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A Study on Housing Price Prediction: Determinants and Effects

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Abstract: *This study explores key factors that influence housing prices and assesses their impact on property valuation. By analysing a range of attributes such as area, number of bedrooms and bathrooms, stories, presence of air conditioning, basement, parking, and proximity to preferred areas the project aims to build predictive models for accurate pricing. The study uses sample of 500 house prices from Kaggle datasets and makes use of statistical and machine learning techniques, including multiple regression analysis, this research identifies significant predictors and quantifies their effect on house prices. The study provides insights into how property features offers useful information for buyers, sellers, and real estate professionals.*

Keywords: House price, Price prediction, Real estate, Data analysis, determinants of house price, Predictive model

I. INTRODUCTION

The real estate sector plays a crucial role in the economy, impacting nearly everyone through activities like buying, selling, renting, and managing properties. It encompasses residential, commercial, and industrial properties, providing shelter for people and operational spaces for businesses, thus fulfilling a basic human need and serving as a major investment channel. The project titled "Housing Price Prediction: Determinants and Effects" focuses on using data analysis to estimate the house price by considering factors such as size, number of bedrooms, number of bathrooms and many more. By developing a predictive model, this project aims to provide fair, data-driven price estimates to making informed decisions.

II. OBJECTIVES

- To examine the determinants of housing price prediction from a data analytics perspective.
- To identify the factors influencing housing price prediction.
- To see whether price, area, bedrooms, bathrooms, stories, main road, guestroom, basement, air conditioning, hot water heating, parking, pref area and furnishing status influence the housing price.
- To see whether price, main road, parking, furnishing status influence the decision for the house to be in preferred area.

III. LITERATURE REVIEW

According to Meixu Chen,Yunzhe Liu, and others UK (2022) found that the user generated images from social media platform can utilized as additional data source and house prices are marginally enhanced by the perceived scene features.

According to Salim Lahmiri, Stelios Bekiros and Christos Avdoulasfound that among the gaussian process, support vector and boosting ensemble regression trees, boosting regression trees outperformed and provided stable predictions with lowest error rate.

According to G. Naga Satish, Ch. V. Raghavendran, M. D. Sugnana Rao and Ch.Srinivasulu, India (2019) found that when predicting the house cost, lasso regression algorithm routinely performed better than the alternative models.

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IV. RESEARCH METHODOLOGY

Descriptive research was used along with multiple and logistic regression analysis to determine the factors influencing the house prices and secondary data is collected from Kaggle datasets with the sample size of 500.

SAMPLING

Thestudy utilized a sample size of 500 individual houses using simple random sampling that represents the subset of individual houses.

STATISTICAL TOOLS

- **Microsoft Excel:** used for data cleaning, initial analysis, organization, and visualization of data such as creation of tables and charts.
- **SPSS software:** supports advanced modelling through logistic and multiple regression analysis, enhancing the accuracy of price predictions.

HYPOTHESIS TEST

Null Hypothesis (H_0)

Price, Area, Bedrooms, Bathrooms, Stories, Main Road, Guestroom, Basement, Hot Water Heating, AC, Parking, Pref area and Furnishing status do not influence the housing price.

Alternative Hypothesis (H_1)

Price, Area, Bedrooms, Bathrooms, Stories, Main Road, Guestroom, Basement, Hot Water Heating, AC, Parking, Pref area and Furnishing status influence the housing price.

ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	117.154	12	9.763	45.336	.000[b]
Residual	114.563	532	.215		
Total	231.717	544			

a. Predictors: (Constant), FURNISHING STATUS, HOT WATER HEATING, STORIES, GUESTROOM, AREA, PREFFERED AREA, MAINROAD, PARKING, AIR CONDITIONING, BATHROOMS, BASEMENT, BEDROOMS
b. Dependent Variable: PRICE

Inference: As significance value of 0.000 is less than the standard P value of 0.005, we reject H_0 and conclude that Price, Area, Bedrooms, Bathrooms, Stories, Main Road, Guestroom, Basement, Hot Water Heating, AC, Parking, Pref area and Furnishing status influence the housing price.

Coefficients[a]

Model		B	Std. Error	Beta	t	Sig.	Result
1	Constant	.496	.177	.122	2.800	.005	Significant
	AREA	.238	.063	.042	3.756	.000	Significant
	BEDROOM	.037	.031	.253	1.179	.239	Insignificant
	BATHROOMS	.329	.045	.174	7.349	.000	Significant
	STORIES	.131	.028	.130	4.689	.000	Significant
	MAINROAD	.244	.061	.039	3.998	.000	Significant
	GUESTROOM	.067	.057	.086	1.169	.243	Insignificant
	BASEMENT	.118	.048	.120	2.454	.014	Insignificant
	HOT WATER	.375	.097	.207	3.862	.000	Significant

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	HEATING						
	AIR CONDITIONING	.290	.047	.146	6.226	.000	Significant
	PARKING	.111	.025	.179	4.398	.000	Significant
	PREFERRED AREA	.275	.050	-.090	5.542	.000	Significant
	FURNISHING STATUS	-.077	.027		-2.813	.005	Significant

V. DISCUSSION AND RESULTS

The factors which are considered in this study like Price, area, bedrooms, bathrooms, stories, main road, guestroom, basement, air conditioning, hot water heating, parking, preferred area and furnishing status will influence the price of the house. Sig of .000 implies that independent variables collectively contribute significantly to explaining the variance in the dependent variable. Price and area have a very strong positive correlation. Properties located in preferred area had significantly higher prices indicating location is major determinant of value.

KEY FINDINGS:

Positive impacts:

Helps in determining the most influencing factors affecting the price of the house and enhances transparency in the housing market by providing accurate, data-driven price predictions, which help buyers and sellers make informed decisions.

Negative impacts:

Dependence on available data introduce bias if certain areas or property types are underrepresented and more focus on quantitative factors by eliminating the qualitative factors impact the property desirability.

VI. CONCLUSION

The study concluded that the variables like area, bedrooms, bathrooms, house in preferred area influence the house prices. Basic facilities including variables like area, number of bathrooms, stories, main road, preferred area, furnishing status greatly influences the house price and advanced facilities like water heating system, AC, basement influence the house prices to lower extent.

VII. LIMITATIONS

- Incomplete and inaccurate data is one among the limitations which often includes data having missing values, errors or inconsistencies which creates potential gap in the analysis.
- Some factors may like economic recessions and natural disasters will inherently difficult to predict and may not be fully captured in historical data.
- Housing prices are affected by a complex interplay of factors, including economic indicators, social trends, and environmental conditions. Capturing and accurately modelling the interactions between these variables is challenging.

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