase Authentication, allowing users to securely register or log in to the app. Main Page which displays a list of available properties and allows users to search and filter based on criteria such as price, location, and property type. AR View Page uses AR technology to visualize properties in the real world by overlaying price predictions and other relevant data on the camera feed. The Application Logic Layer is responsible for handling user interactions and processing data. It includes AR Module that uses the mobile device's camera and augmented reality technology (such as ARCore or SceneView) to display property details and price predictions in the real-world environment. Machine Learning (ML) Module which utilizes historical data and user inputs to predict property prices using regression models. This module analyzes factors like property size, location, and market trends. Image Processing Module which enhances property images and potentially performs image analysis to extract relevant features that may affect property pricing, such as the condition of the house. The Backend Services Layer manages data storage, authentication, and cloud services. It includes, Firebase Database that stores user data, property information, and price predictions in real-time. It also stores other dynamic data such as property images, user preferences, and saved listings. Firebase Authentication which handles secure user login, registration, and session management. Cloud Storage which manages the storage of large files, such as property images and documents, ensuring easy access and retrieval. Firebase Functions which execute server-side logic for tasks such as price predictions and data processing without the need for dedicated backend infrastructure.

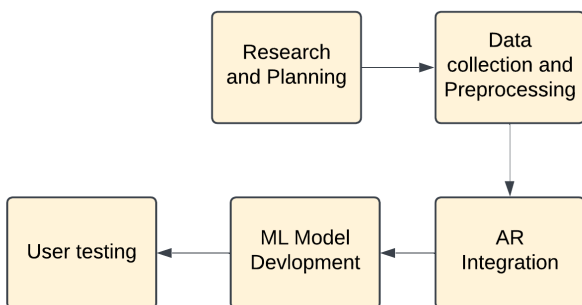


Fig. 3 Flow Chart of Proposed System.

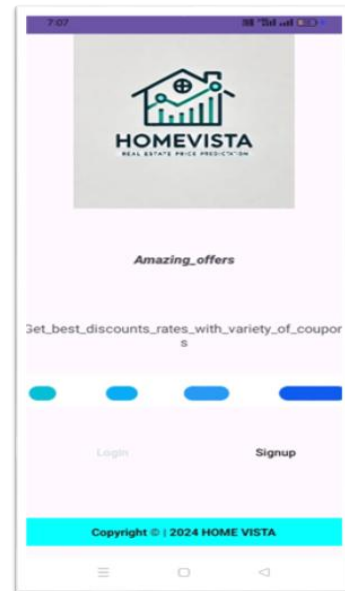


Fig.4 Front Page of Proposed System.

The Front Page of the real estate price prediction app introduces users to the app's theme and functionality with a clean, engaging design. It begins with the app's logo as a full-width image, followed by a brief description emphasizing the app's value proposition. An additional promotional image further enhances the visual appeal, showcasing current offers or property features. At the bottom, two action buttons, Login and Signup, allow users to quickly access their accounts or create a new one. The page also includes a footer for consistent navigation, which is linked through an external layout. The design is scrollable, ensuring a smooth, responsive experience across different devices, guiding users through the app's key features efficiently.

The Login Page serves as the entry point for users to securely access the real estate price prediction app. It is designed for ease of use and integrates Firebase Authentication for secure login using email and password. The page also offers a sign-up option for new users, allowing them to quickly register by entering their basic information.

Key features include real-time input validation to ensure correct data entry, error handling for invalid credentials, and the option to remember the user for future logins. Upon successful login, users are redirected to the Main Page, where they can explore property listings and interact with the AR-based price prediction features. The app prioritizes security by encrypting user data and using secure

HTTPS connections, ensuring safe and private access to user accounts.

