International Journal of Scientific Research in Computer Science, Engineering and Information Technology
© 2019 IJSRCSEIT | Volume 5 | Issue 2 | ISSN : 2456-3307
DOI : https://doi.org/10.32628/CSEIT1952268

Nearby Product Recommendation System Based on Users Rating

Akanksha Jyoti[1], Abhijeet Roy[1], Suraj Singh[1], Nabab Shaikh[1], Payal Desai[2]

[1]Department of Computer Science & Engineering, Parul institute of Engineering and Technology, Parul University, Vadodara, Gujarat, India

[2]Assistant Professor, Department of Computer Science & Engineering, Parul institute of Engineering and Technology, Parul University, Vadodara, Gujarat, India

ABSTRACT

The recommendation system is very popular nowadays. Recommendation system emerged over the last decade for better findings of things over the internet. Most websites use a recommendation system for tracking and finding items by the user's behavior and preferences. Netflix, Amazon, LinkedIn, Pandora etc. platform gets 60%-70% views results from recommendation. The purpose of this paper is to introduce a recommendation system for local stores where the user gets a nearby relevant recommended item based on the rating of other local users. There are various types of recommendation systems one is User-based collaborative filtering by which the system built upon and uses user's past behavior like ratings and gives similar results made by another user. In collaborative filtering uses Euclidean distance algorithm is used to find the user's rate score to make relations with other users and Euclidean distance similarity score distinguish similarity between users. K-nearest neighbor algorithm is used to implement and find the number of users like new user where K is several similar users. Integrate with map interface to find shortest distances among stores whose product are recommended. The dataset of JSON is used to parse through the algorithm. The result shows a better approach towards the recommendation of products among local stores within a region.

Keywords : E-Commerce, Google Map, Nearby Store, Recommendation System, Self-Service, Technology

I. INTRODUCTION

E-commerce has been around the globe since mid-90's around the globe. Its trending day-by-day recently through the internet. Entrepreneur and customers are giving more attention towards this, basically, this is commonly known as, it's a buying and selling of networks. This significant change in the business models, this is a paradigm shift influencing both marketers and the customers. eBay, Yahoo, and Amazon are some reason for the highly successful operation. [1] But it is killing the local market, according to the recent Forrester research, around 21% of the Indian population of 1.6 billion are connected to e-commerce. [2] This is the reason behind the idea of making a recommendation for the nearby market. Here buyer can buy the product from nearest shop available in the locality. [3] From a business point of view, it provides better connectivity.

Here connecting the local market with buyers on the bases of recommendation system. The recommendation means it is a subclass of information that seeks the predict the rating and preference that the user should provide to an item. Under various formats, the recommendation system is used by many e-commerce sites. Item-to-item collaborative filtering currently used by Amazon. [4] In real time amazon provides high-quality recommendation and massive datasets. A user purchased and rated an item of the

similar items which matches these types of filtering. So, in recommending a list of users combing those items in the list. Recommendation system helps the customer to find the product easily. It is based on demographics of the customer, top overall seller on site and analyses of past buying behavior of customer as predictions. [5] In this paper, we study the recommendation system based local market, product over a region, and we can identify the local store on the bases of integration of map API. [6] A collaboration of both recommendation system and integrations of map API. Geolocation method is used to identify the path and shortest distance to reach the place. "We are going to implementing the recommendation system-based e-commerce in the local market." With the help of the integration map API, which help to identify the exact location of the store.

II. MATHODOLOGY FOR IMPLEMENTATION

2.1 User-based collaborative filtration:

Recommendation system based on user behavior. A Collaborative recommendation algorithm. Theory and implementation are most effective proved by the CF has proven it by its simplicity. Based on the same data structure as a user-item matrix and item consisting of their rate score to make a recommendation system. [7]

2.1.1 The recommendation principle:

This is the most successful practical application for personalized recommendation method. User-based CF assumes that it is a good way to find the user's interesting item used to find the other users having the same or similar interest. Firstly, it strained to finds the user's "nearest neighbor" having like the target user for the comprehensive evolution of the project, it can be obtained by the evolution of K-nearest. [8] As shown in figure 1.

