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Recommender System for Social Connectivity

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Abstract: A typical problem of growing social connectivity on social media platforms is the accurate estimation of the probability of acceptance of a request to connect with an individual. A prevalent practice involves the identification of the "friends" of a particular user in a group. The current paper proposes a weighted average metric-based approach to building a recommender system for the given purpose. The weighted average graph search-based approach is simulated and the results examined in the paper.

Keywords: social connectivity, social media, weighed average metric, recommender system, graph search

I. INTRODUCTION

A friend suggestion system for social network uses the lifestyle of user to suggest friends. Many social networking sites recommended friends, item, and books. For example, Facebook suggest the friends based on social relationship those who are sharing common friends. This work utilizes user's lifestyle, field of interest to recommend friend to user. The lifestyle of user can be determined from user's daily activity which he/she uploaded in social sites. Based on the similarity of lifestyle and interest between the users the friend matching graph is drawn. System analyses the connective graph, chalk out the nearest nodes which are not directly connected to that particular node, evaluate the common factor from the post matrix to find out which users are more similar to suggest as friends.

The paper is arranged in the following manner. Section II presents a survey on the different approaches employed by researchers. Section III presents the proposed model and algorithm. The results obtained by application of the proposed model are outlined and the appropriate discussions are presented, in Section IV. Section V concludes the paper.

II. LITERATURE SURVEY

In a general social media the friends of friends of a particular user, who are not directly connected with that user, are suggested to send friend request. For example if a person 'A' is connected with 'B' and person 'B' is connected with person 'C' and 'D', but 'A' is not directly connected with 'C' and 'D' then 'A' is suggested to send friend request to 'C' and 'D'. Now the user suggested to become a "friend", may not be of similar category as of user to whom the suggestion is sent. Considering the above example, the personality or field of interest of user 'A' might not match with that of user 'C' or 'D'.

In recent years, scholars have worked extensively in the domain of friend suggestion for social networking. A novel approach outlined in [1] involves the comparison of lifestyles of users based on smartphone sensor data to generate friend recommendations. Weblog-based social network analysis has been outlined in [2] as the preferred technique for friend suggestion generation. Another novel approach outlined in [3] involves the use of relationship schemas based n television shows to generate friend suggestions between users. [4] uses semantic friend matching to improve recommendations for smartphone users running the application designed by the researchers. [5] explores interest based recommendation techniques for social networking.
Map-based interest matching is an effective alternative to the abovementioned techniques. This class of methods provides the benefits of generating accurate dynamic estimates at lower complexity of computation than most other methods. The present paper also presents a weighed average social map based recommender system.

III. PROPOSED MODEL AND ALGORITHM

When a user posts any status on social media platform it scans the category of post and put them on 'post matrix'. Later by tracking this post matrix a friend should be suggested to any user. This proposed project utilizes user's lifestyle, field of interest to recommend friend to user. The lifestyle of user can be determined from user's daily activity which he/she uploaded in social sites. Based on the similarity of lifestyle and interest between the users the friend matching graph is drawn. System analyses the connective graph, chalk out the nearest nodes which are not directly connected to

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that particular node, evaluate the common factor from the post matrix to find out which users are more similar to suggest as friends.

PROPOSED MODEL

The proposed system suggests friends based on a specific criterion. It aims to compare contact network on the basis of posts which portrays one's interest. The framework sees these posts as various elements. In social network, a user may locate that the majority of his companions reach him considering the posts of similar labels. An adjacency matrix of users is made and the respective cells are filled based on their connectivity. In case of addition of a new user, a row and a column are added. String data type is assigned for user name and user ID is generated as Integer type. There is a separate 2 Dimensional 'post' array for keeping a record of the sphere of liking of any user. Each column of this array is equivalent to the area of interests broadly categorised into a few topics. Each row holds the information about the number of posts by each user on the respective fields. During the process of friend suggestion, four lists are generated. Each user has two lists where the weightage of liking and disliking is stored on the basis of top two interests. Further these lists are compared to check for the existence of common interest. The framework compares the areas of interest and makes this the basis of friend suggestion, rather than arbitrarily proposing random users.

