



一种集成客户终身价值与协同过滤的推荐方法

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- 摘要
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摘要 提出一种加权RFM与协同过滤相结合的集成推荐方法,对由“Web数据挖掘”隐式收集的客户评价数据进行协同过滤处理,应用加权RFM对相似用户聚类结果加以改进,从而更有效地发现推荐规则,提高推荐质量。同时应用产品分类树(PT)对产品进行预处理,以减少计算空间的复杂度。实验评价结果表明该方法无论在推荐精度还是推荐相关性上都更为有效。

关键词: 推荐系统 协同过滤 客户终身价值 产品分类树

Abstract: In this paper, an integrated recommender method which employs weighted RFM and CF method is presented. Firstly, CF is applied to customer ratings on products, which are collected implicitly by Web usage mining approach, then weighted RFM is applied to improve similar user clustering to find recommend rule effectively and generate better quality recommendations. Product Taxonomy (PT) is also used to preprocess products according to their categories and to reduce dimensions of computational space. Evaluation results show that the proposed method is more effective both in the accuracy and relevance of recommendations.

Keywords: [Recommender system](#), [Collaborative filtering](#), [Customer lifetime value](#), [Product taxonomy](#)

收稿日期: 2011-10-19;**基金资助:**

本文系国家教育部青年基金项目“虚拟旅游与目的地形象修正:一致性与非一致性的演化机制分析”(项目编号:10YJC790182)、天津高等学校人文社会科学研究项目“电子商务个性化推荐系统瓶颈问题研究”(项目编号:20112125)和天津市教委项目“虚拟旅游技术感知与行为意向关系评价研究”的研究成果之一。

引用本文:

张慧颖, 薛福亮. 一种集成客户终身价值与协同过滤的推荐方法[J] 现代图书情报技术, 2012, V28(1): 46-52

Zhang Huiying, Xue Fuliang. An Integrated Recommender Method Based on CLV and Collaborative Filtering[J], 2012, V28(1): 46-52

链接本文:<http://www.infotech.ac.cn/CN/> 或 <http://www.infotech.ac.cn/CN/Y2012/V28/I1/46>

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[1] 张智雄, 马建霞, 文奕, 等. 中国科学院国家科学图书馆战略研究调研成果[R]. 2008(9): 98-100.

[2] Ontosaurus: Loom Web Browser[EB/OL]. [2011-11-20]. <http://www.isi.edu/isd/ontosaurus.html>.[3] Bechhofer S, Horrocks I, Goble C, et al. OilEd: A Reasonable Ontology Editor for the Semantic Web[C]. In: *Proceedings of KI2001, Joint German/Austrain Conference on Artificial Intelligence*. 2001: 396-408.[4] d'Aquin M, Bouthier C, Brachais S, et al. Knowledge Editing and Maintenance Tools for a Semantic Portal in Oncology[J]. *International Journal of Human-Computer Studies*, 2005, 62(5): 619-638. [5] 黄晓斌, 邱明辉. 日志分析法在数字图书馆可用性评价中的应用[J]. *情报理论与实践*, 2011, 34(3): 62-65.[6] Dixon B E. Enhancing the Informatics Evaluation Toolkit with Remote Usability Testing[C]. In: *Proceedings of AMIA 2009 Annual Symposium*. 2009: 147-151.

[7] Wei C, Barrick J, Cuddihy E. Conducting Usability Research Through the Internet: Testing Users via the WWW[OL]. [2011-12-02].

