Analysis of Construction Resource Estimation and Prediction Using AI

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Abstract - *In today's rapidly growing technology based world, all things are getting changed very quickly in all fields and sectors like transportation, education, finance, travel, trade etc. To cope up with it, we are introducing a platform for construction and builder sector area. This platform ensures to achieve resource and assets allocation efficiently, for proper estimations and predictions. These estimations and predictions will be in the form of assets, human resources, area, material and time. For this, we are introducing AI based server platform for all types of phases of construction project development, maintenance and management. This is a cloud-based technology where user can be assigned certain access rights by higher authorities depending on the user profile to perform specific task. In this project we are using HTML5, CSS3, JS, NodeJS, MySQL, Custom Reporting, RestAPI. And custom server for deploying application on cloud.*

***Key Words*:** AI, DATA MINING, BIM, MIS, PREDICTION, MANAGEMENT

1. INTRODUCTION
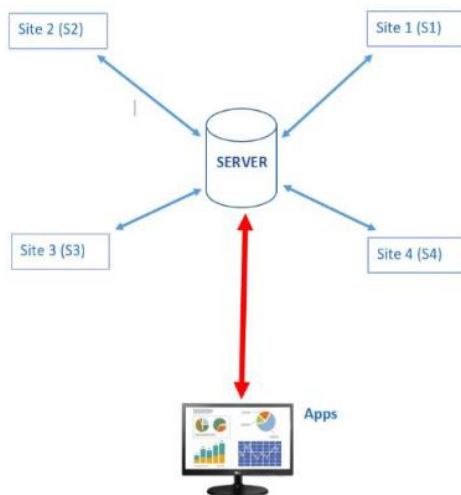
In existing construction sites scenario, the entire assets and resource mapping, its prediction and allocation is done manually, which is less accurate and time consuming. Also the most vital thing of this scenario is the wastage of time and resources like materials and human resource if not utilized correctly. This has a huge effect on the overall company growth while impacting the finances. The construction business management system is the process of managing the construction sites within the given deadlines and budget in the form of time, cost and space. In current manual system the process is lengthy

as well as time and cost consuming. So we have come up with a new idea that includes AI and ANN to design an intelligent and smart system which can manage multiple construction sites very smoothly by estimating, predicting and allocating the assets and resources within the company.

2. LITERATURE SURVEY

Analysis on The Choice of Cloud and BIM in Construction Enterprises: Construction is a highly complex dynamic process. There is a complex dynamic relationship between construction process and construction period, cost, resource and site, and it has considerable uncertainty and randomness. Therefore, the construction project management should not only consider the uniqueness of the design of the building itself, but also consider the constraints such as time limit, cost, resources and site. Seeking a dynamic balance among the three management indicators of progress, cost and quality is a complicated management activity throughout the whole construction process, which has the characteristics of large amount of information, rapid information change and complex factors involved, so the potential application value of information technology in the field of construction project management is huge. At present, the most popular building information modeling(BIM) aims to build a building information model including all kinds of engineering information of the project based on the three-dimensional digital technology, to realize the information mutual use and comprehensive sharing of all stages and multiple participants in the whole life of the building.

3. SYSTEM DESIGN

We are going to provide user interface to each and stack holder at construction site. Using this UI every stack holder will update the information about site like material and resources on cloud. Using this data we will create data set and will apply our smart algorithms and programs on this dataset to prediction and allocation system. Each and every registered user will have access to own profile to CRUD the dataset on cloud. This system is accessible from different devices like desktop, mobile and wearable. Data collection is done at backend once data is collected our program will create dataset asper user query also our system auto generate the reports and states to analyze the results and predict the session.
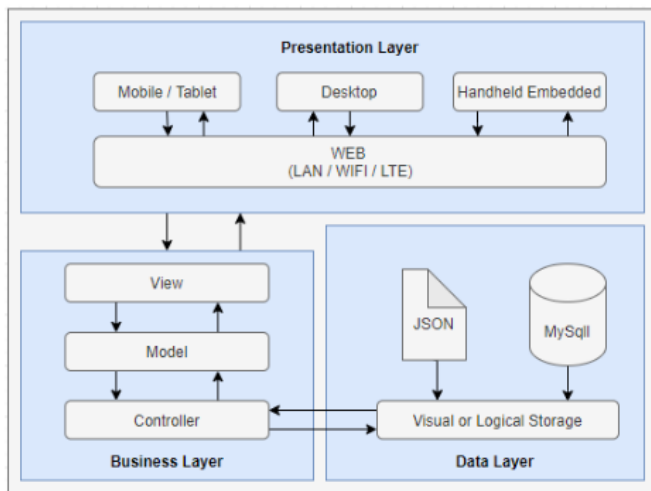
SYSTEM ARCHITECTURE