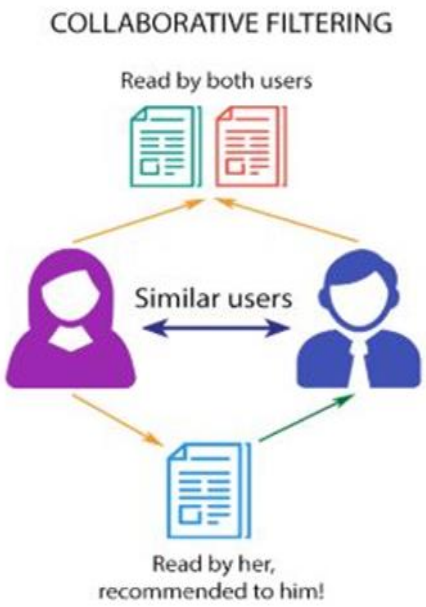

Figure 1. User-based recommendation using CF [1].

2.1.2 Algorithm model:

User-based collaborative filtering basically on the nearest neighbor technique, to calculate the distance between user they use histories of a user as information, and then use the target user's nearest neighbor(k-nearest). Evolution value to predict the target user's preference by evolution weighted. The system makes the based-on rating of products of the user. [9] As shown in figure 2, (k=4, a user recently selected as a neighbor).

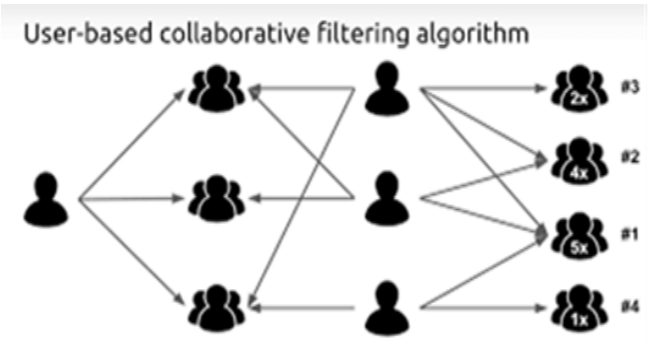

Figure 2. User-based collaborative filtering algorithm [2][16].

Collaboration filtering based on the statement:

Find the user having the similar or same interest and then target the user. This recommendation basically based on neighbor set. User-item rating matrix where user the set the number m and item n, user item

score data matrix can be constructed as shown in table 1.

	Item 1	Item 2	Item 3	...	Item n
User 1	2	3	?	...	5
User 2	?	4	3	...	?
User 3	3	2	?	...	3
...	...	...	...	...	...
User m	1	?	5	...	4

Table 1. Scoring matrix of user [3].

2.2 Euclidean Distance: [10]

It forms the basis of many measures of similarity and dissimilarity which is defined as Euclidean distance. The distance is given as follows:

$$d(p,q) = d(p,q) = \sqrt{(q_1 - p_1)^2 + (q_2 - p_2)^2 + \cdots + (q_i - p_i)^2}$$

$$d(p,q) = d(p,q) = \sqrt{\sum_{i=1}^{n} (q_i - p_i)^2} \quad (1)$$

In other words, Euclidean distance is the square root of the sum of squared differences between corresponding elements of the two vectors.

For example, a matrix of user and product rating is taken and matrix value represents the user's rate score.

Matrix(A)	Product 1	Product 2	Product 3	Product 4
User1	5	3	2	5
User2	1	3	4	1
User3	1	5	2	4

Table 2. Matrix table of User and Product.

Finding the most similar users rating by Euclidean distance and similarity score formula.

1) Step 1: Euclidean distance

Here 'p' is taken as a vector of user1 and 'q' is taken as a vector of user2.

$$d(q,p) = \sqrt{(q_1 - p_1)^2 + (q_2 - p_2)^2 + (q_3 - p_3)^2 + (q_4 - p_4)^2}$$

$$d(q,p) = \sqrt{(5-1)^2 + (3-3)^2 + (2-4)^2 + (5-1)^2}$$

$$d(q,p) = \sqrt{(4)^2 + (0)^2 + (-2)^2 + (4)^2}$$

$$d(q,p) = \sqrt{16 + 0 + 4 + 16}$$

$$d(q,p) = \sqrt{36}$$

$$d(q,p) = 6$$

Similarly, for the rest of the users, it can be calculated.

Users	Distance
User1 and User2	6
User1 and User3	4.5852
User2 and User3	3.3166

Table 3. Euclidean distance between Users.

2) Step 2: Similarity score:

$$s = \frac{1}{(1+d)} \quad (2)$$

$$s = \frac{1}{(1+6)}$$

$$s = \frac{1}{(7)}$$

$$s = 0.1428$$

Similarly, for the rest of the users, it can be calculated

Users	Scores
User1 and User2	0.1428
User1 and User3	0.1791
User2 and User3	0.2316

Table 4. Similarity score between Users.

