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RooMeet Rooms and Room Mate Finding Website

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***Abstract* - Nowadays, roommate services are in high demand these days. With the world getting flattered by the day, people have transcended physical boundaries to look for study and work options in places they haven't visited before. Although a new place throws up its unique challenges, one is today well-equipped to deal with them. The advent of the net has made this possible, with people finding it increasingly easy to relocate to a new apartment and find a suitable roommate in no time. RooMeet: Rooms and Room- Mate finding website is a website that makes sure you find good flatmates with the specific requirements the user has provided. The user will be asked to log in or create an account to enter the website. Then they will be asked a few questions about themselves and the roommate they prefer to be with. With the logistic regression algorithm and recommendation algorithm with collaborative filtering, they will get suggestions as to who can be the perfect fit for their flat buddy, and then if the other end user feels the same way they will enable the option of texting each other and can have a great conversation and see if they are a good fit or not. RooMeet: Rooms and Room- Mate finding website offers a marketplace where you can search for potential roommates. RooMeet: Rooms and Room- Mate finding website will use a highly advanced search algorithm to make the search much more effective. With comprehensive search options, this site makes sure that only results that meet your specific requirements are displayed.**

Keywords: Roommate, Website, Algorithm, Logistic regression, Recommendation Algorithm, Collaborative filtering, Texting, Search, Requirements, etc.

I. INTRODUCTION

The project addresses the critical need for accurate and reliable models in the real estate domain. As housing markets continue to evolve with complex dynamics influenced by factors such as location, size, amenities, and economic conditions, the demand for precise house price predictions has become paramount. Traditional regression models have laid the foundation for predictive analytics in real estate, but this project aims to elevate the accuracy and efficiency of predictions by delving into advanced regression techniques. By exploring methodologies like multiple linear regression, polynomial regression, and ensemble methods such as random forests, this research seeks to uncover nuanced patterns and relationships within extensive housing datasets. The overarching goal is to develop a robust predictive model that not only captures the intricacies of the housing market but also provides valuable insights for homeowners, real estate professionals, and policymakers. Through this investigation, the project aspires to contribute to the advancement of predictive analytics in real estate and offer a refined tool for anticipating housing market trends with greater precision. Our approach to prediction is to use regression techniques. There are various regression techniques available like Linear Regression, Polynomial Regression, Stepwise Regression, Ridge Regression, Logistic Regression, Lasso Regression and Elastic net Regression. India is the second most populated country holding 17.70% of the world's share has approximately 67.27 percent of people aged between 18 and 64, which is the peak period of education and the employment for which almost all the people migrate from their homes to either their workplace or for education purposes. This leads to a concept of shared accommodation which is very common for students but also for people who are in corporate world to reduce their rent and financial burden.

In India, more and more people are shifting to A-tier cities for better opportunities, so the demand for affordable housing is also increasing. The best option is to have flatmates which help to reduce the cost and have a more family environment in the house. But finding flatmates is a daunting task and having the wrong flatmates can be a nightmare. Having a flatmate reduces the overall cost of living as the rent, electricity and some other expenses are also shared. People leave their hometowns and come to cities for jobs and other opportunities, they feel homesick. Having someone to talk to is nice and can be helpful for your mental health. Now if you are living in a shared accommodation then you will surely have to part your space with a roommate, we have observed that the presence of a roommate is equally disturbing as the absence of a roommate. Having a roommate with no compatibility might lead to problems such stress, anxiety, and sometimes depression, but this is a risk to be endured for survival in metro cities where the cost of living alone is very high.

The research objective extends beyond mere algorithmic application, encompassing a holistic consideration of diverse

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features that influence property values. This entails the incorporation of not only fundamental structural attributes but also more nuanced socio-economic indicators that contribute to the overall valuation. Data preprocessing techniques and feature engineering play a pivotal role in refining the input dataset, ensuring that the model is equipped to discern meaningful patterns amidst the myriad variables. The model's predictive performance is meticulously evaluated through cross-validation, ensuring its adaptability to diverse datasets and the provision of reliable predictions. This project seeks to advance the current understanding of house price prediction, offering a nuanced and effective tool for stakeholders within the real estate sector to make informed decisions based on accurate valuation assessments. As the complexities of the real estate market continue to evolve, this research endeavors to provide a forward-looking and adaptable solution that addresses the multifaceted nature of property valuation.

