

Accommodation Price Prediction Using Machine Learning

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Abstract: - Accommodation Price Prediction is used to estimate the variably changing house prices. Since housing price is strongly correlated with factors such as location, area, population and it requires other information apart from to predict individual housing price. The problem faced by the customers in finding houses has been an issue of all time and is increasing due to malpractices by the builders and construction companies which tends to problem for customer only. There has been a considerably large number of papers adopting traditional machine learning approaches to predict housing prices accurately, but they are less concerned about the performance of individual models and neglect the less popular yet complex models. This model takes in consideration of the varies datapoints and modulates it through the various machine learning algorithms like linear regression model and convolution neural networks which checks the image recognition and converts to data and recognition of image points. The dataset developed gets validated through the regression algorithm and gives a prediction to maximum accuracy and efficiency.

Keywords— *Housing Price Prediction; Linear Regression; Machine Learning; Artificial Intelligence.*

I. Introduction

As per the economic situations and variable property prices increasing values, prices of properties are difficult to estimate to the property builders and also justice to customers buying properties. The model has been developed according to various data points and surrounding facilities as per the area and amenities around the properties such as ATMs, banks, grocery shops, vegetable markets, schools, public transportation over a span of time, there is manual rise of the price of any property. But problem arises when manually there are 25% percent error is occurred and such affect is loss of money and overcharging of money. But now there is big change by changing the old technology.

Today's Machine Learning is trending technology. Every industry is moving towards automation. But without data we can't train model. Basically, in Machine Learning involves building these models from previous data and by using them to predict new data. The market demand for housing is increases daily because our population is rising rapidly.in rural area there is lack of jobs due to this public is migrating for financial purpose.so result is increasing demand of housing in cities. People who don't know the actual price of that particular house and they suffer loss of money. In this project, the house price prediction of the house is done using different Machine Learning algorithms like Liner Regression, CNN Algorithm.

House price prediction on a data set has been done by using all the above-mentioned techniques to find out the best among them. 80% of data form know dataset is used for training purpose and remaining 20% of data used for testing purpose. This work applies various techniques such as features, labels, reduction techniques and transformation techniques such as attribute combinations, set missing attributes as well as looking for new correlations. This all indicates that house price prediction is an emerging research area and it requires the knowledge of machine learning.

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A modern city is a massive and ceaseless information producer, constantly generating thousands of disparate pieces of localized information (e.g., housing prices, restaurant health inspection scores, crime statistics, precipitation levels, building code violations, water usage, etc.). Since each such city attribute is associated with a location (latitude, longitude) we typically visualize them as attribute maps. While such maps have long been used to analyze and understand cities, urban planners have recently started applying big data analysis and mining techniques to identify meaningful correlations between these mapped attributes. These correlations can then be used to predict the value of one attribute given another when that attribute is not readily available [3]. Housing market plays a significant role in shaping the increasing the house sales rate, employment and expenditures. It also affects the demand for other relevant industries such as the construction supplies and the household durables (Li et al., 2011). The value of the asset portfolio for households whose.

II. RELATED WORK

There is a vast amount of work that is focused on training models to detect patterns in datasets to predict what the future output could be. However, there are researches where the authors use different machine learning algorithms with a combination of pre-processing data methods.

Housing Price Prediction using Machine Learning Algorithms: The Case of Melbourne City, Australia Author-The Danh Phan Macquari University Sydney, Australia danh.phanthe@students.mq.edu.au

House price forecasting is an important topic of real estate. The literature attempts to derive useful knowledge from historical data of property markets. Machine learning techniques are applied to analyze historical property transactions in Australia to discover useful models for house buyer and sellers.[1]

Predicting the Housing Price Direction using Machine Learning Techniques Author-Debanjan Banerjee Department of Management Information Systems SarvaSiksha Mission Kolkata, India debanjanbanerjee2009@gmail.com

Description: Development of civilization is the foundation of increase of demand of houses day by day. Accurate prediction of house prices has been always a fascination for the buyers, sellers and for the bankers also. Many researchers have already worked to unravel the mysteries of the prediction of the house

prices. There are many theories that have been given birth as a consequence of the research work contributed by the various researchers all over the world.[2]

Real Estate Value Prediction Using Linear Regression Author-Nehal N Ghosalkar Department of Computer Engineering Sardar Patel Institute of Technology Maharashtra, India nehal.ghosalkar@spit.ac.in Description-The study of real estate value is felt critical to help the choices in urban arranging. The land framework is a precarious stochastic process. Financial specialist's choices depend on available patterns to procure most extreme returns. Designers are intrigued in knowing the future patterns for their basic leadership. To precisely gauge real estate costs what's more, future patterns, vast measure of information that impacts arrive cost is required for examination, demonstrating and determining.[3]

A Hybrid Regression Technique for House Prices Prediction Author-Sifei Lu, Zengxiang Li, Zheng Qin, Xulei Yang, Rick Siow Mong Goh DescriptionHow to use machine learning algorithms to predict house price? It is a challenge to get as closely as possible result based on the model built. For a specific house price, it is determined by location, size, house type, city, country, tax rules, economic cycle, population movement, interest rate, and many other factors which could affect demand and supply. For local house price prediction, there are many useful regression algorithms to use. For example, support vector machines (SVM), Lasso (least absolute shrinkage and selection operator) [2], Gradient boosting [3], Ridge, Random forest. We will investigate and explore them [4].