Since User2 and User3 has a higher similarity in product rating among the rest of users. Therefore, lesser the Euclidean distance between the user concludes a higher similarity score between users. In

other words, Euclidean distance is inversely proportional to the Similarity score.

2.3 K-Nearest Neighbor: [11]

K-nearest neighbor introduces for improvement in the CF recommendation system, for improves some methods of CF. KNN having one of the simplest classification algorithms and one of the most used learning algorithms. This is a non-parametric algorithm. When we say that the technique is non-parametric it means that it does not make any prediction on underlying data sharing. In other words, from the data the model structure is determined. KNN is also a lazy algorithm, it means that to do generalization it does not use any training data, it simply means that the training data is needed during the testing phase.

KNN algorithm summarized as:

With a new sample, a positive integer k is specified. We select the k entities in our database which are closest to the new sample. This classification we give to the new sample.

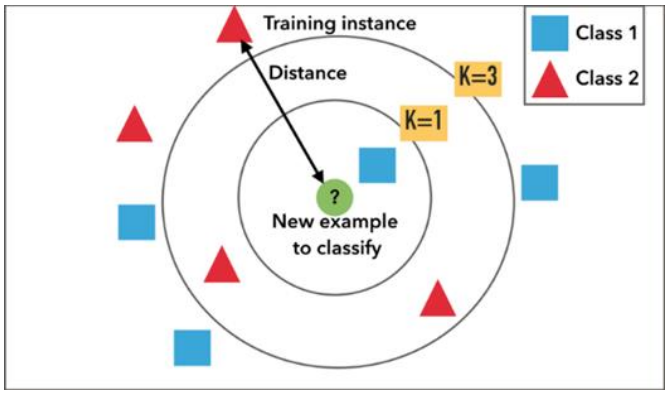

Figure 3. Classification of k-nearest neighbor [5][11].

Example of k-NN classification in fig 3, the test sample which is inside the circle. It classified as either to the first class of blue squares or the second class of red triangle. If k=3 is outside the circle as it allocated to the second class because there are 2 triangles and 1 square which is inside the inner circle. If, k=5 it is allocated to the first class where square=3 and triangle=2 outside the circle.

2.4 Shortest distance map API:

Shortest distance means the briefest path to reach a place. It an application in Mapmyindia that shows you to shortest path between two points. Mapmyindia API would help to add predicted travel time & duration from a given origin point to several points. The Driving Distance Matrix API provides driving distance and estimated time to go from a start point to multiple destination points, based on recommended routes from Mapmyindia Maps and traffic flow conditions. We are integrating this in our project to find the shop with exact distance.

When a new user found the products rank wise then the new user gets the location of all vendors nearby its current location where all products are available. It will show the exact location of the product, then it will show how much distance and time will be required to cover the distance from your current location.

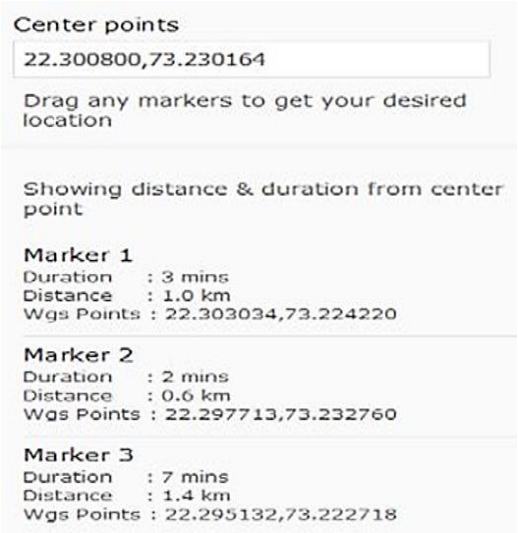

Figure 4: Duration, distance and exact location of product [6].

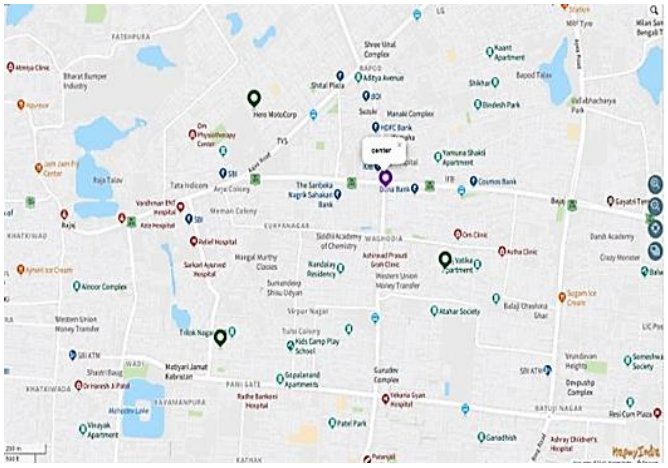

Figure 5 : All stores nearby current location [7][6].