II. LITERATURE REVIEW

The research paper focuses on improving rental property management by addressing challenges such as paperwork, data loss, and security concerns. It aims to simplify the lives of rental managers and enhance their productivity through the development of a rental home management system. The system emphasizes ease of use with an intuitive interface for rental managers. Users access a dashboard upon login, serving as a central hub for property management tasks. Menu options include House Type, Houses, Tenants, Payments, Reports, and Users, covering all aspects of property management, from house types to user accounts. 2023[1].

Inefficient record management for house rental agents and landlords due to data growth, lack of computerized systems, and data security concerns. Prospective tenants wasting time in their search for rental properties due to manual-based techniques, exacerbated by population growth and metropolitan migration. This research presents a cloud-based mobile rental management system with two main components: users (prospective tenants, tenants, agents, landlords) and the cloud. The system includes modules for location tracking, notifications, payments, authentication, messaging, cloud infrastructure, wallet management, reports, chat, rental posting, and search. 2020[2]

The research paper addresses the deficiency in existing vacation rental management systems by introducing a solution for managing access keys to rental properties. It specifically focuses on integrating a smart lock system to simplify and enhance door access for users. This paper details the design and development of a vacation rental management system that incorporates a smart lock system to address the key access issue. A prototype of the integrated system is created to assess its feasibility. The prototype undergoes testing to evaluate its performance. The system emphasizes ease of use with an intuitive interface for rental managers. Users access a dashboard upon login, serving as a central hub for property management tasks. Menu options include House Type, Houses, Tenants, Payments, Reports, and Users, covering all aspects of property management, from house types to user accounts.[3]

The research paper addresses the limitations of an existing room allocation model that assumes uniform room capacity and disregards budget constraints. It introduces a more practical and complex room allocation problem that considers varying room capacities and budget constraints, aiming to maximize social welfare in the allocation process. This paper explores the room allocation problem with capacity diversity and budget constraints, focusing on maximizing social welfare. It presents the complexity of this problem by proving it to be NP-hard, even in a simplified scenario. The paper offers an approximation algorithm for cases where room capacities are bounded by a constant.[4]

The research paper addresses the critical issue of affordable housing among middle income groups. It examines how housing affordability problems impact societal wellbeing and proposes options to manage these issues. The study collected data from fifty respondents using housing issues questionnaires. Descriptive statistics were used to analyze the data, revealing that the primary housing challenges faced by middle-income groups are housing prices, housing loans, and housing schemes' policies. The paper emphasizes the need to address these issues to ensure a majority of the population can afford livable properties, which would enhance the quality of life in Malaysia.[5]

III. EXISTING SYSTEM

Accommodation in today's world has been soaring at high rates. In addition, to get a shelter that matches one's preference, budget, interest and proximity is a challenge. This problem becomes even more bigger if the person looking for accommodation is a student. For students, factors like affordability, proximity to the university, similar company etc. matters the most. There are number of websites and mobile apps that provide facilities for finding suitable roommate and vacant apartment, but as of now, there is no such mobile app that helps to find roommate or apartment for a specific university.

IV. PROPOSED SYSTEM

The proposed work encompasses a structured methodology for the development and implementation of an advanced Flatmate model. The initial phase involves

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comprehensive data collection, sourcing a diverse dataset that includes both fundamental structural attributes and nuanced socio-economic factors. Subsequent data preprocessing techniques ensure dataset cleanliness and prepare it for effective model training. Feature engineering, a pivotal step, involves creating new features and transformations to enhance the model's capacity to discern intricate patterns within the data.

The proposed system for paper is designed to revolutionize the process of finding compatible flatmates by leveraging advanced web technologies and intuitive user interfaces. At its core, ROOMEET offers a user-friendly platform where individuals seeking shared accommodation can create profiles, specify preferences, and connect with potential flat mates seamlessly. The system features a comprehensive user registration and profile creation module, allowing users to input personal details, lifestyle preferences, and housing requirements. Utilizing sophisticated matching algorithms, ROOMEET intelligently analyzes user profiles to suggest compatible matches based on shared interests, habits, and preferences.

