Limitation
The accuracy of this scheme can be provide most accurate result if more aggregate information is disclosed along with the concealed data, especially those aggregate information whose disclosure does not compromise much of users privacy. This kind of information includes distribution, mean, standard deviation, true data in a permuted manner.

2.1.2 SVD (Singular Value Decomposition)

In this paper, H. Polat and W. Du proposed SVD-based collaborative filtering technique to preserve privacy. The method used is a randomized perturbation-based system to protect users privacy while still providing recommendations with decent accuracy. In this, the same perturbative technique is applied to collaborative filtering algorithms based on singular-value decomposition [2].

Limitation:

Even though a user disguises all his/her ratings, but the items themselves may uncover sensitive information. The simple fact of showing interest in a particular item may be more revealing than the ratings assigned to that item.

2.2 Tag Prediction

Tag prediction concerns about the possibility of identifying the most probable tags to be associated with a non tagged resource. Tags are predicted based on resources content and its similarity with already tagged resources.

2.2.1 Social Tag Prediction

In this paper, D. Ramage, P. Heymann, and H. Garcia-Molina proposed a tag prediction technique. Tag is predicted based on anchor text, page text, surrounding hosts, and other tags applied to the URL. An entropy-based metric which captures the generality of a particular tag and informs an analysis of wellness of the tag which can be predicted. Tag-based association rules can produce very high-precision predictions and giving the deeper understanding into the relationships between tags [3].

Limitation:
The predictability of a tag when the classifiers are given balanced training data is negatively correlated with its occurrence rate and with its entropy. More popular tags and higher entropy tags are harder to predict. When considering tags in their natural (skewed) distributions, data scarcity issues lead to dominate, so each tag improves classifier performance. This method performs poor in case of popular tags and distribution becomes poor with overall performance.

2.2.2 Granularity of User Modeling

In this paper, Frias-Martinez, M. Cebrian, and A. Jaimes proposed a tag prediction technique based on granularity. One of the characteristics of tag prediction mechanisms is that, all user models are constructed with the same granularity. In order to increase tag prediction accuracy, the granularity of each user model has to be adapted to the level of usage of each particular user. In this, canonical, stereotypical and individual are the three granularity levels which are used to improve accuracy. Prediction accuracy improves if the level of granularity matches the level of participation of the user in the community [4].

Limitation:

This approach doesn't investigate the following two areas:
1) How to identify the scope of information used in the construction of the models (i.e., size and shape of clusters in the stereotypical case).
2) How and when user models evolve from one granularity to the next.

2.3 Recommendation Approach

In this paper, G. Adomavicius and A. Tuzhilin proposed a tag recommendation approach. It suggests to users the tags to be used to describe resources they are bookmarking. It is enforced by computing tag based user profiles and by suggesting tags specified on a given resource by users having similar characteristics/interest [7].

2.3.1 Content-based Recommendation Approach:

Content-based recommendation systems try to recommend items similar to those a given user has preferred in the past. The basic process performed by a content-based recommender consists in matching up the attributes of a user profile in which preferences and interests are stored, with the attributes of a content object (item), in order to recommend to the user new interesting items.

a) Heuristic-based
In this item profile is searched by using TF-IDF (Term Frequency-Inverse Document Frequency). User profile (weights of keywords for each user) and cosine similarity are calculated.

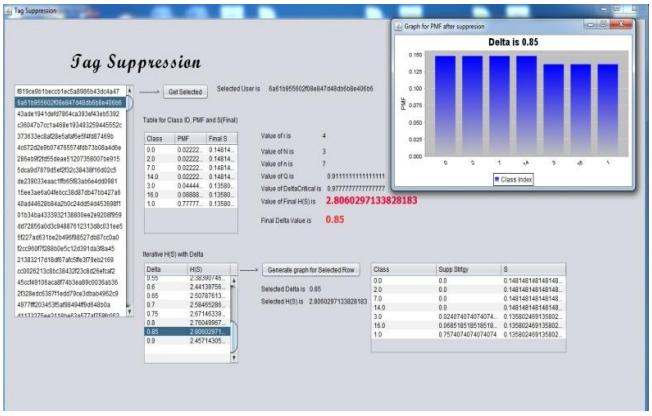
b) Model-based
In this Bayesian classifiers and Probability measures are used in content-based approach. Some of the model-based approaches provide rigorous rating estimation methods utilizing various statistical and machine learning techniques.

