

# **Make Your Home- An AI Based Home Building Solution**

## ***Synopsis report of Major Project***

### **BACHELOR OF TECHNOLOGY IN COMPUTER SCIENCE AND ENGINEERING**

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The synopsis includes the following:

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## **Abstract**

"Make Your Home" aims to provide a platform that connects buyers and suppliers of construction materials including manufacturers. The portal will allow users to browse through a wide variety of materials, compare prices and quality, and place orders online. Using the latest state-of-the-art technologies, we will statistically analyze the prices of commodities and even predict their future value. Smart statistical indicators with the help of optimized algorithms will help the buyer to save maximum on cost. The platform will also provide an NLP based text scanner which scans the items written on paper and a review system, allowing customers to rate their experiences with suppliers and materials. The portal will provide suppliers with a broader reach and increased visibility, increasing competition and saving costs. Using business routing technique, the system will try to cover maximum vendors to get business. The building material portal will ultimately streamline the procurement process for construction materials, making it faster, more efficient, and cost-effective, making the dream home come especially for low-income groups.

# **Introduction**

Welcome to our "Make My Home" project, aimed at providing a one-stop solution for all your construction material needs. This project is designed to simplify the process of procuring building materials for your construction project, whether it's a small home renovation or a large commercial development. Our portal will provide a platform where builders, contractors, architects, and homeowners can easily access a wide range of construction materials from trusted suppliers and manufacturers.

To make the purchasing smarter and budget friendly we are using the latest technologies from AI/ ML domain, which gives deeper insights into the prices. Up and down trends in product prices will help customers to purchase smartly. There is no stable or big platform in India which provides purchase of building materials through click of button. With the convenience of online ordering and delivery, our portal will save you time and effort in sourcing the best quality materials at competitive prices. Our team is committed to ensuring that our portal is user-friendly and reliable, providing a seamless experience for all our users. Thank you for choosing our building material portal, and we look forward to being your preferred partner for all your construction material needs.

## **1. Motivation**

India is a developing nation, construction and renovation is going around in every nook and corner. These works range from basic house building to luxurious renovations, creating it a billion-dollar industry. But there is a big challenge, in this fast-moving world we don't have time to visit every shop and negotiate prices, the technician provides the list of material to be brought. Thus came the need of a platform which provides a consultancy service between dealers and consumers.

# **Problem Identification and**

## **Formulation**

Cost estimation is one among the key concerns throughout the project management life cycle and may be thought to be one of the foremost important parameters of a project and also actuation of project success. Fluctuations within the costs of construction materials have great effect on estimating the value of a project and thereby impacting the favorable outcome of the construction projects. The variation in the prices affects project execution costs and eventually impacts the ability to complete the projects. This article focuses on the importance Artificial Neural Networks which is considered as an ideal tool in today's construction market. It benefits the contractor trace past prices and circumstances affecting these prices and then forecast future prices. Artificial intelligence will help to facilitate inexperienced users solve engineering issues, and can also assist experienced users to enhance the work efficiency. In this study, prediction of different construction materials cost using Artificial Intelligence tool is performed, and then validated by comparing it with Linear Trend results on the basis of Co-efficient of Regression ( $R^2$ ).

### **Problem Identification:**

The problem at hand is to predict the cost price of building materials. The cost of building materials plays a crucial role in construction projects, as it directly impacts the overall budget and profitability. Accurate prediction of material costs can help construction companies plan their projects effectively, estimate project expenses, and make informed decisions regarding pricing, bidding, and resource allocation.

## **Problem Formulation:**

The objective is to develop a predictive model that can estimate the cost price of various building materials accurately. The model should take into account relevant factors that influence material costs, such as market conditions, inflation rates, availability, demand, and any other significant variables. By analyzing historical data and incorporating relevant features, the model should be able to provide reliable cost predictions for different types of building materials.

The formulated problem can be approached as a regression task, where the model aims to estimate the continuous numerical value of the cost price for a given set of input features. The input features may include parameters such as material type, quantity required, geographic location, time of purchase, and any other relevant factors that impact material costs.

# **Methodology**

To develop a building material cost price prediction model, you can follow a systematic methodology and plan your work accordingly. Here is a suggested approach:

1. **Define the Scope:** Clearly define the scope of your project, including the specific building materials you want to predict the cost prices for. Determine the geographic region or market you will focus on and the time period for which historical data will be collected.

2. Data Collection: Gather historical data on building material cost prices along with relevant features. This data can be collected from various sources, including construction industry reports, market databases, supplier records, and government publications. Ensure that your dataset is comprehensive, accurate, and covers a significant time period.

3. Data Preprocessing: Clean and preprocess the collected data to ensure its quality and usability. This step involves removing duplicates, handling missing values, standardizing units, and transforming variables if necessary. Perform exploratory data analysis (EDA) to gain insights into the data distribution, correlations, and identify any outliers.

4. Feature Engineering: Select the most relevant features that could impact the cost prices of building materials. This may include factors such as material type, quantity, location, time of purchase, market conditions, inflation rates, and any other relevant variables. Create new features if they provide valuable information, such as price indices or demand-supply ratios.

5. Data Split: Split the dataset into training and testing sets. The typical split ratio is 80:20, where 80% of the data is used for training the model, and the remaining 20% is used for evaluating its performance.

6. Model Selection: Choose an appropriate regression model or ensemble of models that can effectively capture the relationship between the input features and the cost prices of building materials. Consider models such as linear regression, decision trees, random forests, support vector machines (SVM), or neural networks. You can also experiment with different models and compare their performance.