Moreover, the system incorporates robust search and filtering functionalities, enabling users to refine their search criteria based on location, budget, lifestyle preferences, and other relevant factors. Interactive communication tools, such as instant messaging and video calls, facilitate direct interaction between users, fostering communication and collaboration throughout the flatmate selection process. Additionally, Roomeet (Explore rooms and Roomates) prioritizes security and privacy, implementing stringent verification measures and data encryption protocols to safeguard user information and ensure a trustworthy environment for all users.

Furthermore, ROOMEET offers additional features such as real-time notifications for new matches, in-app messaging for seamless communication, and a ratings and review system to provide feedback on flatmate experiences. The system's responsive and intuitive design ensures compatibility across various devices, including desktops, tablets, and smartphones, enhancing accessibility and usability for users on-the-go. Overall, ROOMEET aims to streamline the flatmate searching experience, revolutionizing the way individuals find compatible living arrangements and fostering meaningful connections in shared accommodations..

The final phase involves the practical implementation and deployment of the developed model. This could manifest as a user-friendly web application, allowing real estate professionals and stakeholders to input property features and receive accurate price predictions. This ensures the model's insights are accessible and applicable in real-world scenarios, contributing to informed decision-making within the dynamic real estate market. Overall, the proposed work aims to deliver a comprehensive and effective solution to the challenges of house price prediction, integrating advanced regression techniques with meticulous methodology for practical deployment and utilization.

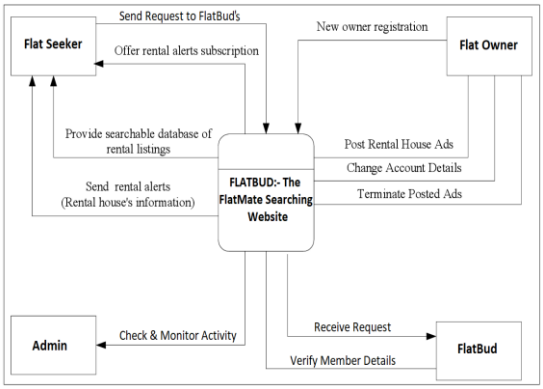

Figure 1: Architecture Diagram

The proposed work outlines a systematic and comprehensive strategy for the development and implementation of a robust house price prediction model using advanced regression and Collaborative filtering techniques. The methodology encompasses several key stages, each contributing to the refinement and efficacy of the predictive model.

A) Data Collection and Preprocessing

The first phase involves the acquisition of a diverse and representative dataset encompassing a wide array of real estate attributes. This includes fundamental structural features such as square footage, number of bedrooms, and bathrooms, as well as more intricate socio-economic variables like neighborhood demographics, crime rates, and proximity to amenities. Data preprocessing techniques, including handling missing values, normalization, and outlier detection, are applied to ensure the dataset's cleanliness and enhance the model's ability to discern relevant patterns.

B) Feature Engineering

Feature engineering is a critical component aimed at enhancing the model's capacity to capture complex relationships within the dataset. This involves the creation of new features or transformations of existing ones to extract valuable information. For instance, the generation of interaction terms or polynomial features can amplify the model's sensitivity to non-linear patterns, contributing to improved prediction accuracy.

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C) Model Selection and Training

The proposed work involves the utilization of a suite of advanced regression techniques, including multiple linear regression, support vector regression, and ensemble methods such as random forests and gradient boosting. The rationale behind employing an ensemble of models is to capitalize on the strengths of individual algorithms while mitigating their respective weaknesses. The models are trained on the preprocessed dataset, and hyper-parameter tuning is performed to optimize their performance.

D) Cross-Validation and Evaluation

To ensure the robustness and generalizability of the predictive model, rigorous cross-validation techniques are employed. K-fold cross-validation is utilized to assess the model's performance across different subsets of the dataset. Evaluation metrics such as Mean Squared Error (MSE), Root Mean Squared Error (RMSE), and R-squared are employed to quantify prediction accuracy, providing a comprehensive understanding of the model's effectiveness in capturing variance within the target variable.

