

Restaurant Revenue Prediction and Recommendation System

Binni Gandhi¹, Nivya Shah², Nidhi Thakkar³, Prof. Seema Yadav⁴
Department of Information Technology
K.J. Somaiya Institute of Engineering & Information Technology
Sion, Mumbai
*binni.gandhi@somaiya.edu¹, nivya.shah@somaiya.edu²,
nidhi.t@somaiya.edu³, syadav@somaiya.edu⁴*

Abstract- There are thousands of quick service restaurants over the globe, and many others. Deciding when and where to setup a restaurant is largely a tedious process which requires a lot of experience and judgment. For launching a new restaurant a large investment of time and capital is needed. Therefore, wrong location for a restaurant if chosen, leads to a heavy amount of loss. Also, for a customer to decide which restaurant to visit according to a budget and location preference is again a tedious job. Therefore, restaurant revenue prediction and recommendation system can be a promising solution for the problem mentioned above. Using Hadoop and big data, evaluation will be done using different aspects taken from the customers and hoteliers.

Keywords- Big Data; Hadoop; HDFS; Map Reduce.

I. INTRODUCTION

Restaurant revenue prediction and recommendation is aimed to provide a prediction of probable locations that would be profitable for the hoteliers. It will also recommend a list of restaurants to the customers based on their area of preference and choice of cuisine.

In this paper, we will use Hadoop and big data for this proposed system. In present scenario deciding when and where to open a restaurant is largely subjective and requires a lot of research and experience. The goal is to take inputs from the customers or the hoteliers and provide a proper prediction which will help to reduce the difficulties and the losses faced by the hoteliers or the customers.

Now a days, every nook and corner of an area has a restaurant. Thus, selecting an area for setting up a new restaurant becomes very difficult due to the increased competition. The proposed system will aim to provide a location where the hotelier can earn maximum profit. Also new restaurant sites take large investments of time and capital to get up and running. If a wrong location for a restaurant brand is chosen, the site closes within few months and operating losses are incurred.

Restaurant revenue prediction and recommendation will provide a prediction of probable locations that would be profitable for the hoteliers. It will also recommend a list of restaurants to the customers based on their area of preference and choice of cuisine.

The primary aim is to develop a prediction and a recommendation system. Basically, the prediction system will be developed for the investors. This system will provide a prediction of the probable location based on the data provided by the hoteliers that will provide huge amount of profit. Also, a recommendation system will be developed. Recommendation system will be for the customers. The customers will be provided with a recommendation list according to the preferences given like budget, location, cuisine etc.

The primary objective is to provide recommendation for the customers based on the preferred area, cuisine of choice

etc. Another most important objective of this system is that it will provide a accurate prediction to the investors. The prediction will be done using very large amount of data i.e. big data that will be provided by the hoteliers. This will be done in a very user friendly way. The prediction will be done based on the factors like budget of the investor, area of preference, cuisine preferred.

II. EXISTING SYSTEM

Majority of a research is carried out on a limited amount of data which does not provide accurate results since all the aspects are not considered. Also, in the existing system filtration of data is not done using the budget aspect. Any of the existing systems which are based on predicting the areas where a hotelier can invest does not include all the aspects like budget, area of preference, etc which are considered to be important factors while investing.

The existing recommendation system provides the facility to understand a person's taste and find new, desirable content for them automatically based on the pattern between their likes and rating of different items. The existing recommendation system, for the large amount of data available on the web in the form of ratings, reviews, opinions, complaints, remarks, feedback, and comments about any item (product, event, individual and services) using Hadoop Framework find out the results and provide recommendation to the users [1]. One drawback which can be considered here is that the rating and reviews provided can be false. Thus, trusting these recommendations would not be reliable.

The existing system uses global rating to recommend restaurants to the users [2],[4],[5]. Based on the global rating and reviews the recommendation provided will not be authentic. The global rating might not match with the personal views of each and every customer.

III. PROPOSED SYSTEM

For prediction system linear based algorithm will be used. In linear based regression algorithm, based on the different parameters, say x, y, a prediction will be given. [3] Linear regression is an approach for modeling the relationship between a scalar dependent variable y and one or more

explanatory variables (or independent variables) denoted X. The case of one explanatory variable is called simple linear regression. For more than one explanatory variable, the process is called multiple linear regression. In this proposed system multiple linear regression will be used.

The knowledge based theory of the firm considers knowledge as the most strategically significant resource of a firm. Knowledge based recommender system algorithm will be used for the proposed recommending system. It includes different constraints using which the recommendation will be done. The constraints such as budget, cuisine and location will be used.

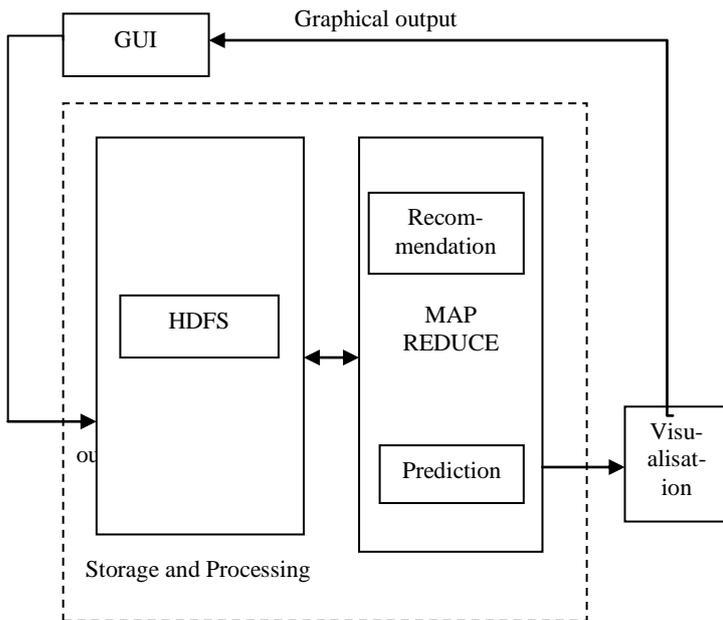


Figure 1: Block diagram

Contents of the System :

- GUI – It’s the user interface from where the users will enter the input.
- HDFS – It’s the storage part of the Hadoop.
- Map Reduce – It’s the processing part of Hadoop where in recommendation and prediction algorithm’s phases will be implemented.
- Visualization – It will provide the output in graphical form.