- [8] Bolt N. Guide to Remote Usability Testing[EB/OL]. [2011-12-02]. <http://okcancel.com/archives/article/2006/07/guide-to-remote-usability-testing.html>.
- [9] Fidas C, Katsanos C, Papachristos E, et al. Remote Usability Evaluation Methods and Tools: A Survey[C]. In: *Proceedings of PCI 2007, Patras, Greece*. 2007: 151-163.
- [10] 田晓迪. Ontolingua Server: 全球第一个本体服务器[J]. *现代图书情报技术*, 2006(2): 21-25.
- [11] Thoméré J, Barker K, Chaudhri V, et al. A Web-based Ontology Browsing and Editing System[C]. In: *Proceedings of National Conference on Artificial Intelligence*. 2002: 927-934.
- [12] Xiang Z S, Lin Y, He Y Q. OntoFox and Its Application in the Development of the Brucellosis Ontology[C]. In: *Proceedings of the International Conference on Biomedical Ontology*, New York, USA. 2011: 304-306.
- [13] Xiang Z S, Courtot M, Brinkman R R, et al. OntoFox: Web-based Support for Ontology Reuse[J]. *BMC Research Notes*, 2010, 3: 175-186.
- [14] Liebig T, Noppens O. OntoTrack: A Semantic Approach for Ontology Authoring[J]. *Journal of Web Semantics*, 2005, 3(2): 116-131. 
- [15] Tudorache T, Noy N F, Tu S, et al. Supporting Collaborative Ontology Development in Protégé[C]. In: *Proceedings of the 7th International Semantic Web Conference (ISWC 2008)*, Karlsruhe, Germany. 2008.
- [16] WebOnto[EB/OL]. [2011-11-20]. <http://projects.kmi.open.ac.uk/webonto/>.
- [17] Islam N, Siddiqui M S, Shaikh Z A. TODE: A Dot Net Based Tool for Ontology Development and Editing[C]. In: *Proceedings of the 2nd International Conference on IEEE Computer Engineering and Technology (IC CET)*. 2010: 229-233.
- [18] Tudorache T, Vendetti J, Noy N F. Web-Protégé: A Lightweight OWL Ontology Editor for the Web[OL]. [2011-11-20]. http://bmir.stanford.edu/file_asset/index.php/1712/BMIR-2008-1467.pdf.
- [19] Domingue J, Motta E, Garcia O C. Knowledge Modelling in WebOnto and OCML a User Guide[OL]. [2011-11-20]. http://projects.kmi.open.ac.uk/webonto/user_guide.2.4.pdf.
- [20] McBride B. Jena: A Semantic Web Toolkit[J]. *IEEE Internet Computing*, 2002, 6(6): 55-59. 
- [21] 唐歆瑜, 乐文忠, 李志成. 基于知网语义相似度计算的特征降维方法研究[J]. *科学技术与工程*, 2006, 6(21): 3442-3446.
- [22] 董振东, 董强. 知网[DB/OL]. [2011-02-10]. <http://www.keenage.com>.
- [23] 许海玲, 吴潇, 李晓东. 互联网推荐系统比较研究[J]. *软件学报*, 2009, 20(2): 350-362.
- [24] Liu D R, Shih Y Y. Hybrid Approaches to Product Recommendation Based on Customer Lifetime Value and Purchase Preferences[J]. *Journal of Systems and Software*, 2005, 77(2): 181-191. 
- [25] Liu D R, Shih Y Y. Integrating AHP and Data Mining for Product Recommendation Based on Customer Lifetime Value[J]. *Information & Management*, 2005, 42(3): 387-400. Information target="_blank"> 
- [26] 李聪. 电子商务推荐系统中协同过滤瓶颈问题研究[D]. 合肥: 合肥工业大学, 2009.
- [27] Sarwar B, Karypis G, Konstan J, et al. Item-based Collaborative Filtering Recommendation Algorithms[C]. In: *Proceedings of the 10th International World Wide Web Conference*. New York: ACM, 2001.
- [28] Kim K J, Ahn H. A Recommender System Using GA K-means Clustering in an Online Shopping Market[J]. *Expert Systems with Applications*, 2008, 34(2): 1200-1209. 
- [29] Jalali M, Mustapha N. OPWUMP: An Architecture for Online Predicting in WUM-based Personalization System[J]. *Communications in Computer and Information Science*, 2009, 6: 1001-1120.
- [30] Puntheeranurak S, Tsuji H. An Improved Hybrid Recommender System Using Multi-based Clustering Method[J]. *IEEJ Transactions on Electronics, Information and Systems*, 2009, 129(1): 125-132. 
- [31] Albadvi A, Shahbazi M. Integrating Rating-based Collaborative Filtering with Customer Lifetime Value: New Product Recommendation Technique[J]. *Intelligent Data Analysis*, 2010, 14(1): 143-155.
- [32] Devi M K, Venkatesh P. Kernel Based Collaborative Recommender System for E-purchasing[J]. *Academy of Sciences*, 2010, 35(5): 513-524.
- [33] Cho Y H, Kim J K. Application of Web Usage Mining and Product Taxonomy to Collaborative Recommendations in E-commerce[J]. *Expert Systems with Applications*, 2004, 26(2): 233-246. 
- [34] Hung L P. A Personalized Recommendation System Based on Product Taxonomy for One-to-One Marketing Online[J]. *Expert Systems with Applications*, 2005, 29(2): 383-392. 
- [35] 陈思义. VMware在图书馆数据中心管理中的应用[J]. *图书情报论坛*, 2010, 30(1): 56-58.
- [36] 蔡敏. 三种常用参考文献管理软件比较研究[J]. *现代情报*, 2007, 32(2): 33-36, 50.
- [37] NoteExpress [EB/OL]. [2011-10-11]. <http://www.reflib.org>.
- [38] DSpace System Documentation: System Administration [EB/OL]. [2011-03-02]. http://www.dspace.org/1_6_1Documentation/ch08.html.
- [39] 许海玲, 吴潇, 李晓东. 互联网推荐系统比较研究[J]. *软件学报*, 2009, 20(2): 350-362.