Research was done in 2010 by Reza Gharoie Ahangar, Mahmood Yahyazadehfar and Hassan Pournaghshband [23]. The authors estimated the stock price of activated companies in Tehran 13 (Iran) stock exchange by using Linear Regression and Artificial Neural Network algorithms. The authors considered ten macroeconomic variables and 30 financial variables. Then, they obtained seven final variables, including three macroeconomic variables and four financial variables, to estimate the stock price using Independent Components Analysis (ICA). They showed that the value of estimation error square mean, the absolute mean of error percentage and R² coefficient will be decreased significantly after training the model with ANN. [5]

A study was accomplished in 2017 by Suna Akkol, Ash Akilli, Ibrahim Cemal [22], where they did a comparison of Artificial neural network and multiple linear regression for prediction. In

their study, the impact of different morphological measures on live weight has been modelled by artificial neural networks and multiple linear regression analyses. They used three different back-propagation techniques for ANN, namely Levenberg-Marquardt, Bayesian regularization, and Scaled conjugate. They showed that ANN is more successful than multiple linear regression in the prediction they performed. [6]

III. PROPOSED METHODOLOGY

The proposed model works on the below working:

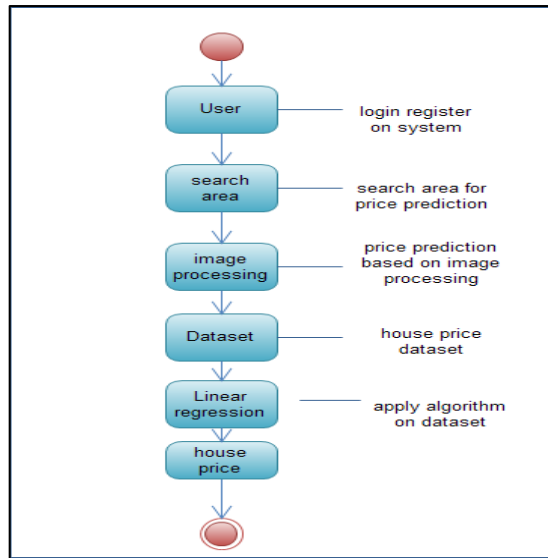


Fig.1. Process diagram

3.1 Image processing

3.1.1 Convolutional Neural Network

Convolutional Neural Network is one of the main categories to do image classification and image recognition in neural networks. Scene labeling, objects detections, and face recognition, etc., are some of the areas where convolutional neural networks are widely used. CNN takes an image as input, which is classified and process under a certain category such as dog, cat, lion, tiger, etc. The computer sees an image as an array of pixels and depends on the resolution of the image. Based on image resolution, it will see as $h * w * d$, where h = height, $6 * 3$ array of the matrix, and the grayscale image is $4 * 4 * 1$ array of the matrix.

In CNN, each input image will pass through a sequence of convolution layers along with pooling, fully connected layers, filters (Also known as kernels). After that, we will apply the

Soft-max function to classify an object with probabilistic values 0 and 1. w = width and d = dimension.

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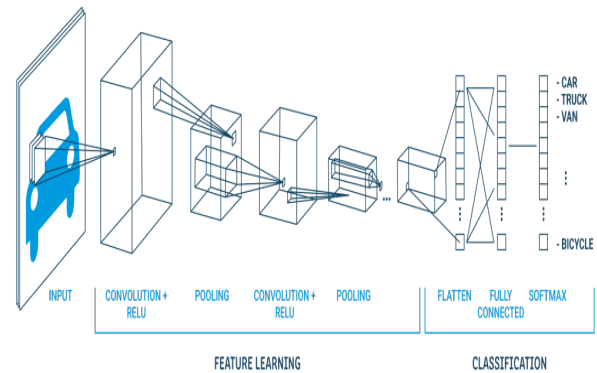


Fig.2. Image- data extraction

3.2 House Dataset Development

The dataset has been developed using the popular house search websites and moreover from the builder and construction site companies whose projects are in development around the vicinity of the targeted area. The house dataset was developed through various sites operating locally like housing.com, magicbricks.com & yourhome.com with various data aspects which included rooms and property details and needed to be evaluated and some properties details were gathered from local construction companies where the property sale.

