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Housing Price Prediction using Machine Learning

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Abstract— The real estate market is one of the fields where machine learning can be applied to optimize and predict the price with high accuracy. Determining housing price is vital model for decision making for customers in which number of parameters can be considered to predict price of desired house. The participants that are involved in the process are not aware of the various analytical techniques available to guess the property price considering various features relating to surroundings, environment and other amenities etc. The design will help users to invest in a property without approaching an agent. It also decreases the risk involved in the transaction. Use of lasso regression is done as model because of its convertible and probability methodology on model selection. The result displays that the approach of the issue needs to be successful, and has the ability to operate predictions that would be comparative with other house price prediction models.

Index Terms: Lasso regression process, Machine learning algorithm and neural system, housing price prediction

I. INTRODUCTION

Hedonic Pricing Model in Economics, the hedonic pricing model is used multiple times to gauge a property's price. The model is depends on the theory of consumer's demand by Mumbai (2000), which city that utilities of a good is not based on the good itself however on the individual "characteristics" of the good. However, it's not until Rosen (1974) that the idea of pricing is added to the model. Rosen contends that a good can be assessed dependent on the individual values of its composite qualities From that point forward, this estimating model has been adjusted to assess properties dependent on their inside and outside qualities. Hedonic pricing model joins both a house's internal characteristics (such as number of bedrooms, Number of restrooms, etc.) and its external characteristic (such as neighborhood walkability score, schools' scores, etc.) to from that point forward, this estimating model has been adjusted to assess properties dependent on their inside and outside qualities. The Content Based Information Filtering (IF) frameworks need appropriate procedures for representing the items and delivering the client profile, and a few methodologies for comparing the client profile with the item representation. Instead of using hardcoded parameters and static program instructions, the prediction system can learn from the dataset to teach itself to refine its parameters and make data driven predictions. With a prediction model, we aim to assist property buyers in making predictions on future London property prices by harnessing the power of the large dataset already available.

II. LITERATURE SURVEY

The studies approaches to calculate the Price of House are done in previous years. But there are few that give pricing based on these attributes. In this section we will review the previous system and approaches to find their strengths and their limitations.

In 2018, Rohan Bafna, Anirudh Dhole, Ankit Jagtap, Asif Kazi, Arbaz Kazi specified the rate of fluctuation in prices should have a method for its traceability. Round the world, the ways such hedonic pricing method, multiple linear regression analysis, travel cost method, fuzzy logic system, AHP technique, ARIMA, ANN (Artificial Neural Network) techniques etc.

In 2014Azme Bin Khamis, Nur Khalidah Khalilah Binti Kamarudin Stated that the model's accuracy in predicting house price was measured by a number of criteria. The value of R 2 and MSE were compared to select preferred model.

In 2017 Calhoun C. A. Stated that the property valuation models and house price indexes reported, represent a first attempt to apply standard hedonic methods to the analysis of residential housing values in Thailand and to develop a broad-based set of regional HPIs.

In 2013 Frew J. Jud G.D Applied hedonic modelling techniques to estimate the value of a sample of apartment properties sold during 1996–99 in the greater Portland, Oregon area. The results provide a model of the application of hedonic modelling to apartment valuation. Values decline with increasing economic activity in the neighbourhood and rise with resident income, but the effects are not statistically significant at reasonable probability levels.

In 2016 Kanojia Anita specified the hedonic pricing method is relatively straightforward and uncontroversial to apply, because it is based on actual market prices and fairly easily measured data. If data are readily available, it can be relatively inexpensive to apply. If data must be gathered and compiled, the cost of an application can increase substantially.

In 2003 Limsombunchai,Christopher Gan Minsoo Lee empirically compared the predictive power of the hedonic price model with an artificial neural network model for house price prediction. The results from hedonic price models support the previous findings. Even if the R2 of hedonic price

models is high (higher than 75%) for in sample forecast, the hedonic price models do not outperform neural network models. models is high (higher than 75%) for in sample forecast, the hedonic price models do not outperform neural network models.

