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House Rent Prediction

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Abstract: ***Forecasting rental trends is crucial for many individuals as rental rates in the real estate market tend to escalate annually.***
Some people want a house with low rent and a usable area, so our article furnishes valuable insights into rental expenses, catering to individuals seeking prospective tenants. Hence, considering our demographic profile, it's essential to employ a systematic approach for predicting future residential rental prices. Buyers who rent accommodation according to their specific needs will know the perfect duration for renting.
Many factors, such as seller type, bedroom count, layout type, property type, locality, price, area, furnish type, and bathroom count, influence rent. This study explores and applies multiple regression models Including linear regression, Random Forest regression, and gradient boosting regression, and XG boosted regression algorithm in Machine learning is utilized for prediction of the rental rate of a residence
Keywords: Residential rental prices, regression models, linear regression, random forest regression, gradient boosting regression, XGBoost regression, machine learning, rental rate prediction.

I. INTRODUCTION

In order to find rental properties that meet their clients' budgets, several real estate websites employ ML algorithms and appropriate data. One of the biggest real estate marketplaces globally is the rental housing sector. Research on rental pricing trends may be very beneficial to practitioners and academics alike. Rental property owners must set reasonable costs to draw in potential tenants, but tenants find it most economical to find acceptable pricing based on anticipated location and dwelling quality. For urban researchers, predicting housing rent is a useful signal. Regression models are often used to analyse home/rental prices and their determinants; however, because of flaws in fundamental model assumptions, feature selection, and the utilization of unstructured data, their application is discouraged. In this work, the best results for random forest regression are obtained by comparing regression methods to forecast the rent of the dwelling. Several traditional parameters are used to estimate rent, including price per square foot, rent amount, and number of beds. The cost of renting is unaffected by other factors. Since the epidemic struck India, house rent has been steadily increasing. In such circumstances, it is critical for tenants to understand what constitutes a fair rent; otherwise, they risk being harmed by landlords who intentionally raise rent. It will take a rent price prediction model to tackle this problem. The research analyses rent data from six Indian cities: Kolkata, Mumbai, Bangalore, Delhi, Chennai, and Hyderabad along with several variables such as size, furnishing conditions, and the number of bathrooms, bedrooms, halls, and kitchens. Based on the data, a forecasting model is developed. The two key analytical methods employed are logarithmic transformation and linear regression. A common factor analysis based on the data is also cited within this study. The findings indicate that while this model may be a fairly accurate reference, it still needs work before it can be applied commercially.

II. RELATED WORD

The field of rent prediction has seen significant advancements through various research studies aiming to comprehend the intricate factors that impact rental prices within different regions. A seminal analysis by Dokmeci et al. (2003) in Istanbul, Turkey, utilized hedonic regression to highlight the importance of external elements including property size, number of rooms, bathrooms, balconies, and housing type in determining rent prices. In subsequent studies, Ming et al. applied XGBoost to analyse rent prices in Chengdu, China, while Li utilized the Light Gradient Boosting Model, an enhanced version of XGBoost, to predict rent prices in China. Further expanded on this by integrating advanced algorithms like Random Forest Regressor and Extra Tree. Regressor into their research, offering improved predictive capabilities by capturing nuanced relationships between various features and rental prices.

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Apart from advanced algorithms, traditional Linear regression models are also applied remain relevant in recent research. Kumar (2019) examined rent dynamics in Ames, Iowa, utilizing the techniques of linear regression and ridge regression. Similarly, Tomal (2020) modelled rent prices in Cracow, Poland, employing OLS regression and incorporation.

SAR and GWR-SAR models to analyse spatial heterogeneity and autocorrelation in rental prices. Coleman and Scobie (2009) devised a straightforward housing rental and ownership model with policy simulations, focusing on New Zealand. Their findings emphasized the elasticity of rental property demand compared to overall housing demand, providing insights into the nuances of housing market dynamics. Studies concentrating on specific regions like Beijing, China, underscored the crucial role of factors like a residence area and spot within influencing rent prices. The proximity to commercial centers was highlighted as a key element leading to variations in rent prices within the same city. Christina pinpointed eight crucial elements that impact rent prices, including the total count of bathrooms and bedrooms, pet policies, square footage, parking availability, laundry facilities, location, and outdoor amenities like lawns. Furthermore, Bogdan's extensive study on the global renting landscape unveiled a rising trend of renters across thirty countries, aligning with a rise in rental prices. Each of these research studies offers valuable perspectives on understanding the complex nature of rent prediction. They stress the significance of considering a multitude of factors and utilizing advanced analytical methods to elevate the accuracy and robustness of rental price modeling.