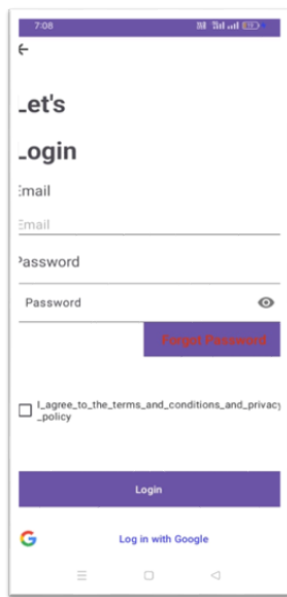


Fig .5 Login Page of Proposed System.

The Property Details Page of the real estate price prediction app enables users to enter essential property information for price estimation. The page begins with the title "Real Estate Price Prediction," followed by fields where users can input details such as Property ID, Location, Square Feet, Number of Bedrooms, Number of Bathrooms, and Year Built. A checkbox is included to specify if the property has a garage. After filling out these fields, users can tap the "Predict Price" button to generate an estimated price, which will be displayed on the screen. Additionally, the page offers two buttons, "View Image" and "View AR," to let users view property images or explore the property through augmented reality for a more engaging experience. The layout is designed to be scrollable, providing a user-friendly and accessible experience on various devices.

AR Integration is powered by ARCore (for Android) and ARKit (for iOS), which enable users to interact with virtual models of houses through their smartphone cameras. These frameworks allow users to scan and project house models in real-time. The AR models are trained using datasets of real estate prices sourced from platforms such as Kaggle, HousingPriceIndex.com, and government databases. Advanced computer vision techniques

and deep learning models, particularly Convolutional Neural Networks (CNNs), are applied to process the scanned images and enhance the AR experience.

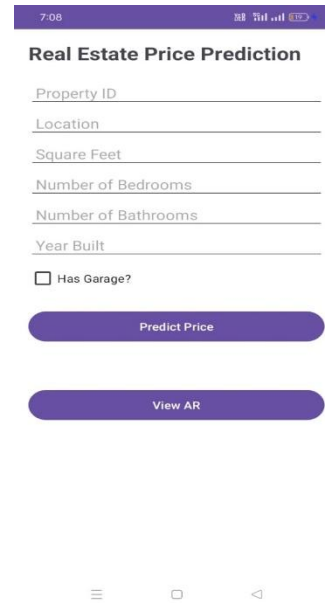


Fig.6 Home Page of Proposed System.

The Database Management component of the app involves the use of two databases. MySQL is employed to store real estate data gathered from external sources and the images of scanned houses along with their price estimates. Additionally, Firebase Realtime Database is utilized to manage user-specific data, such as scanned house models and price estimates, ensuring real-time data synchronization across devices.

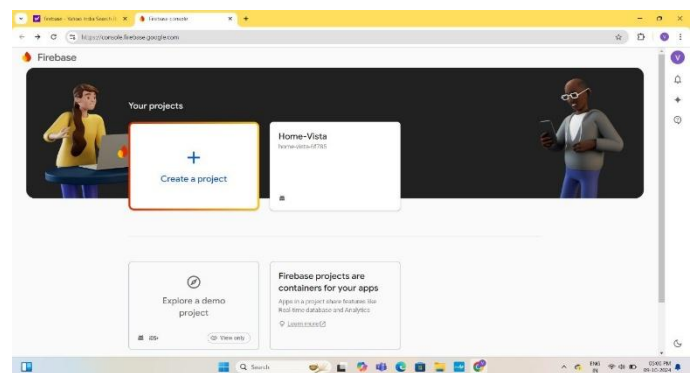


Fig 7. Firebase Connectivity of Proposed System.

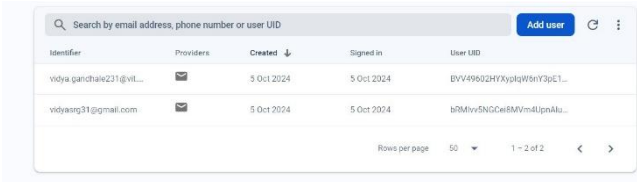


Fig 8. Firebase Authentication of Proposed System.