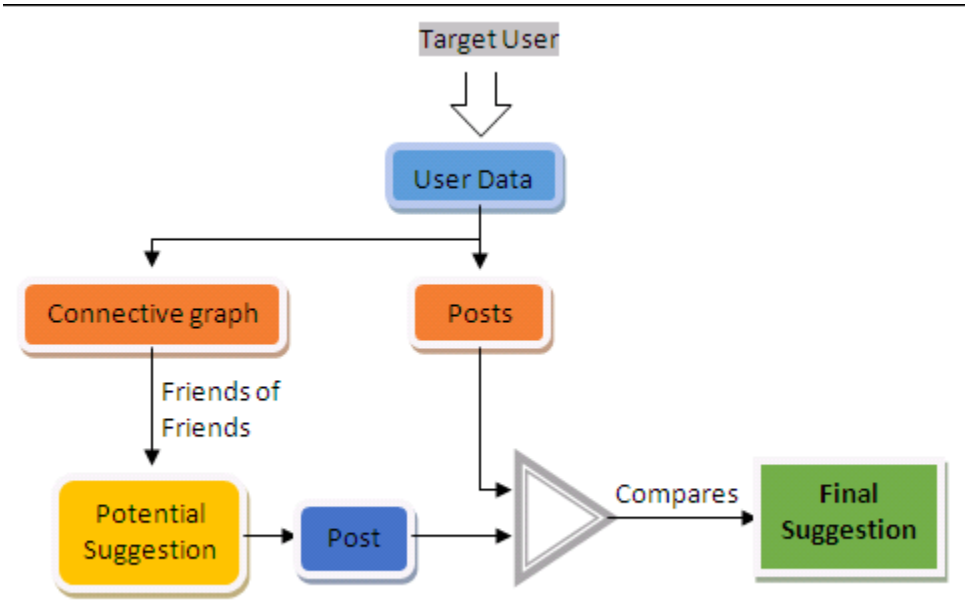

Figure 1. Proposed Model

ALGORITHM

INPUT: Initial number of users, user names, sending friend requests, update posts according to interests.
OUTPUT: Refined friend suggestion depending on specific criterion.

Connected Friends:

- By using depth first search (DFS) on the social graph, the algorithm prints the interconnected components or users.

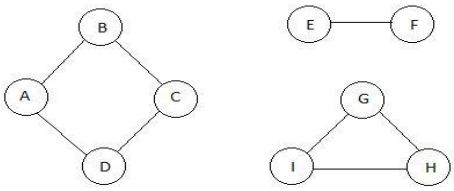

Figure 2. Social Graphs

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- For these above graphs, the algorithm will print →
  A, B, C, D
  E, F,
  G, H, I

Friend Request:

- Send a friend request from source user (i) to destination user (j).
- On accepting the request, connect them by making adjacency[i][j] = adjacency[j][i] = 1.

Friend Suggestion:

- Let us suppose a graph with user '0', '1', '2', '3' and '4'.
- Suppose we want to suggest user '0' a friend. First, we have to see who are the direct friends of '0' by checking non-zero value of each column of that '0' row of the adjacency matrix (in this case these are user 1, 2, 3).
- Then for the first match ('1') we have to check the non-zero column value of '1' row except column '0' and if non-zero value found at position 'j' then check if a[0][j] == 0.
- If not then find the next non-zero value of user '1'.
- If yes then check the 'post' matrix for finding the common factor between the user corresponding to that column value and the user '0'.

IV. RESULTS AND DISCUSSIONS

A sample connectivity graph is shown in Figure 3. The generation algorithm for the graph is explained stepwise following the figure.

