Video Recommendation based on Content and Social Behaviour of User

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***Abstract*—Large number of videos are available in online social network. User can directly access video contents in Online Social Network .It allowing user to import and re-shares the videos through the social connections. Video recommendation based on both content and social behaviour of user. It consists of four phases. They are (i) Data Collection, (ii) User Appearance, (iii) Similarity, and (iv) Clustering . Data Collection module consists of large number of videos from YouTube. From this videos the tag information are extracted and preprocessed the keyword. User Appearance based on User-User Matrix, Content-Content Matrix and Initial User-Content Matrix are computed. Missing entries in User -Content Matrix is update by using Social Propagation and Content Similarity. To find the similarity between User Space and Content Space is used to improve the high recommendation accuracy for importing and re-sharing. Finally, clustering with k- medoids to find the representative user and representative videos.**

***IndexTerms*—Online SocialNetwork, Content Similarity, Video Recommendation, Social Propagation.**

I INTRODUCTION

Highlight Social Network can be defined as the social structure of interaction between individual . User can be represented by social actor. Specific characteristic of Social Network are user based, interactive, community driven ,relationship, and emotional.

Social Network Analysis (**SNA**) is the study of structure and behavior of Social Network. Social Network Analysis views social relationships in terms of network theory. Social Networking service is a platform to build Social Networks or social relations among people for example, share interests, activities, backgrounds, or real-life connections.

Two important service in today internet service are online social network service (e.g. Face book, Twitter).and online video sharing sites(e.g. YouTube). In Online social network, video contents are generated by individuals, instead of the centralized content providers for e.g. , videos are uploaded by users per minute on YouTube .Video sharing system are being "imported" by individuals to the online social network ,and "re-shared" among users through the social connections.:

IMPORTING RECOMMENDATION: Import from one to other video sharing sites (E.g. YouTube to Twitter) simply Posted the links .It help to user interesting video from the video sites.

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RESHARING RECOMMENDATION: User can share the video in social connections anyone interested in this video and follow the user to re-share the video. Re-sharing video propagates in a cascade way. It helps to user which one share large number of videos.

Existing video recommendation include both social based recommendation and content based recommendation. Content Based Recommendation includes content filtering, and collaborative filtering. Recommendation based on the user by using content similarity analysis or user historical rating of content. For e.g. content similar to the user has been recommended and or the content that user similar to him to recommend the system. Social Based Recommendation or social relationship to form the recommendation through the social connections, the content likely to the friends to be suggested through social connections. This recommendation approach to provide user with the content based on the interest his friends.

II RELATED WORK

In recent years, many works have been proposed towards the Recommendation System. Many authors are still working to produce a new method which can give efficient recommended system.

M. Pazzani et al. [1] describe the content based recommendation system that are suggested by this system are based on the description of the item and the user interest profile on that particular item.

J. Ben Schafer et al. [2] describes about Collaborative filtering (CF) is the process of filtering or evaluating items through the opinions of other people. This technique is used in powering the adaptive web. CF technique combines the opinions of large interconnected communities on the web, supporting filtering of substantial quantities of data. Collaborative filtering is used along with the theory and practice of CF algorithms and design decisions regarding acquisition of ratings.

Robin Burke et. al. [3] deals the Hybrid search give the better performance for automated recommendation system through the adaptive web pages. Number techniques included in hybrid are collaborative, content based and knowledge based recommendation. Two part of hybrid recommendation are combining four different recommendation techniques and seven hybridization strategies. Combination of two is more recommendation to improve the performance of the cold start problem .Hybrid is not suitable for taking one component individually.

B. Sarwar, et al. [4] discuss the Recommendation system helps its user to choose an item based on recommendation. It is mainly classified into three categories. [1][2][3]

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content-based, collaborative, and hybrid recommendation approaches. Recommender systems suggest the people by find product, sharing information, and activities of one people to another people. User profile interest and behavior of user are based on the recommendation of user.

J. Basilico et al. [5] deals the content based filtering and collaborative filtering[1][2] applied in the context of the recommender system and the user preference prediction information of past user item rating and attribute of item or user to learn a prediction to perform the unified approach .To identified the kernel or similarity function of user and item pairs that generalizes the perceptron algorithm and JRank algorithm.

