Survey Paper on Queue Management and Restaurant Recommendation System

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ABSTRACT

This survey paper focuses on a restaurant recommendation and virtual queue management system. Here, we compare many such algorithms and techniques to manage queues and hence, reduce crowding and recommend restaurants using behavioral and statistical data. In the recent times of Covid19, crowding near restaurants is very dangerous and hence, we need a foolproof system to manage the same. The two algorithms that will be used in the proposed system are K-NN and TF-IDF. The user need to login into this system with credentials. Then, the menus and restaurants will be displayed. The user can place the order and make an online payment through the RazorPay gateway. The behavioral data of the user is captured and stored in the database to recommend the most apt restaurants and dishes.

Keywords- KNN, content-based filtering, collaborative filtering, tf-idf, virtual queuing, restaurant recommendation, behavioral analysis, predictive analysis

ARTICLE INFO

I. INTRODUCTION

This project is titled 'Restaurant Recommendation and Queue Management System'. In the wake of the worldwide pandemic of Covid19 going on, it is very risky to have long queues in front of restaurants and food joints. This might lead to a breach of social distancing. Hence, this project aims to eliminate all real-time queuing and introduce virtual queuing. The user will be able to place orders for food. For each order, there will be an order number, queue position and QR code will be generated. This queue position number will be used to form a virtual queue. When the order is ready, the user will get notified about it. The user needs to get the QR code scanned at the restaurant and pick the order up. In addition to this virtual queuing system, there is also a payment gateway available. RazorPay gateway is reliable, secured and open-source. This API is integrated with this system and that helps the payment to get redirected to PazorPay. The user is prompted to enter his/her NetBanking details or UPI details to complete the online payment. Since this system focuses on eliminating surface contact and maintaining social distancing, the option of cash payment is eliminated.

The restaurant recommendation system of this project is a machine learning module. It is a well-known fact that machine learning algorithms are used far and wide for prediction and recommendation purposes. The algorithms generate results by learning the trends and patterns in previously available data. These results are used to predict the future behavior of the user.

In this module, there are a couple of algorithms used. first one is the KNN and the second one is TF-IDF. The KNN algorithm is basically used to predict the next move of the customer. Here, this algorithm is being implemented at two points. The map tracker system uses KNN to predict the route that the customer will be taking to reach the restaurant. Also, it is used in the search bar. When the user will start typing, the predictions based on previous searches will appear there. This will help in good quality and efficient searching.

The TF-IDF algorithm is used to recommend items to the user. The TF-IDF algorithm works by maintaining a score of the number of appearances of a specific word or term in a database. Here, it maintains a record of what the user has ordered the most number of times. Based on the trend that

the user has followed in placing orders, the TF-IDF algorithm helps to analyze the behavior of the user. This behavioral analysis, in turn, helps in predicting what the user would order next.

This entire system needs a large dataset and hence, strong database support. Here, all the data files are uploaded to the Cloud Database. The links of the uploaded files are given in the local database to have easy access to the data.

II. LITERATURE SURVEY

[1] The paper titled 'Application of Clustering Technique to Electricity Customers- Classification of Load Forecasting' focuses on the k-means clustering algorithm. Various clusters which are created based on the load put on the electricity distribution system. This clustering is done using the k-means algorithm. It has been proved that the k-means algorithm works well on these clusters and gives results of great accuracy.

[2] 'Prediction Analytics for Predicting Customer Behavior' states the use of behavioral data to predict the behavior of the customer. This algorithm for predictive analysis takes into consideration historical data, statistical and logistical values as well as some machine learning techniques to predict how the customer will behave next.

[3] The research paper titled 'A Machine Learning Approach to Classify News Articles based on Location' uses many machine learning algorithms like random forest classifier, support vector machine and multinomial Naïve Bayes classifier. The dataset under consideration was classified using all of the given three algorithms. The output of the paper proved that random forest classifier is the most efficient one.

[4] In the paper titled 'An Improved Text Sentiment Classification Model Using TF-IDF and Next Word Negation', there are three types of approaches given about sentimental analysis. The first model is a binary sentiment analysis where the system checks for the presence of specific words to determine the sentiment of that sentence. The second model works by vectoring the words and maintaining scores of each word. The scores determine the term frequency and the inverse document frequency of the word. The third model is based on the next word negation strategy. Here, if a negative word is spotted in a statement, the next word is not considered in the TF-IDF execution. The efficiency of the simple TF-IDF model works well and gives accurate results.

[5] In the paper titled 'Research Paper Classification System Based on TF-IDF and LDA Schemes', the abstract of each paper is evaluated based on the TF-IDF algorithm. The paper length, TF score and IDF scores are calculated and then, the TF-IDF score helps to categorize the papers. This helps the users get only those papers which they want for any particular research.

[6] In the paper titled 'A Restaurant Recommendation System: Improving Rating Predictions using Sentiment Analysis', the system used is a TF-IDF algorithm. There are six steps in the sentiment analysis process, viz. data collection, manual reviews annotation, data pre-processing,

data representation, classification process and sentiment analysis performance. The output of the sentiment analysis is used as input to the recommendation engine wherein the restaurants are sorted on the basis of their reviews and arranged based on their ratings.