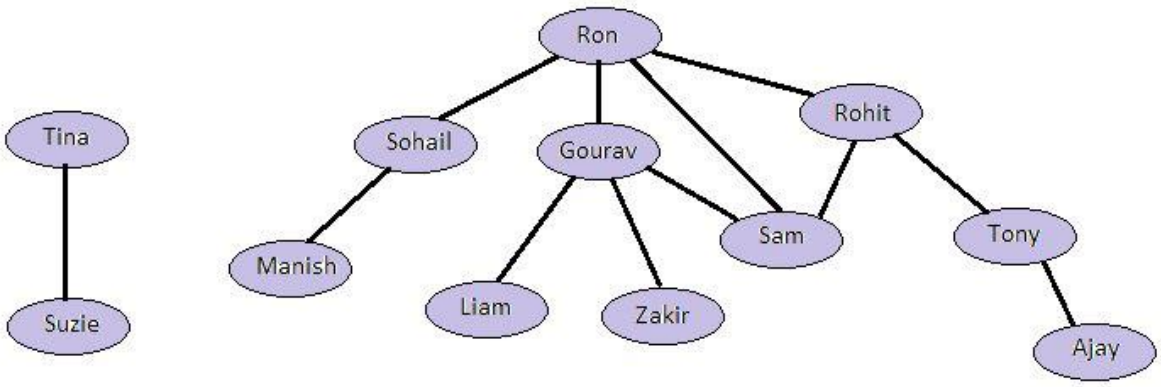

Figure 3. Generated Connectivity Graph

Initial data collection is done in the form of number of users and user names. Here 10 users and their usernames are considered initially. The menu driven approach provides various options for user. Friend requests are sent by entering the sender and receiver names. A confirmation message is generated to accept the request. On accepting the request, the cells of adjacency matrix corresponding to those users is filled with 1. All the requests sent according to the graph. Connectivity among the users can be seen in a linear form. The adjacency matrix can be displayed to visualise the connection status. New users are then added. The connectivities of new added users are displayed. Friend relation between the newly added user is established and verified by the adjacency matrix. Each user has the liberty to add a post on the topic of their liking. For each post the corresponding column value is incremented. The rows display the usernames and the columns show our post categories. Suggesting friend to a particular is done after updating several posts by users. The friend suggestions by using traditional method and weighed average interest based evaluation method are displayed.

Here a social networking forum is executed where a user can create a new account, send friend request to other users, accept or reject friend requests, monitor connectivity with other users, update post of different categoriesaccording to

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their liking, get friend suggestions and also log out from the portal. At first the forum is initiated with a no of users and their credentials. Here initially ten users named Ron, Sohail, Gourav, Sam, Rohit, Manish, Liam, Zakir, Tony, and Ajay have created account. Ron sent friend request to Rohit. A confirmation message is displayed to Rohit and Rohit accept the friend Request by pressing 'Y'. Friend request from any user can be rejected by entering 'N' in the confirmation statement. In this way all the friend requests are send and accepted in order to establish the connectivity between the users according to the graph shown in Fig. f. In the adjacency matrix the connective path between user 1 and user 2 is implied by integer 1 at the cell (user 1, user2) and (user 2, user 1). All initial ten user are now interconnected and nodes of a single undirected sub-graph.

In case of creating new account the credentials of user is taken and the rows and columns adjacency matrix is incremented by one. The cells of corresponding user are filled with zeroes, as initially it is not connected with any other users. For an example when Suzi and Tina created their account in each case this following method is repeated. Since Suzi or Tina is neither connected with the sub-graph of initial ten users nor connected with each other, their names are displayed in separate lines. After connecting Suzi and Tina when the connected user method is executed their name is printed in single line. In a social networking site a user has a liberty to add posts about any topic. In this case-study ten common sports category (Football, Cricket, Hockey, Tennis, Swimming, TT, Ludo, Chess, Carom and UNO) are considered. A post matrix is there to keep track of the posts of different categories by different users, where each row stands for each user and each column indicates one of the categories. Each time a user posts an update about a topic the cell value of index (posting_user, post_category) is incremented by one.

While suggesting friend for 'Ron' initially the algorithm finds his friends of friends from adjacency matrix who are not directly connected with Ron and stores them in a Match list. According to the traditional method this matched user i.e. Tony, Manish, Liam, and Zakir are to be suggested. But to optimise the result this algorithm compares their interest with Ron. First the index values of category of Ron's highest and second highest post is listed under the separate array list (highest- 0 (Football), second highest- 4 (Swimming), 9 (UNO)). For the first user in Match list i.e. Tony the highest and second highest post index are evaluated (highest- 1 (Cricket), second highest- 4 (Swimming), 3 (Tennis)). Here we can see the second highest index of Ron 4(swimming) matches with the second highest index of Tony. Thus in final suggestion Tony is referred to Ron. For the second user in Match list i.e. Liam the highest and second highest post index are evaluated (highest- 8 (Carrom), second highest- 6 (Ludo)). Here we can see any of the index value of Liam's highest or second highest post not matches with that of Ron. So Liam is discarded from the final suggestion list.

Similarly evaluating the posts Manish is discarded and Zakir is referred to Ron in final suggestion. In this way effective friend suggestion are generated for a user and enhances the efficiency of suggestion. The algorithm therefore ensures higher probability of correct recommendations compared to the traditional approach.

V. CONCLUSION

The future scope of this work includes the development of trainable neural network based models which allow accurate recommendations to be generated through neural network implementations of unsupervised map-based learning algorithms. It is also the intention of the authors to develop a better metric than weighed average for improving the accuracy of the recommendations.

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