III. METHODOLOGY

Certainly! Let's give a brief clarification for each module within the script:

1) Module 1

Imports and Constants This module contains all the vital consequence explanations and consistent definitions. Moment explanations bring in outside libraries and modules required for the script, and constants hold values that are utilized all through the script.

2) *Module 2*

Information Preprocessing In this module, information preprocessing errands are performed. It incorporates stacking information from a MySQL database, cleaning the information by evacuating copies and exceptions, and preprocessing categorical highlights utilizing name and ordinal encoding. The findings are stored in Word references for afterward.

3) Module 3

Exploratory Information Examination (EDA) This module centres on exploratory information investigation. It includes creating different plots to imagine and get it the information for each city. Plots incorporate checks of houses in each city, normal costs in each city, and categorical highlight dispersions. The comes about are spared as picture records.

4) Module 4

Show Preparing In this context, machine learning models are prepared for each city utilizing the XGBoost regressor. The information is part into preparing and testing sets, and the XGBoost show is prepared on the preparing set. Assessment measurements, particularly R-squared scores, are calculated for both the preparing and testing sets. The prepared models are spared, and the comes about are composed to a content record.

IV. RESULTS

Upon analysing the R2 value and p-value, we identified a slight inconsistency in the results. While the p-values indicate a strong correlation between all factors and housing rent, the R2 values indicate that specific factors, like status and floor level, may have no significant relationships with housing rents. This discrepancy prompts us to reevaluate our model or data analysis approach

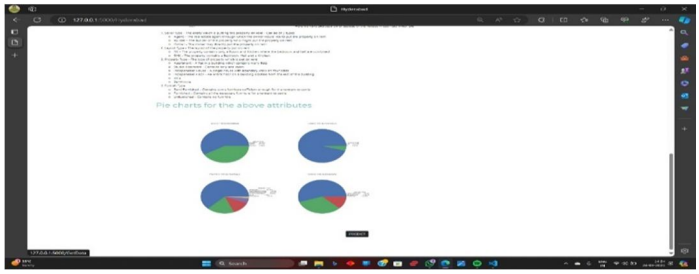


Fig. 1: Home page

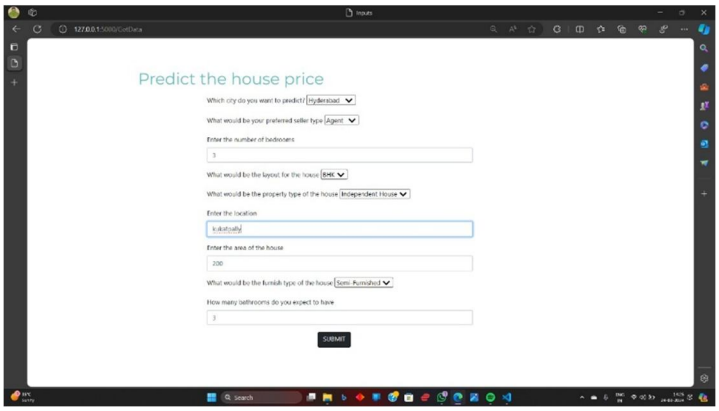


Fig. 2: Entering Details

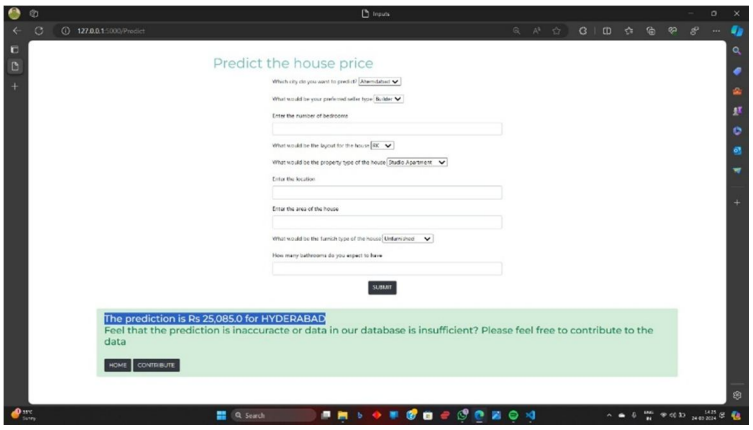


Fig. 3: Output

Finally, we explored the effect of logarithmic transformation on enhancing the accuracy of our models. This transformation technique was applied to the regression models to potentially improve their predictive performance and capture nonlinear relationships between variables.

