

# CSM: A Framework of Recommendation System Combining Network Structure and Messages

Bi-Ru Dai\* and Chang-Yi Lee

Department of Computer Science and Information Engineering,

National Taiwan University of Science and Technology,

Taipei, Taiwan

brdai@csie.ntust.edu.tw; M9515045@mail.ntust.edu.tw

*Received 14 March 2011; Revised 25 April 2011; Accepted 25 May 2011*

**Abstract.** The evolving of Internet technology allows people to communicate even they are far away from each other. More and more people share information and exchange their thoughts via the communities on the websites and become friends. A larger community usually attracts more users. Therefore, how to enhance the development of a social network on the website is an important issue for the survival of a website. In this paper, we combine the social network features into the recommendation system. In addition to messages between nodes, the features of network structure are taken into consideration. Experimental results show that the recommendation accuracy of our method is higher than the existing method which is based on the message ratio.

**Keywords:** Social network, recommendation system, network structure

## References

- [1] S. Milgram, "The Small World Problem," *Psychology Today*, Vol. 2, pp. 60-67, 1967.
- [2] S. Lo and C. Lin, "Wmr-a Graph-based Algorithm for Friend Recommendation," in *Proceedings of 2006 IEEE/WIC/ACM International Conference on Web Intelligence*, Hong Kong, China, pp. 121-128, 2006.
- [3] R. A. Hanneman, "Introduction to Social Network Methods," *University of California*, 2001.
- [4] D. Liben-Nowell and J. Kleinberg, "The Link-prediction Problem for Social Networks," *Journal of the American Society for Information Science and Technology*, Vol. 58, No. 7, pp. 1019-1031, 2007.
- [5] G. Jeh and J. Widom, "Simrank: A Measure of Structuralcontext Similarity," in *Proceedings of the Eighth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*, Edmonton, Canada, pp. 538-543, 2002.
- [6] L. Ngo and P. Haddawy, "Probabilistic Logic Programming and Bayesian Networks," in *Proceedings of the 1995 Asian Computing Science Conference on Algorithms, Concurrency and Knowledge (ACS'95)*, London, Vol. 1023, pp. 286-300, 1995.
- [7] R. van Meteren. and M. van Someren, "Using Content-based Filtering for Recommendation," in *Proceedings of ECML/MLNET Workshop on Machine Learning and the New Information Age*, Barcelona, Vol. 4203, pp. 47-56, 2000.
- [8] L. Adamic and E. Adar, "Friends and Neighbors on the Web," *Social Networks*, Vol. 25, No. 3, pp. 211-230, 2003.
- [9] J. Palau, M. Montaner, B. L'opez, J. L. de la Rosa, "Collaboration Analysis in Recommender Systems using Social Networks," in *Proceedings of the Cooperative Information Agents(CIA)*, Erfurt, Germany, pp. 137-151, 2004.
- [10] K.Y. Jung, D.H. Park, J.H. Lee, "Personalized Movie Recommender System through Hybrid 2-way Filtering with Extracted Information," in *Proceedings of Flexible Query Answering Systems(FQAS)*, Lyon, France, pp. 473-486, 2004.

---

\*Correspondence author

- [11] J. Karamon, Y. Matsuo, H. Yamamoto, M. Ishizuka, "Generating Social Network Features for Link-based Classification," in *Proceedings of the 11th European conference on Principles and Practice of Knowledge Discovery in Databases (PKDD2007)*, Warsaw, Poland , pp. 127-139, 2007.
- [12] W. Buntine and T. Niblett, "A Further Comparison of Splitting Rules for Decision-tree Induction," *Machine Learning*, Vol. 8, No. 1, pp. 75-85, 1992.
- [13] M. E. J. Newman, "The Structure and Function of Complex Networks," in *Proceedings of the Society for Industrial and Applied Mathematics(SIAM), Review* , Vol. 45, No. 2, pp. 167-256, 2003.
- [14] B. Sarwar, G. Karypis, J. Konstan, J. Riedl, "Analysis of Recommendation Algorithms for E-commerce," in *Proceedings of the 2nd ACM conference on Electronic commerce*, New York, NY, USA, pp. 158-167, 2000.
- [15] Analytic Technologies, [www.analytictech.com](http://www.analytictech.com)