E) Model Interpretability and Explain ability

An essential aspect of the proposed work involves enhancing the interpretability and explain ability of the developed model. Techniques such as feature importance analysis and SHapley Additive explanations (SHAP) values are employed to elucidate the contribution of each feature to the model's predictions. This not only facilitates a deeper understanding of the factors influencing house prices but also instills confidence in the model's decision-making process.

V. IMPLEMENTATION OF SA ALGORITHM

Our approach to prediction is to use regression techniques. In this project we are using Linear Regression, Lasso Regression, Ridge Regression, Elastic Net Regression and Collaborative filtering Techniques for result analysis.

A) Algorithms used

a) Linear Regression

It establishes a relationship between dependent variable (Y) and one more independent variables (X) using a best first aright line (also known as regression line). It shows the linear relationship, which means it finds how the value of the dependent variable is changing according to the value of the independent variable.

Mathematically, we can represent a linear regressions:

$$y= a0+a1x+ \varepsilon$$

Here,

Y= Dependent Variable (Target Variable)
X= Independent Variable (predictor Variable)
a0= intercept of the line (Gives an additional degree of freedom)
a1 = Linear regression coefficient (scale factor to each input value).
ε = random error

B) Lasso Regression

LASSO stands for Least Absolute Shrinkage and Selection Operator. In statistics and machine learning, lasso is a regression analysis method that performs both variable selection and regularization in order to enhance the prediction accuracy and interpret ability of the statistical model it produces. It Shrinkage is where data values are shrunk towards a central point ,like the mean. The lasso procedure encourages simple, sparse models (i.e. models with fewer parameters).

Ridge Regression: Ridge Regression is a technique for analyzing multiple regression data that suffer from multi co linearity. When multi-co-linearity occurs, least squares estimates are unbiased, but their variances are large so they may be far from the true value. Ridge regression belongs to a class of regression tools that use L2 regularization.

Elastic Net Regression: Elastic net is a regularized regression method that linearly combines the L1 and L2 penalties of the lasso and ridge methods. The technique combines both the lasso and ridge regression methods by learning from their shortcomings to improve on there vulgarization of statistical Model.

C) Evaluation Metrics

R Squared Value: It determines how much of the total variation in Y (dependent variable) is explained by the variation in X (independent variable).

Mathematically, it can be written as:

$$\mathbf{R - Square = 1 -= \frac{\sum(Yactual - Ypredicted)\text{^}2}{\sum(Yactual - Ymean)\text{^}2}}$$

Adjusted R Squared Value: The Adjusted R-Square is the modified form of R-Square that has been adjusted for the number of predictors in the model. It incorporates model's degree of freedom. The adjusted R-Square only increases if the new term improves the model accuracy.

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$$R^2 Adjusted = 1 - \frac{(1 - R^2)(N - 1)}{N - p - 1}$$

Where,

R^2 = Sample R square
P= No of predictors
N= Total sample size

VI. RESULTS

This application is aimed at trying to solve the major accommodation problem for university students. This application consists of a variety of features like sending messages, searching based on university name and address, potential match based on user's preferences and short listing.