III. DATASET AND IMPLEMENTATION

3.1 Dataset:

RDBMS dataset used in this experiment is Product Rate dataset. It has 9 attributes (p_ id, p_ name, vendor_ name, buyer_ name, categories, vendor_ city, longitude, latitude, rating). It contains few anonymous rating products within range of 1 to 5. The RDBMS dataset parse into JSON data format as training set for recommendation system.

3.2 Implementation:

The experiment performing on JSON dataset. Parsing the RDBMS data into JSON format. Now formatting the JSON data into a specific format for the algorithm of recommendation system. Making an array of objects of products rated by each user where user are keys and product's rate are the values.

Now runs the User-based collaborative filtering algorithm on JavaScript where Euclidean distance finds the distance between each user based on ratings and find similarity score between them. Compare the similarity score with the new user who rated only a few products. Filter the top-K number of users whose score is near to the new user or could say those users have the nearly similar rated product to the new user. Predicting the non-rated product of new user as per similar users and sorted into higher rated products which mean those high rated products could be most like by the new user. So, recommend those products to a new user.

Now find the nearby store location of the recommended product. For which fetch the longitude and latitude of those stores form dataset and passes as an attribute of Shortest Distance function to JavaScript program which is integrated with Mapmyindia API.

Resultant of a function will display all the stores' location who has the recommended product nearby new user or current user in the local region.

IV. CONCLUSION

Recommendation system help to find relevant product near the user. Many recommendation systems use the user-based collaboration filtering method, which has proved one of the best techniques for the recommendation system in recent years. In this paper details the recommendation system, in which k-nearest neighbor algorithm use for finding a similar user whose product rating is similar. As per the similarity between them, the system can predict the non-rate product for recommending nearby them within a city with the help of map API integration.

V. REFERENCES

[1]. An A, Fang. Research commerce personalized recommendation service information. University of International Business and Economics.2006.

[2]. George Prassas, Katherine C. Pramataris, 14th Bled Electronic Commerce Conference Bled, Slovenia, June 25 - 26, 2001.

[3]. Lohse, P.L and Spiller, P. Electronic Shopping. Communications of the ACM. Vol. 41(7). 1998.

[4]. Nichols, D.M. Implicit Rating and Filtering. In Proceedings of the 5th DELOS Workshop

on Filtering and Collaborative Filtering,10-12. Budapaest, Hungary, ERCIM, 1997.

[5]. Maltz, D. and Ehrlich, K. Pointing the Way: Active Collaborative Filtering. In Proceedings CHI'95, 202-209. 1995.

[6]. Anuj Jain 2012 MapMyIndia API https://www.mapmyindia.com/api/ accessed on 12th March 2019.

[7]. Maltz, D.A. Distributing Information for Collaborative Filtering on Usenet Net News. MIT Department of EECS MS Thesis. May 1994.

[8]. Kevin Liao 2018 https://towardsdatascience.com/prototyping-a-recommender-system-step-by-step-part-1-knn-item-based-collaborative-filtering-637969614ea accessed on 12th March 2019.

[9]. Breese J, Hecherman D, Kadie C. Empirical analysis of predictive algorithms for collaborative filtering. 1998. 43~52.

[10]. Anton, Howard (1994), Elementary Linear Algebra (7th ed.), John Wiley & Sons, pp. 170–171, ISBN 978-0-471-58742-2

[11]. Shakhnarovish, Darrell, and Indyk, eds. (2005). Nearest-Neighbor Methods in Learning and Vision. MIT Press. ISBN 978-0-262-19547-8.

[12]. Maurits van der Goes 2017 https://neo4j.com/blog/collaborative-filtering-creating-teams/ accessed on 12th March 2017.

Cite this article as :

Akanksha Jyoti, Abhijeet Roy, Suraj Singh, Nabab Shaikh, Payal Desai, "Nearby Product Recommendation System Based on Users Rating ", International Journal of Scientific Research in Computer Science, Engineering and Information Technology (IJSRCSEIT), ISSN : 2456-3307, Volume 5 Issue 2, pp. 963-968, March-April 2019. Available at doi : https://doi.org/10.32628/CSEIT1952268 Journal URL : http://ijsrcseit.com/CSEIT1952268