Decision Tree is a supervised learning technique that can be used for both classification and Regression problems, but mostly it is preferred for solving Classification problems. It is a tree-structured classifier, where internal nodes represent the features of a dataset, branches represent the decision rules and each leaf node represents the outcome. In a Decision tree, there are two nodes, which are the Decision Node and Leaf Node. Decision nodes are used to make any decision and have multiple branches, whereas Leaf nodes are the output of those decisions and do not contain any further branches. The decisions or the test are performed on the basis of features of the given dataset. It is a graphical representation for getting all the possible solutions to a problem/decision based on given conditions. It is called a decision tree because, similar to a tree, it starts with the root node, which expands on further branches and constructs a tree-like structure. In order to build a tree, we use the CART algorithm, which stands for Classification and Regression Tree algorithm. A decision tree simply asks a question, and based on the answer (Yes/No), it further split the tree into sub trees.

4. ADVANTAGES

1. Easy to implement and maintain as a programmer.
2. All the operations result is predictable.
3. Fast and deadlock prevented processing.
4. Centralized operations management system which helps to provide transparent operations in organizations.

5. OUTPUT SCREENS
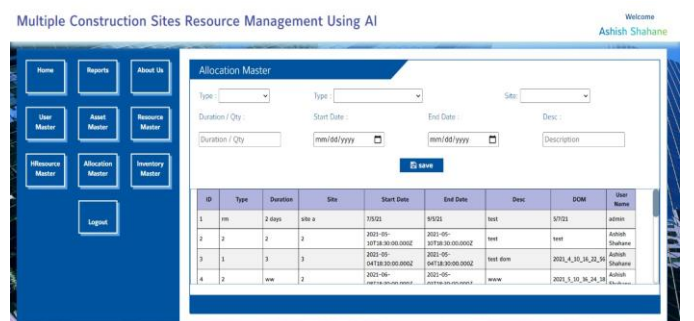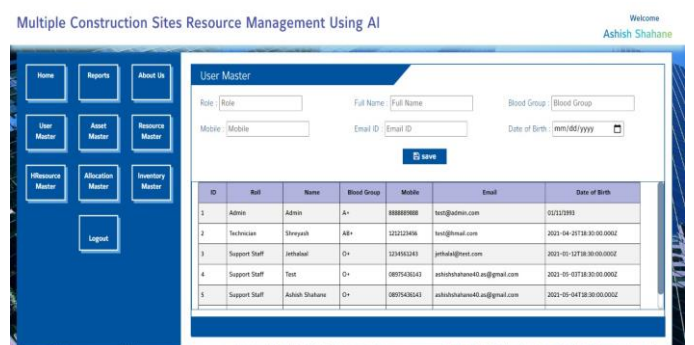
6. CONCLUSIONS

Now as we conclude that unlike in the existing system where most of the management was manual, less accurate and time consuming the proposed system overcomes it by estimating, predicting and allocating the required assets and resources intelligently; overall leading the management of multiple sites efficiently. Also the proposed system is beneficial for tracking and accounting purposes.

ABOUT SPONSORS

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frame which led them to get appreciation with bonus in some of the projects. They believe that a customer plays a very crucial role in the growth and development of the company. So, they strive to maintain the trust of our customers and this has led us to have record of 21 successful years.

N P Khandebharad
CEO, Pune
Arpita Land Developers

REFERENCES

1. Tulenheimo Risto, "Challenges of Implementing New Technologies in the World of BIM –Case Study from Construction Engineering Industry in Finland", Procedia Economics & Finance, vol. 21, pp. 469-477, 2015.

2. Li Li and Li Xin. Wang, "Application of BIM Technology in Green Building Engineering Construction", Advanced Materials Research, pp. 860-863-1301-1305, 2013.

3. Carrie S Dossick and Gina. Neff, "An artificial neural network approach for cost estimation of engineering services", International Journal of Construction Management, vol. 136, no. 4, pp. 459-467, 2019.

4. Lu Weisheng, Peng Yi, Shen Qiping et al., "Generic Model for Measuring Benefits of BIM as a Learning Tool in Construction Tasks", Journal of Construction Engineering & Management, vol. 139, no. 2, pp. 195-203, 2013.

5. Shing Dong, Zhang Limei, "Design and Implementation of Intelligent Construction Engineering Information Management System Supporting Mobile Platform. "International Conference on Smart Grid and Electrical Automation, 2019.