7. Model Training and Evaluation: Train the selected model(s) using the training dataset. Optimize the model's hyperparameters through techniques like cross-validation or grid search. Evaluate the model's performance on the testing dataset using appropriate evaluation metrics such as mean squared error (MSE), root mean squared error (RMSE), mean absolute error (MAE), or R-squared ( $R^2$ ) score. Repeat this step with different models to compare their performance and select the best one.

8. Model Refinement: If the initial model performance is not satisfactory, consider refining the model. This may involve adjusting the feature set, applying feature transformations, addressing outliers, or trying different algorithms. Iteratively refine and retrain the model until you achieve desired accuracy.

9. Model Deployment: Once you have a satisfactory model, deploy it for cost price predictions. Create an interface, such as a web application or API, to allow users to input relevant features and obtain predicted cost prices for building materials in real-time.

10. Model Maintenance and Monitoring: Regularly monitor the performance of your deployed model and update it with new data periodically. Building material costs can fluctuate over time, so it's essential to retrain the model using updated data to ensure accurate predictions.

## Dataset Example

Price of Materials										
Aggregate (Rs./cu m)	Brick (Rs./No )	Cement (Rs./Ba g)	Sand (Rs./cu m)	Steel (Rs./kg)	Crush Sand (Rs./cu m)	Rubble (Rs./cu m)	Shutteri ng Plywoo d (Rs./Sq m)	Binding Wire (Rs./kg)	Labour (Skilled) (Rs./He ad)	
2006	705	2.5	245	600	27	600	332	282	35	156
2007	811	4	245	650	29	670	385	300	38	151
2008	987	3.6	245	700	31	710	440	320	42	200
2009	882	3.6	268	800	34	750	480	350	47	250
2010	829	3.8	260	900	38	800	519	372	50	325
2011	883	4	255	950	29.5	850	630	418	76	300
2012	918	4.5	260	900	44	810	405	530	65	350
2013	1000	5	310	1009	50	950	475	450	57	436
2014	1175	5	290	1147	45	1050	500	485	60	450
2015	1236	6	315	1236	40	1130	530	500	64	500
2016	1170	5	330	1320	41	1050	610	530	65	600
2017	1080	5.5	345	1410	42	1000	650	570	66	700
2018	1060	6	350	1500	43	1060	706	602	67	800



# Price Fluctuation

Product type: Cement-Bag

Concrete cinder block (8 in x 8 in x 16 in, cored)



## Problem Objective:

In this study, prediction of different construction materials cost using Artificial Intelligence tool is performed successfully, and then validated by comparing it with Linear Trend results.

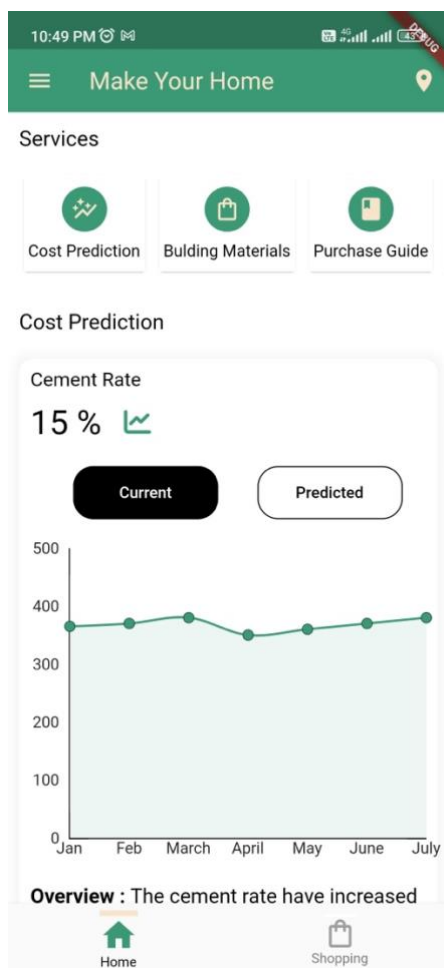
Following inferences are drawn on the basis of co-efficient of Regression variable ( $R^2$ ) of the results obtained from both the models.

- Neural Network models are suitable for varying data pattern. These are more ideal in real life scenarios in construction industry, as prices may increase and decrease over time.
- Linear Trend Progression models are more data fit models and can be used for uni-directional data. Which means, either data will only increase or decrease, respectively.

Variation in cost of materials can be tracked and analyzed more precisely using Neural Networks. This helps in accurate cost estimation of the project, which is the baseline for any project plan. Therefore, this can be used as a decision making tool in project planning and its success.

- Making it easy to analyze the price fluctuations of building materials and planning of constructions accordingly.
- Find the lowest prices among different suppliers in your area.
- Provides a consultancy platform for dealers and customers.

## Current Status of Work



10:53 PM

Make Your Home

Ultratech

₹ 350 / bag

In Stock

Order Range : 1 - 5000 bag (may vary as per location)

Ultratech

★★★★★ 4.8 ( 7 ratings and reveiw )

Cost Calculator

₹ 350 1 bag

Add to Cart : 350 (1)

Above is the screenshot of mobile application developed using flutter framework which uses machine learning algorithm to predict price of building materials.

# References

- Levelset -> <https://www.levelset.com/>
- Prediction of Construction Materials Cost using Artificial Intelligence Tool
- **Authors :** Mohammed Hasware , Prof. Sonali Baviskar , Prof. Raju Narwade
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