V. CONCLUSION

In conclusion, the analysis demonstrates that all nine factors, namely seller type, bedroom count, layout type, property type, locality, price, area, furnish type, and bathroom count, hold substantial importance in the determination of housing rents Among these variables, the number of bathrooms and the size of the dwelling are highlighted as the most influential factors that affect rental prices in a given area. Conversely, factors like layout type and furnish type yield a relatively lesser impact on the final rent value. Consider, the city of Mumbai is renowned for its significantly high housing rental rates, that are strongly correlated with the aforementioned factors. On the contrary, Hyderabad tends to offer more affordable rental options compared to Mumbai. Therefore, individuals with limited financial resources are advised to explore properties with fewer bathrooms or smaller floor areas in Hyderabad to stay within their budget constraints.

Moreover, opting for a furnished property can also prove to act as a cost-effective decision for renters as it eliminates the demand for additional expenses on furnishing the accommodation. By selecting a pre-furnished property, tenants potentially cut costs that would have otherwise been incurred for purchasing furniture and essential household items separately.

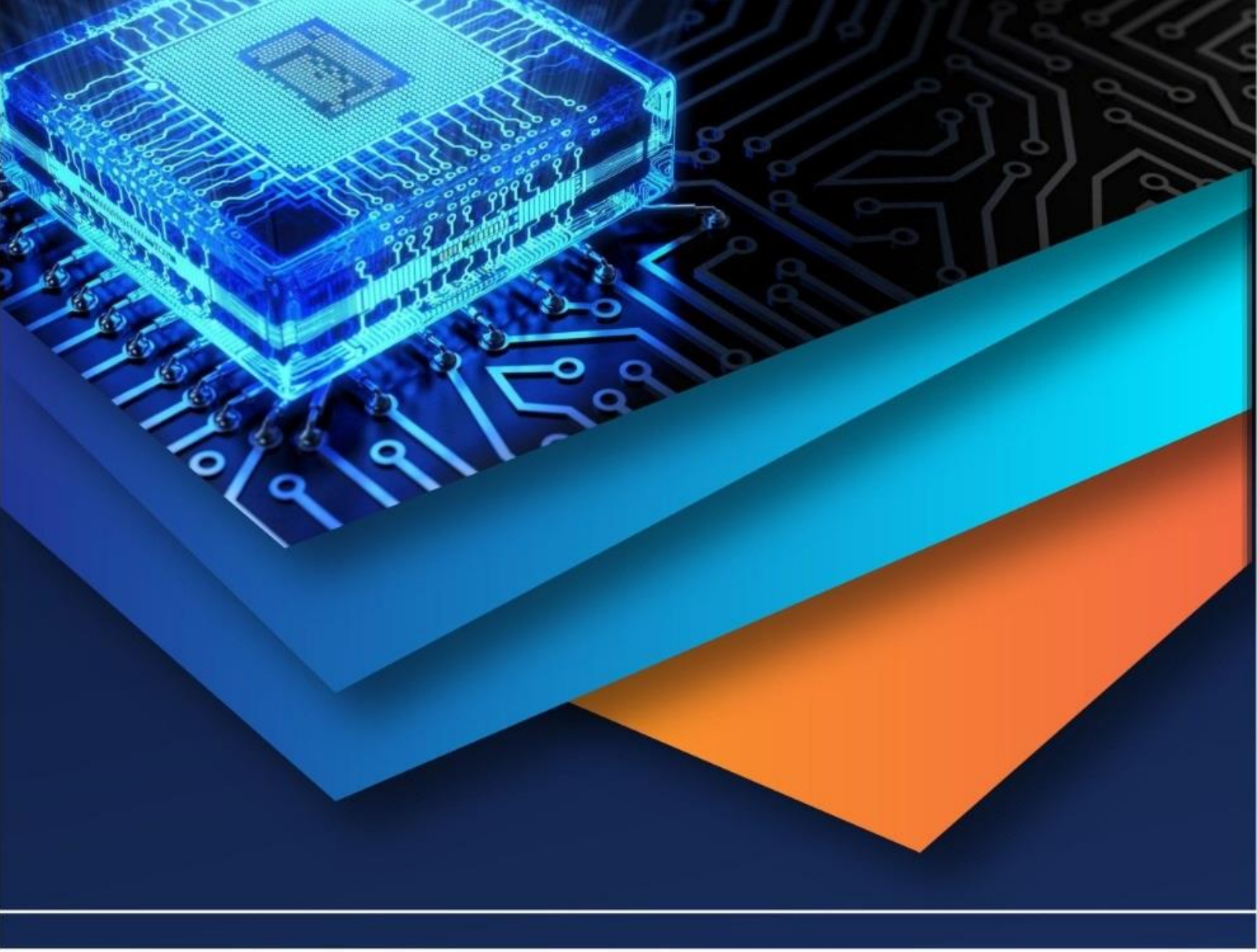
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