Hadoop Distributed File System (HDFS) is a distributed file-system that stores data on machines, providing very high aggregate bandwidth across the cluster. HDFS architecture follows master-slave architecture. HDFS storage operations are:

- Indexing
- Read Operation
- Write Operation

HDFS consists of name node, data node and secondary namenode.

Namenode is a master server that manages the file system namespace and regulates access to files by clients. It executes file system operations like opening, closing, and renaming files and directories also it determines the mapping of blocks to datanodes.[6] Name Node performs two operations:

- Indexing:

Ideally the indexes are saved into two critical files named fsimage and edits.

FSIMAGE- This file is responsible to maintain the index information of the data that is committed in the previous session and image resides on HDFS.

EDITS- This file is responsible to maintain the index information of the data that is committed in the current session. Edits resides on RAM. Edits files flushes the data to the fsimage in the following scenario:

- During restart of Hadoop cluster.
- During memory full operation.

• **Resource Allocation:**

Name node is responsible to logically slice the data and assigned the slices to the respective data node based on the shortest path algorithm and random probability.

Datanode manages storage attached to the nodes that they run on. It is responsible for serving read and write requests from the file system’s clients. It perform block creation, deletion, and replication as per the instructions of namenode.

Secondary namenode remembers the previous node. It is responsible to maintain the index information of the previous session which was partially and committed.

Prediction :

The proposed system consists of user, a prediction system and processing system. The user is the hotelier. For a hotelier, the parameters entered can be budget, area of preference, cuisine, profit etc. These parameters will be entered by the hotelier via the front-end and then these entered parameters will be forwarded to the HDFS which is the storage part. Then these parameters will be converted in the form of blocks by the HDFS. These parameters will be forwarded to mapreduce where the multiple linear regression algorithm will be elicited. The algorithm will be implemented in five phases. The first phase will be the input phase i.e. when the parameters enter the processing system. The next phase is the mapper phase where the prediction logic will be implemented. The next phase is sort and shuffle phase where the sorting will be done based on the parameter. The next phase is reducer phase will be used to contract the data into single cluster. The last phase is the output phase, here, the output will be stored in success file in HDFS. The user will get the output in graphical format on the front-end[7],[8].

Recommendation:

The proposed system consists of user, a recommendation system and processing system. The user will be the customer. For a customer, the parameters entered can be budget, area of preference, cuisine, etc. These parameters will be entered by the customer via the frontend and then these entered parameters will be forwarded to the HDFS which is the storage part. Then these parameters will be converted in the form of blocks by the HDFS. These parameters will be forwarded to mapreduce where the knowledge based algorithm will be elicited. The algorithm will be implemented in five phases. The first phase will be the input phase i.e. where the parameters enter the processing system. The next phase is the mapper phase where the recommendation logic will be implemented. The next phase is sort and shuffle phase where the sorting will be done based on the parameter like budget. The next phase is Reducer phase will be used to contract the

data into single cluster. The last phase is the Output phase, here, the output will be stored in success file in HDFS. The user will get the output in graphical format on the front-end[7],[8],[9].

IV. CONCLUSION

In this paper, the proposed system will recommend customers all the restaurants according to the aspects preferred by them, thus results will be in a more filtered manner. Also, the hoteliers using this proposed system will be able to predict profitable areas where they can invest, thus avoiding large amount of losses.

V. ACKNOWLEDGMENTS

The project has been supported by Department of Information Technology, K. J. Somaiya Institute of Engineering and Information Technology and the authors would like to thank our guide Prof. Seema Yadav, Dept. of Information Technology Engineering, K. J. Somaiya Institute of Engineering and Information Technology for helping in this project.

REFERENCES

- [1] Jai Prakash Verma Bankin Patel, Atul Patel, Big Data Analysis: Recommendation System With Hadoop Framework, 2015.
- [2] Fernando Sanschez- Vilas, Eduardo Sanchez and Manuel Lama, Fabian P. Lousame, applying Multicriteria Algorithms to Reataurant Recommendation.
- [3] F.P. Lausame and E. Sanchez, multicriteria predictor using aggregation functions based on items used, 2010.
- [4] F.P. Lausame and E. Sanchez, view based recommender system of the third ACM conference on recommender system, 2010.
- [5] G. Adomavicius, R. Sankaranarayanan, S. Sen and A. Tuzhilin Incorporating Contextual information in Recommendation system using a multidimensional Approach, 2005.
- [6] Hadoop Operations by Eric Sammer
- [7] Instant MapReduce Design Patterns by Donald Miller and Adam Shook.
- [8] MapReduce: Simplified Data Processing On Large clusters by Jeffrey Dean, Sanjay Ghemawat.
- [9] <http://www.ibm.com/developerworks/library/os-recommender1>.