Z. Wang, et al. [6] describe about Online social network has emerged as the most popular approach for people to directly access multimedia contents. Among these contents, video sharing is a challenging task due to the demand on a large amount of uplink bandwidth at the dedicated server.

F. Walter et al .[7] discuss the model of a trust based recommendation system is developed for social networks like Face book, Twitter, etc. System the selected recommendations are further filtered by their trust relationships there by increasing the security level of the recommendations. Impact of network density, preference heterogeneity among agents and knowledge sparseness are also identified which are the crucial factors for the performance of the system.

F. Benevento, et al. [8] deals the understanding of how users behave when they connect to social networking sites creates opportunities for better interface design in on-line social networks.

III FRAMEWORK

Next we present the framework of our recommendation which include the following key technologies:1)Data Collection 2) User Appearance 3)Similarity 4)Clustering.

A. Data Collection

Randomly choose number of videos from online video sharing service e.g. YouTube.. Collect the large number of videos from the category like sports, politics and education etc. Data in the form of the xml tags contain the collaboration of video dataset.. So using the tag extracted operation performing the preprocess technique. a) Collecting keywords from video tag list*:* to find the similarity between two videos is evaluating the common keyword. Each video given a list of tag containing description of the video show several short sentence. Weighting the keyword, some words having high frequency so problem in similarity calculation.

B. User Appearance

Recommendation inputs from the user-user matrix, content-content matrix and user- content matrix.

1) *User-User Matrix:* User matrix is form by interest of the users in the social network. User can follow anyone without their permission. It assign follow the user to 1, not follow the user to assign 0. This matrix represented the how user are

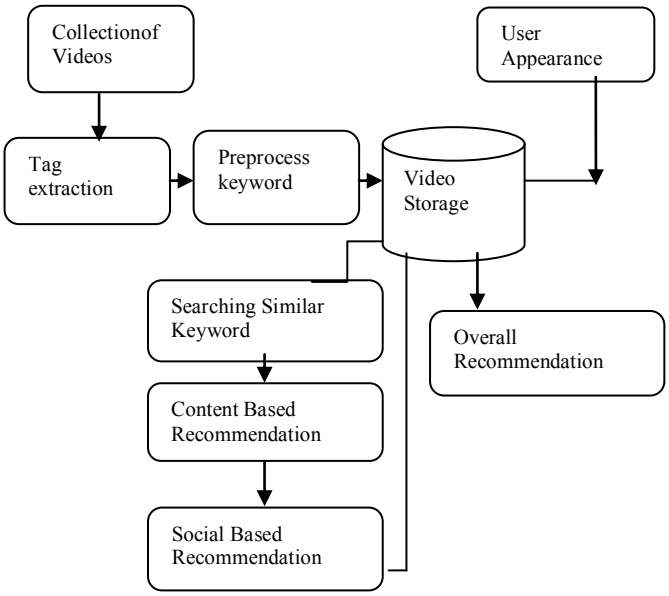

Fig 1. ARCHITECTURE DIAGRAM

socially connected to each other.

2) Content-Content Matrix: System learns users are interested in these videos. Some users have no viewers in user generated video the problems start

Table I .USER-USER MATRIX

	User1	User2	User3	User4	User5
User1	1	0	1	1	1
User2	0	0	0	1	1
User3	0	1	1	1	1
User4	0	1	1	1	1
User5	1	1	1	1	0

TABLE I. CONTENT-CONTENT MATRIX

	Content1	Content2	Content3	Content4	Content5
Content1	1	0	1	1	1
Content2	0	0	0	1	1
Content3	0	1	1	1	1
Content4	0	1	1	1	1
Content5	1	1	1	1	0

In the table If the content follow by another user it assign 1 in the table and assign 0 to user not follow content of another user. To avoid this problem content matrix provide the similarity to the videos perform these videos by using the content similarity analysis..

$$C_{IJ} = \frac{\Sigma_{\omega} \epsilon w_{i \cap w_j}}{\Sigma_{\omega} \epsilon w_{i \cup w_j}} \quad (1)$$

w_i -content1 w_j -content2

3. .Initial User- Content Matrix

Information about the importing and re-sharing videos. Initial user- content matrixes based on user import or re-share to assign as 1. Not import or re-share to assign as 0 in the table.