In 2018, Neelam Shinde,Kiran Gawande.

Described Step by step procedure to analyse the data set and finding the correlation between the parameters. Calculated the performance of each model using different performance matrix and compared them

Model	Accuracy
Decision Tree	84.64%
Lasso	60.32%
Logistic Regression	72.81%
SVR	67.81%

In 2014 Azme Bin Khamis, Nur Khalidah Khalilah Binti Kamarudin explained the model's accuracy in predicting house price was measured by a number of criteria. By using Artificial Neural Network, accuracy was increase about 26.47% higher than Multiple Linear Regression. They conclude that Neural Network model is preferred to predict house price compared to Multiple Linear Regression model and can be used as an alternative way to estimate house price in future.

IN 2018 Sharmila Muralidharan ,Katrina Phiri, Sonal K. Sinha nal K. Sinha Calculated MSD, MAD, & MAPE for both residential and non-residential datasets .and they analyzed in the case of both the residential and non-residential models, the linear regression model showed the lowest error rate. However, it must be noted that due to the fact that linear regression cannot deal with categorical variables, this is not an entirely accurate picture. Between the decision trees and neural network models, neural networks performed better.

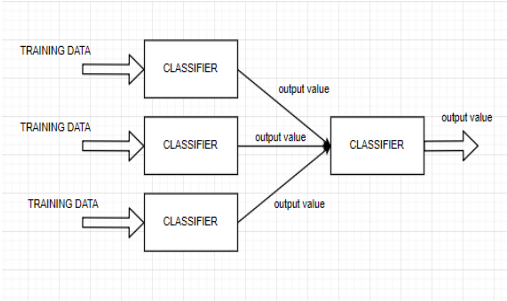
In 2015 Hromada describes a software that can be used for real estate price evaluations and analysis of real estate advertisements published on the Web in the Czech Republic. The software systematically collects, analyzes and assesses dataset about the changes in the real estate market. For each half year, the software assembles over 65000 price quotations concerning sale or rental of apartments, houses, and building lots. All real estate advertisements are continuously stored in a software database and are thoroughly analyzed for their credibility.

III. PROPOSED SYSTEM

Existing System Architecture

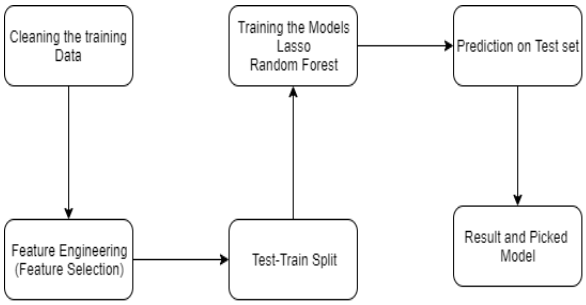
The existing system as we seen includes the use of classifier were they train dataset and perform operations on the dataset and then user get output value.

The presented System Architecture is using classifier and datasets:



This system works on classifier and its repetitive output since predicting accurate house price is not possible with this architecture.

Proposed System Architecture As discussed above, architecture does not have the accurate price prediction to overcome this we designed architecture where accuracy can be achieved



In the proposed system data is passed through 6 stages where we perform different operations to achieve accuracy

Cleaning the dataset is the first step where data it removes all outliers in system and other false data nodes. Then comes feature selection where system selects suitable features to get accurate output and data is sent to nest stage where we split data in 80 and 20 fractions for test and train. Fourth step involve working of models like Lasso and Random forest and it predicts the value on test dataset and we get our final result.

3.2 Hardware and Software Specifications

The experiment setup is carried out on a computer system which has the different hardware and software specifications as given in Table 1 and Table 2respectively.

Table 1 Hardware details

Processor	2 GHz Intel
HDD	180 GB
RAM	2 GB

Table 2 Software details

Operating System	Windows XP Professional With Service pack 2
Programming Language	JDK 1.8
Database	Oracle 9

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