For the Machine Learning and Data Science aspects, the app employs regression models to estimate the total price of a house based on scanned images of furniture and other property features. Data is collected from external sources and the app’s scanned images, and regression analysis is applied to predict the house’s total value. We also use a dataset based on Pune real estate prices to try and predict prices based on information provided by the user in text format. The computed prices are stored in the MySQL database and displayed within the app interface for user reference. This is an example of the dataset we used.

id	area	square_feet	num_bedrooms	num_bathrooms	year_built	has_garage	price
1	Viman Nagar	1521	1	1	2016	0	4315847
2	Kalyani Nagar	2957	1	2	2003	1	12861155
3	Pimpri-Chinchwad	2816	3	2	1993	0	8615274
4	Kalyani Nagar	2869	3	1	2000	1	5360008
5	Kalyani Nagar	1285	3	3	2012	0	6412776
6	Hinjewadi	1171	1	3	2013	0	5463767
7	Pimpri-Chinchwad	2602	4	2	2019	1	9289185
8	Pimpri-Chinchwad	1997	4	3	1995	1	1212898
9	Pimpri-Chinchwad	2982	5	1	2006	1	9982144
10	Kalyani Nagar	1079	1	3	2003	0	4566237
11	Viman Nagar	1559	3	2	1990	1	12105141
12	Pimpri-Chinchwad	1067	1	3	1986	0	5849347
13	Kalyani Nagar	1193	3	3	1984	1	4998729
14	Hinjewadi	1194	1	1	2009	1	12136027
15	Viman Nagar	2739	2	2	2022	0	7908901
16	Hinjewadi	1077	2	1	1983	1	3852581
17	Viman Nagar	2869	4	1	1983	1	11682433
18	Kalyani Nagar	2632	3	2	1993	0	13874766
19	Koregaon Park	2503	2	2	1992	1	6855141
20	Viman Nagar	1947	3	1	1984	1	9780819
21	Hinjewadi	834	1	1	2003	0	11289406
22	Kalyani Nagar	2095	3	2	1987	0	6469931

Fig.8 Dataset of Proposed System.

The Data Storage and Retrieval system ensures persistence and accessibility of the user’s scanned house data. The MySQL database retains the AR models and scanned home images, enabling users to view previously scanned homes and retrieve corresponding price estimates from the app.

Key software and tools include:

- Android Studio for app development using XML and Java.
- Google Sign-In for user authentication.
- ARCore/ARKit for AR functionalities.
- MySQL for real estate data storage.
- Firebase Realtime Database for real-time synchronization of user-specific data.
- Python for implementing ML algorithms, specifically CNNs and regression models.

- TensorFlow/Keras for training and deploying deep learning models.

A working example of the app’s functionality starts when the user logs in via Google Sign-In, which directs them to the AR interface. By activating the camera, users can scan their home or rooms. The ARCore/ARKit frameworks then process these images, and the app applies trained ML models to estimate the total property price based on individual furniture and features. The results, including the estimated price, are stored in the MySQL database and the scanned images are stored in Firebase and displayed in the app. Users can also retrieve and view their scans and price estimates at a later time.

This methodology integrates cutting-edge AR and ML technologies to offer an immersive and user-friendly real estate experience, providing accurate price estimates and interactive visualizations of homes.

IV. RESULT AND DISCUSSIONS

The proposed system was tested across a variety of properties in Pune, India, with the aim of assessing the accuracy of its property valuation model and the effectiveness of its AR-based virtual tours. The results demonstrate that proposed system integrated approach significantly enhances user engagement and provides accurate, data-driven valuations that align with market expectations.

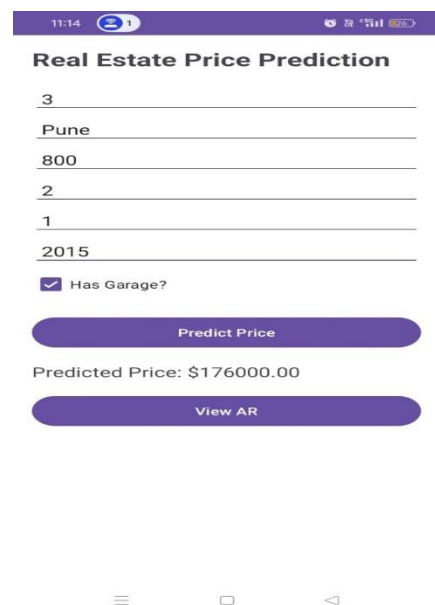


Fig.9 Result of Proposed System.