3.3 Linear Regression

3.3.1 Linear regression algorithm

In Regression, we plot a graph between the variables which best fit the given data points. The machine learning model can deliver predictions regarding the data. In naive words, "Regression shows a line or curve that passes through all the data points on a target-predictor graph in such a way that the vertical distance between the data points and the regression line is minimum." It is used principally for prediction, forecasting, time series modeling, and determining the causal-effect relationship between variables. Linear regression is a quiet and simple statistical regression method used for predictive analysis and shows the relationship between the continuous variables. Linear regression shows the

linear relationship between the independent variable (X-axis) and the dependent variable (Y-axis), consequently called linear regression. If there is a single input variable (x), such linear regression is called *simple linear regression*. And if there is more than one input variable, such linear regression is called *multiple linear regression*. The linear regression model gives a sloped straight line describing the relationship within the variables.

The above graph presents the linear relationship between the dependent variable and independent variables. When the value of x (*independent variable*) increases, the value of y (*dependent variable*) is likewise increasing. The red line is referred to as the best fit straight line. Based on the given data points, we try to plot a line that models the points the best.

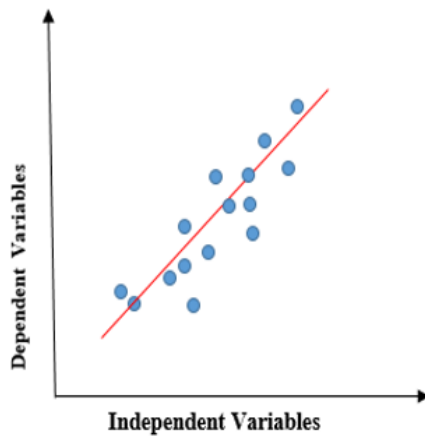


Fig.3. Graphical representation

To calculate best-fit line linear regression uses a traditional slope-intercept form.

$$y = mx+b \implies y = a_0+a_1x$$

The model after processing image and extracting data points from implements through linear regression predicts the exact price of the property.

IV. RESULTS AND DISCUSSION

The model is able to predict exact price of the houses among multiple available options with accuracy using the datapoints used by the Algorithms which can modulate and

simultaneously plot a graphical data on the graph which helps to predict the result to a definite accuracy.

The accuracy is the factor to which the model has shown its efficiency and needs to be modulated as per the correlation of factors to which the algorithms work.

The result of the model works with most efficient and improvised way to predict the result to a high level of accuracy.

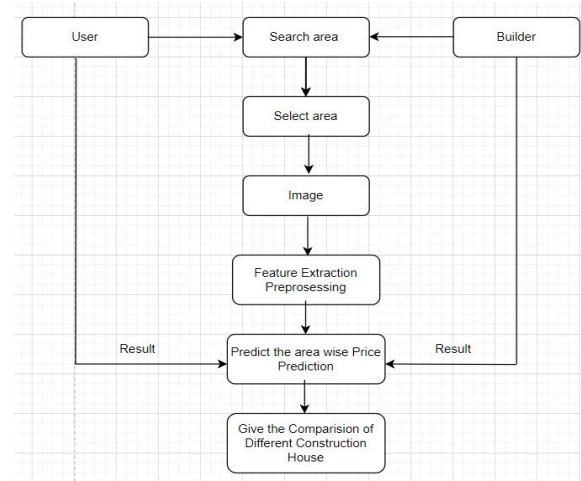


Fig.4. Module-application model.

V. CONCLUSION

The project model has been developed as per need of the upcoming future prospect which can be modulated as per the correlation of the data-points to which the price depends and has to be predicted to an extent of nearer accuracy to the models of other authors to which we can say that the model has been giving results as per prior models of different authors.

The model has been proved successful with regard to the requirements of the referential models.

REFERENCES

- [1]. Author-Debanjan Banerjee Department of Management Information Systems Sarva Siksha Mission Kolkata, IndiaPaper-Real Estate Value Prediction Using Linear Regression Author-Nehal N Ghosalkar.
- [2]. Ayush Varma, Abhijit Sarma, Sagar Doshi, Rohini Nair - "Housing Price Prediction Using Machine Learning and Neural Networks" 2018, IEEE.
- [3]. G.Naga Satish, Ch.V.Raghavendran, M.D.Sugnana Rao, Ch.Srinivasulu "House Price Prediction Using Machine Learning". IJITEE, 2019.

- [4]. House Price Index. Federal Housing Finance Agency.
- [5]. Author-S Arietta, A Efros, R Ramamooorthi, and M Agrawala. 2014. City Forensics:Using Visual Elements to Predict Non-Visual City Attributes. IEEE Transactions on Visualization and Computer Graphics (2014).
- [6]. Paper: Predicting the Housing Price Direction using Machine Learning Techniques.
- [7]. Author-E Ahmed and M Moustafa. 2016. House price estimation from visual and textual features. arXiv:1609.08399[cs.CV] (2016). Paper-A Hybrid Regression Technique for House Prices Prediction Author-Sifei Lu, Zengxiang Li, Zheng Qin, Xulei Yang, Rick Siow Mong Goh.
- [8]. Furia, Palak, and Anand Khandare. "Real Estate Price Prediction Using Machine Learning Algorithm." eConference on Data Science and Intelligent Computing. 2020.