Limitations:
1. Limited Content Analysis (insufficient set of features).
2. Overspecialization (recommend too similar items).
3. New User Problem (not enough information to build user profile).

2.3.2 Collaborative based:

In this, the user is recommended items that people with similar tastes and preferences liked in the past. Collaborative recommender systems (or collaborative filtering systems) try to predict the utility of items for a particular user based on the items previously rated by other users. The utility u(c, s) of item s for user c is calculated based on the utilities u (cj , s) assigned to item s by those users cj € C who are similar to user c.

a) Heuristic-based
In this, correlation coefficient and cosine-based Similarity measurements are used. Heuristic based methods are also



5. Conclusion

In this paper, the privacy of end user is preserved using tag suppression. The enhanced collaborative tagging architecture is proposed that consists of a bookmarking service and two additional services built on it. The former service enables users to set policies both to block undesired web content and to denote resources of interest. The Tag suppression is a privacy preserving technology based on data perturbation. The combination of these two services allows broadening the functionality of collaborative tagging systems and, at the same time, providing users with a mechanism to preserve their privacy while tagging. Future scope is an extensive performance evaluation of collaborative tagging system architecture, showing its effectiveness in terms of privacy guarantees, data utility, and filtering capabilities for two key scenarios, for example, parental control and resource recommendation.

References

[1] Javier Parra-Arnau, Andrea Perego, Elena Ferrari, Jordi Forne´, and David Rebollo-Monedero," Privacy-Preserving Enhanced Collaborative Tagging", IEEE Transactions on Knowledge and Data Engineering, VOL. 26, NO. 1, January 2014.
[2] H. Polat and W. Du, SVD-Based Collaborative Filtering with Privacy, Proc. ACM Intl Symp. Applied Computing (SASC), pp. 791-795, 2005.
[3] P. Heymann, D. Ramage, and H. Garcia-Molina, Social Tag Prediction, Proc. 31st Ann. Intl ACM SIGIR Conf. Research Development Information Retrieval, pp. 531-538, 2008.
[4] E. Frias-Martinez, M. Cebrian, and A. Jaimes, A Study on the Granularity of User Modeling for Tag Prediction, Proc. IEEE/ WIC/ACM Intl Conf. Web Intelligence Intelligent Agent Technology (WIIAT), pp. 828-831, 2008.
[5] H. Kargupta, S. Datta, Q. Wang, and K. Sivakumar, On the Privacy Preserving Properties of Random Data Perturbation Techniques, Proc. IEEE Intl Conf. Data Mining (ICDM), pp. 99- 106, 2003.
[6] Z. Huang, W. Du, and B. Chen, Deriving Private Information from Randomized Data, Proc. ACM SIGMOD Intl Conf. Management Data, pp. 37-48, 2005.
[7] G. Adomavicius and A. Tuzhilin, Toward the Next Generation of Recommender Systems: A Survey of the State-of-the-Art and Possible Extensions, IEEE Trans. Knowledge Data Eng., vol. 17, no. 6, pp. 734- 749, June 2005.
[8] H. Polat and W. Du, Privacy-Preserving Collaborative Filtering Using Randomized Perturbation Techniques, Proc. SIAM Intl Conf. Data Mining (SDM), 2003.

Author Profile

Ms. Benazeer S. Inamdar received the Bachelor degree (B.E.) in Information Technology in 2013 from Vidyapratishthan college of Engineering, Pune University. Currently, She is pursuing Master's degree in Computer Engineering at Vidya Pratishthan's College of Engineering, BARAMATI, Pune University. Her current research interests include Data Mining and Information Security.

Prof. Mrs. Gyankamal J. Chhajed obtained Engineering degree (B.E.) in Computer Science and Engineering in the year 1991-95 from S.G.G.S.I.E.T, Nanded and Postgraduate degree (M.Tech.) in Computer Engineering from College of Engineering, Pune (COEP) in the year 2005-2007 both with distinction. She is approved Undergraduate and postgraduate teacher of Pune university and having about 17 yrs. of experience. Gyankamal authored a book and has 21 publications at the national, international level for Conferences and Journal. She is life member of the ISTE & International Association IACSIT. Her research interests include Steganography and Watermarking, Image processing, Data mining and Information Retrieval, Biomedical Engineering.