For instance, a sample prediction generated an estimated value of \$176,000, computed by the linear regression model trained on historical real estate data. This model identifies relationships between property attributes and their market values. When users press the "Predict Price" button, the app triggers the model to calculate the predicted price. Additionally, the "View AR" button enhances user engagement by displaying a 3D model of the property in augmented reality, offering an immersive and interactive experience.

The choice of the linear regression model is grounded in its simplicity and interpretability, making it suitable for identifying linear relationships between the independent variables (property features) and the dependent variable (price). Despite its simplicity, this model has proven effective in capturing trends across the dataset, allowing for reasonably accurate price estimation in real-time.

The real estate price prediction model was tested on various properties in different locations across Pune, India. The table-1 below summarizes the model's predicted prices based on specific property characteristics, such as area (in square feet), number of bedrooms, number of bathrooms, and year of construction.

Table.1 Output of Proposed System for various Flat Price Prediction in Pune.

Id	Location	Area (Sq. feet)	No. Of BHK	Age Of Building	Predicted Price (RS)
1.	PCMC	2982	4	2006	29850000
2.	Kalyani Nagar	1079	1	2003	6890000
3.	Viman Nagar	1959	3	1990	24590000
4.	Hinjewadi	1194	1	2009	6500000
5.	Koregaon Park	2903	2	1992	12030000

The model's predictions reveal significant variations in prices across different locations and property characteristics. For example, properties in Viman Nagar and Hinjewadi exhibit higher predicted values, potentially due to factors such as larger area and high demand in these neighbourhoods. The property in Viman Nagar, built in 1959 with three bedrooms and two bathrooms, has a predicted price of ₹24590000, underscoring the influence of both location and area on property value. Conversely, the property in Koregaon Park, although spacious at 2,903 square feet, has a lower predicted price of ₹12030000, possibly reflecting different market conditions in that locality.

These results demonstrate how the linear regression model effectively captures the relationship between various property features and their market values, delivering accurate, context-specific predictions. The predicted prices align with expected property trends in the Pune region, where attributes like area size, number of rooms, and neighbourhood characteristics substantially impact property valuation.

V. CONCLUSION

Our app is really changing how people explore real estate, making it more engaging, accurate, and data-driven. By integrating AR, users can take virtual tours of properties right from their homes, giving them a realistic sense of the space without having to visit in person. This not only saves time but has received great feedback from users, who say it helps them imagine living there far better than traditional photos or videos. This way, they're more confident about their choices.

Using machine learning, we've built a more objective way to estimate property values. Traditionally, valuations are based on appraisers' judgments, which can be subjective. With our app, property values are calculated using data like past sales and current market trends, providing a more transparent and reliable estimate for both buyers and sellers.

Data science also plays a big role in our app, helping users see market trends and potential future developments. This is especially useful for investors, as it helps them spot promising opportunities based on solid predictions rather than just guesswork.

Looking ahead, we're excited about adding features like neighbourhood insights and financial calculators, which would give users an even more complete picture. We're also considering VR to make property tours even more immersive. Collaborating with data providers will be crucial to keep everything accurate and up-to-date, especially in areas where data is limited. By continuously improving, we hope to make this app a valuable tool in real estate, making the process smoother, more informed, and accessible.