TABLE II. INITIAL USER-CONTENT MATRIX

	Content1	Content2	Content3	Content4	Content5
User1	1	0	1	1	1
User2	0	0	0	1	1
User3	0	1	1	0	0
User4	0	1	0	1	0
User5	1	0	0	1	0

4. User- Content Matrix Updation

Updating based on user matrix and Content matrix to recommendation for cold user/ cold videos to predict the item too likely to import and re-share with little history with the information. . Missing entry in the matrix 0 can be filled by using social propagation and content similarity. Social propagation update based on the user- user matrix and user-content matrix, content similarity update based on the content- content matrix and user-content matrix .Initial user-content matrix performing the relevance based recommendation .selecting entry in the update matrix so update on round by round set the candidate set of entries to update in round. Entries can be filled by to rank the numbers of user according to the number of videos import or re-share Updating the missing based on the Video propagates through social connections one's interest can influence the other in the cascade way .Missing entry based on the user interest in social connection. Content similarity analysis matrix based on the ability that the user and the content. Update based on the interest and their friends interest to predict the which video to import and re-share.

TABLE III. UPDATE MATRIX

	Content1	Content2	Content3	Content4	Content5
User1	1	0	1	1	0
User2	**1**	0	**1**	1	0
User3	**1**	1	1	**1**	0
User4	**1**	1	**1**	1	0
User5	1	0	**1**	1	0

Candidate set represented as$E^{(T)}$ to maximize the updating gain in the missing entries.

$$\max_r \sum_{(i,j)\in r} G(B^{(T)})_{ij} \quad (2)$$

$$G(B^{(T)})_{ij} = \begin{cases} 1, \Omega(B^{(0)})_{ij} = 1 \\ 0, \Omega(B^{(0)})_{ij} = 0 \end{cases} \quad (3)$$

$G(B^{(T)}$-updating gain entry,T-set entry for updating

C. Similarity

Construct the user space and content space separately to measure the similarity between user and video can be mapped into two space. Combine the two spaces to measure the relevance between user and a video.

1). User Space

Construction of user space based on the user- user matrix .

a) Select Representative User: user having large number of followers. Ranking based to spilt the user and find the representative user. orm the group to optimization the large number of user. Representation based on categories this user belong to this group.

b)User Vector In User Space:. In user space corresponding entry filled by the user interest in the particular group. so normalized the user vector

c)User Vector In Content Space: update user-content matrix to construct the content vector . strength of user denote the import and re-share videos .set of user import and re-share video . so normalized the content vector to indicate more user from the corresponding group like that video.

2),Content Space

Construction of content space based on the content-content matrix.

a)Select Representative Videos: choose representative content from the import and re share videos . Representation based on the most popular videos and forms the rank list to the videos. Selection process using heuristic algorithm .To form the group to optimization the large number of videos.

b) Content Vector In User Space:. User follow the more representative user so normalized the user vector .In user space corresponding entry filled by the user interest in the particular group.

c) Content Vector In Content Space: user import and re-share video to normalized the content vector. Indicate more user from the corresponding group like that video.

3).Choose Representative Item from Candidate Set

Combine the vector in user space and content space to measure the relevance between user and video to perform the recommendation .similarity is calculated by we using the selection algorithm. Calculates the similarity cost of the each user and content. Let $sim(x,y)$ denote the similarity between the item x and item y. Larger $sim(x,y)$ indicate xis more similar to y.

$$\frac{min}{R} \sum_{x,y\in R} sim(x,y) \quad (4)$$

R C Hclustering

R-selected representative item, H-whole candidate set

D. Clustering

Clustering refers to grouping of similar objects. Descriptive index can be defined which group has highest index . k medoids to evaluate the similarity of the item within a group of user and the video. Finally Identify this group has higher index.

IV CONCLUSION

In this paper, we propose to use information from the online social network and online content sharing network jointly to perform recommendation for user-generated contents, Large number of videos are available to the user. To suggest user which videos to import and re-share in online social network .Designing a framework consist of user-user matrix, content-content matrix and user-content matrix. Avoid the cold start problem in the updated matrix. Find the relevance between user and videos by using user space and content space. To improve the high recommendation accuracy of importing and re-sharing by using content and social behavior of user.

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