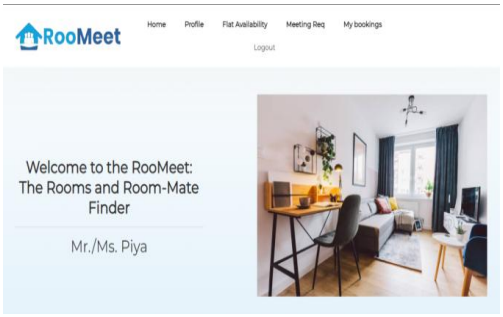

Figure 2: Home Page

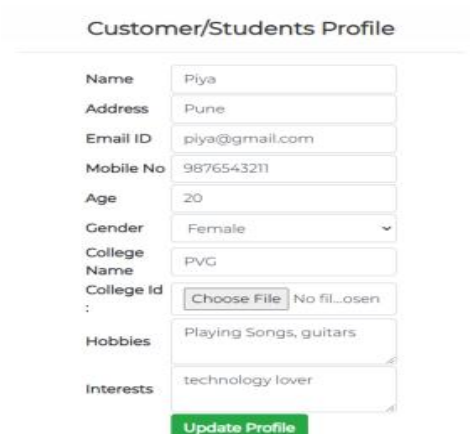

Figure 3: User Panel

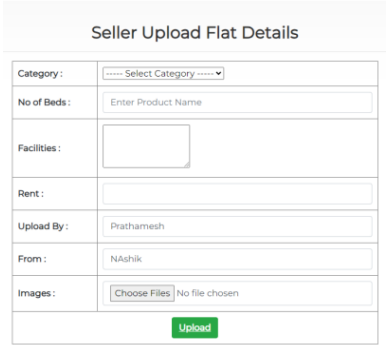

Figure 4: Flat Details

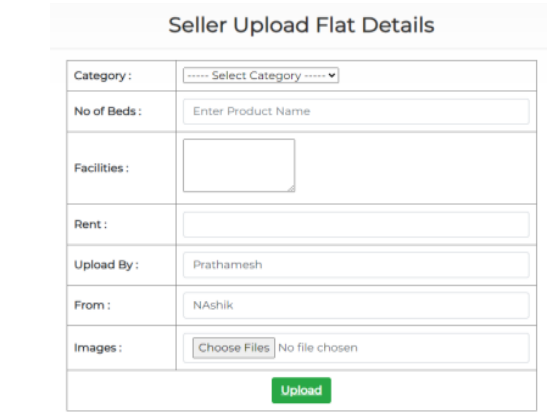

Figure 5: Find Rooms

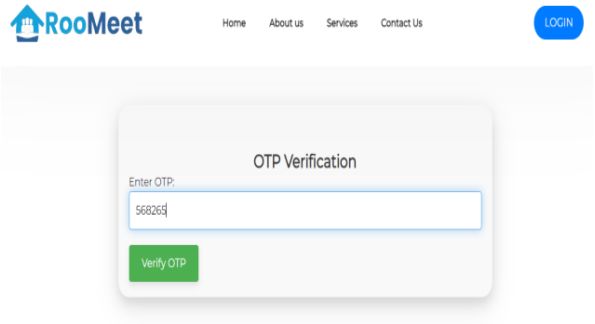

Figure 6: OTP Verification

Figure 7: Customer Details

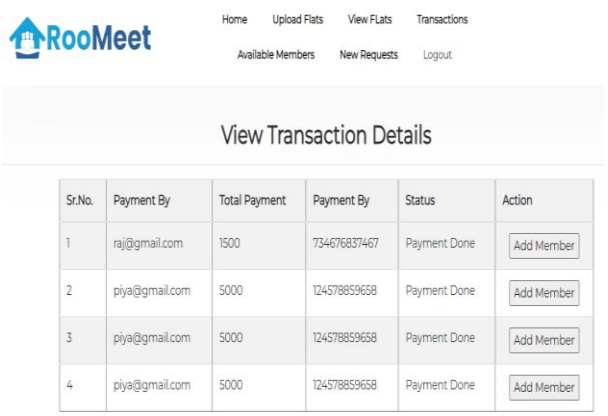

Figure 8: Transaction Details

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VII. CONCLUSION

In conclusion, paper presents a transformative solution to the challenges individuals face when searching for compatible flatmates. Through its intuitive user interface, advanced matching algorithms, and robust communication features, ROOMEET streamlines the flatmate searching process, empowering users to find suitable living arrangements with ease. By prioritizing user preferences, security, and privacy, ROOMEET creates a trustworthy environment where users can connect, communicate, and collaborate effectively. The platform's responsive design ensures accessibility across various devices, enhancing user convenience and flexibility. With its emphasis on fostering meaningful connections and facilitating seamless interactions, ROOMEET not only simplifies the flatmate searching experience but also contributes to the creation of harmonious living environments. Ultimately, ROOMEET stands as a testament to innovation in the realm of shared accommodation, offering a comprehensive solution that addresses the diverse needs and preferences of individuals seeking compatible flatmates.

Furthermore, the commitment to model interpretability enhances its practical utility, allowing stakeholders to not only trust the predictions but also gain insights into the driving factors behind them. The envisaged deployment of the model in a user-friendly application underscores its practical relevance, empowering real estate professionals and potential homebuyers with a valuable tool for informed decision-making.

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