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REFERENCES

- [1] Serena Loro, Valerio R.M. Lo Verso, Elena Fregonara, Alice Barreca. Influence of daylight on real estate housing prices. A multiple regression model application in Turin. *Journal of Building Engineering*. 2024.
- [2] Anand G. Rawool, Dattatray V. Rogye, Sainath G. Rane, Dr. Vinayk A. Bharadi. House Price Prediction Using Machine Learning. *IRE Journals*, Volume 4 Issue 11, ISSN: 2456-8880. 2021
- [3] Saptarsi Sanyal, Saroj Kumar Biswas, Dolly Das, Manomita Chakraborty, Biswajit Purkayastha. Boston House Price Prediction Using Regression Models. 2nd International Conference on Intelligent Technologies. 2022.
- [4] Vedika Patil, Sonali Sathe, Aprajita, Milind Kamble. Augmented Reality For Real Estate. *International Research Journal of Engineering and Technology (IRJET)*. Volume: 09 Issue: 01. 2022.
- [5] Fadhil M. Basysyar, Gifthera Dwilestari. House Price Prediction Using Exploratory Data Analysis and Machine Learning with Feature Selection . *Acadlore Trans. Mach. Learn.*, vol. 1, no. 1, pp. 11-21. 2022.
- [6] Yanbo Chen, Chao Wu, and Junjian Qi. Data-driven Power Flow Method Based on Exact Linear Regression Equations. *Journal Of Modern Power Systemsand Clean Energy*, Vol. 10, No. 3, May 2022.
- [7] Aditi Shahasane, Mayuri Gosavi, Ayushi Bhagat, Nandini Mishra, Amit Nerurkar. House Price Prediction Using Machine Learning. *International Research Journal of Engineering and Technology (IRJET)*. Volume: 10 Issue: 04. Apr 2023.
- [8] James Frew and G. Donald Jud. Estimating the Value of Apartment Buildings. *JRER Vo l . 25 No . 1– 2023*.
- [9] Anil Nahak, Deepika Yadav, Shashikant Gupta. Real Estate Price Prediction Using Machine Learning. *International Journal of Research Publication and Reviews*, Vol 3, no 4, pp 122-127, April 2022.
- [10] Dan Komosny, Martin Bulin, And Petr Ilgner. *Internet Geography and Real Estate Market*. IEEE. VOLUME 5, 2023.
- [11] Ali Nouriani, Lance Lemke. Vision-based housing price estimation using interior, exterior & satellite images. *Intelligent Systems with Applications 14 (2022) 200081*.
- [12] Thangaraja Arumugam, P. L. Swerna, R. Arun, R. Anitha, Vimala Kadiresan. Advancing and Methodizing Artificial Intelligence (AI) and Socially Responsible Efforts in Real Estate Marketing. *Data-Driven Intelligent Business Sustainability (pp.48-59)*. 2023.
- [13] Eduard Hromada. Mapping of real estate prices using data mining techniques. *Procedia Engineering 123 (2021) 233 – 240*.
- [14] Vedang Matey, Nikita Chauhan, Aditi Mahale, Vidya Bhistannavar, Dr. Ajitkumar Shitole. Real Estate Price Prediction using Supervised Learning. *IEEE Pune Section International Conference (PuneCon) International Institute of Information Technology ((IIT), Pune, India. Dec 15-17, 2022*.
- [15] Barbara Cardone, Ferdinando Di Martino, Sabrina Senatore. Real estate price estimation through a fuzzy partition-driven genetic algorithm. *Information Sciences 667 (2024) 120442*.
- [16] Fahim Ullah, Fadi Al-Turjman. A conceptual framework for blockchain smart contract adoption to manage real estate deals in smart cities. *Neural Computing and Applications (2023) 35:5033–5054*.
- [17] Jose A. Rodriguez-Serrano. Prototype-based learning for real estate valuation: a machine learning model that explains prices.
- [18] Hujia Yu, Jiafu Wu. Real Estate Price Prediction with Regression and Classification.
- [19] Kholim Sahray, Anis Syazwani Sukereman, Siti Hasniza Rosman, Fatin Nur Hanis Jaafar. The Implementation Of Virtual Reality (Vr) Technology In Real Estate Industry. *Journal of the Malaysian Institute of Planners Volume 21 Issue 3 (2023), Page 255 – 265*.
- [20] Nikodem Szumilo and Thomas Wiegelmann. AI: Real Estate's New Roommate - The Good, the Bad, and the Algorithmic.