[7] In 'Tourist Recommender System sing Hybrid Filtering', two algorithms are used, viz. new user cold start and new package cold start. In the new user cold start, the demographic details of the user are tabulated and that table is used to recommend the tour package to a new user using the ratings given to it. In the case of the new package cold start algorithm, the tour packages are distinguished and categorized based on the demographic details. This information is used to recommend a specific tourism package to the user.

[8] The paper titled 'Career Recommendation System using Content-based Filtering' is very informative about the methodologies of a recommendation system. While the paper mentions the chances of hybrid recommendation systems being much more efficient, it is yet to be proven. The content-based methodology given by the paper eliminates the cold start problem of collaborative systems, the work of securing the users' data arises at developers end. Content-based also forms a chain of feedback to sentiment analysis of each content recommendation. Each feedback is analyzed, tokenized and normalized and comes to sentiment by following the cleaning process which in turn provides the input to the collaborative approach. It has established communication between two approaches.

[9] The paper titled 'A Restaurant Recommender System Based on User Preference and Location in Mobile Environment' uses a hybrid recommendation system to find the best suitable restaurants for the user. The similarity between a restaurant and the user is calculated. This calculation helps find out the restaurants that are suitable for the user. The recommendation is done on the basis of the distance between the user and the restaurant and the preferences of the user. These two influential factors give the best results for restaurant recommendation.

[10] The paper 'Research on O2O Take-away Restaurant Recommendation System' suggests that based on the ratings and reviews of restaurants, the cumulative score of the restaurants can be calculated. These scores help the system show only the best and the most apt restaurants to the user.

[11] In the paper titled 'Restaurant Recommendation System', there are 3 types of features taken into consideration, viz. user-based features, restaurant-based features and user-restaurant features. Hence, there are three learning algorithms used- SVM with RBF kernel, linear SVM and logistic regression. Among these 3 algorithms, linear SVM gave the best results with the highest accuracy of 69.89%.

III. CONCLUSION

In this paper, we tried to explore various algorithms and methods that can be used for recommending restaurant and food items based on the behavioural data of the user. The research papers we studied while proposing system showed some flaws and some strength of the said systems. Considering the studies we carried out for this project, we have zeroed down on the usage of K-NN and TF-IDF

algorithms. The conclusion of this paper, the literature review focuses on real time environment and non real time environment for a restaurant recommendation system and the algorithms proposed for the same using many different approaches and similar examples. The main aim of this paper is to propose a system that gives the best and highly accurate results for restaurant recommendation and queue management.

REFERENCES

[1] Y. Wang, L. Li and Q. Yang, "Application of clustering technique to electricity customer classification for load forecasting," 2015 IEEE International Conference on Information and Automation, Lijiang, 2015, pp. 1425-1430, doi: 10.1109/ICInfA.2015.7279510.

[2] Asniar and K. Surendro, "Predictive Analytics for Predicting Customer Behavior," 2019 International Conference of Artificial Intelligence and Information Technology (ICAIIT), Yogyakarta, Indonesia, 2019, pp. 230-233, doi: 10.1109/ICAIIT.2019.8834571.

[3] M. L. Bai, R. Pamula and P. K. Jain, "Tourist Recommender System using Hybrid Filtering," 2019 4th International Conference on Information Systems and Computer Networks (ISCON), Mathura, India, 2019, pp. 746-749, doi: 10.1109/ISCON47742.2019.9036308.

[4] Kim, SW., Gil, JM. Research paper classification systems based on TF-IDF and LDA schemes. Hum. Cent. Comput. Inf. Sci. 9, 30 (2019). https://doi.org/10.1186/s13673-019-0192-7

[5] M. Petrusel and S. Limboi, "A Restaurants Recommendation System: Improving Rating Predictions Using Sentiment Analysis," 2019 21st International Symposium on Symbolic and Numeric Algorithms for Scientific Computing (SYNASC), Timisoara, Romania, 2019, pp. 190-197, doi: 10.1109/SYNASC49474.2019.00034.

[6] V. Rao and J. Sachdev, "A machine learning approach to classify news articles based on location," 2017 International Conference on Intelligent Sustainable Systems (ICISS), Palladam, 2017, pp. 863-867, doi: 10.1109/ISS1.2017.8389300.

[7] T. V. Yadalam, V. M. Gowda, V. S. Kumar, D. Girish and N. M., "Career Recommendation Systems using Content based Filtering," 2020 5th International Conference on Communication and Electronics Systems (ICCES), COIMBATORE, India, 2020, pp. 660-665, doi: 10.1109/ICCES48766.2020.9137992.

[8] J. Zeng, F. Li, H. Liu, J. Wen and S. Hirokawa, "A Restaurant Recommender System Based on User Preference and Location in Mobile Environment," 2016 5th IIAI International Congress on Advanced Applied Informatics (IIAI-AAI), Kumamoto, 2016, pp. 55-60, doi: 10.1109/IIAI-AAI.2016.126.

[9] https://www.scribd.com/document/273417237/Ashish-Gandhe-Restaurant-Recommendation-System