- [40] Liu D R, Shih Y Y. Hybrid Approaches to Product Recommendation Based on Customer Lifetime Value and Purchase Preferences[J]. *Journal of Systems and Software*,2005, 77(2): 181-191. 
- [41] Liu D R, Shih Y Y. Integrating AHP and Data Mining for Product Recommendation Based on Customer Lifetime Value[J]. *Information & Management*,2005, 42(3): 387-400. 
- [42] 李聪. 电子商务推荐系统中协同过滤瓶颈问题研究[D]. 合肥: 合肥工业大学, 2009.
- [43] Sarwar B, Karypis G, Konstan J, et al. Item-based Collaborative Filtering Recommendation Algorithms[C]. In: *Proceedings of the 10th International World Wide Web Conference*. New York: ACM, 2001.
- [44] Kim K J, Ahn H. A Recommender System Using GA K-means Clustering in an Online Shopping Market[J]. *Expert Systems with Applications*,2008, 34(2): 1200-1209. 
- [45] Jalali M, Mustapha N. OPWUMP: An Architecture for Online Predicting in WUM-based Personalization System[J]. *Communications in Computer and Information Science*,2009, 6: 1001-1120.
- [46] Puntheeranurak S, Tsuji H. An Improved Hybrid Recommender System Using Multi-based Clustering Method[J]. *IEEJ Transactions on Electronics, Information and Systems*,2009, 129(1): 125-132. 
- [47] Albadvi A, Shahbazi M. Integrating Rating-based Collaborative Filtering with Customer Lifetime Value: New Product Recommendation Technique[J]. *Intelligent Data Analysis*,2010, 14(1): 143-155.
- [48] Devi M K, Venkatesh P. Kernel Based Collaborative Recommender System for E-purchasing[J]. *Academy of Sciences*,2010, 35(5): 513-524.
- [49] Cho Y H, Kim J K. Application of Web Usage Mining and Product Taxonomy to Collaborative Recommendations in E-commerce[J]. *Expert Systems with Applications*,2004, 26(2): 233-246. 
- [50] Hung L P. A Personalized Recommendation System Based on Product Taxonomy for One-to-One Marketing Online[J]. *Expert Systems with Applications*,2005, 29(2): 383-392. 
- [1] 边鹏, 赵妍, 苏玉召. 一种改进的K-means算法最佳聚类数确定方法[J]. *现代图书情报技术*, 2011, 27(9): 34-40
- [2] 赵妍, 苏玉召, 管涛. 一种提高过滤用户偏好精度的数据采集方法[J]. *现代图书情报技术*, 2011, (11): 31-37
- [3] 董坤. 基于协同过滤算法的高校图书馆图书推荐系统研究[J]. *现代图书情报技术*, 2011, (11): 44-47
- [4] 李聪. 电子商务协同过滤可扩展性研究综述[J]. *现代图书情报技术*, 2010, 26(11): 37-41
- [5] 金亚亚, 牟援朝. 基于改进信任度的协同过滤推荐算法[J]. *现代图书情报技术*, 2010, 26(10): 49-53
- [6] 李聪. ECRec: 基于协同过滤的电子商务个性化推荐管理*[J]. *现代图书情报技术*, 2009, (10): 34-39
- [7] 王虹予, 赵英, 党跃武. 基于混合算法的电子商务推荐系统设计研究[J]. *现代图书情报技术*, 2009, 3(1): 80-85
- [8] 马丽. 基于组合加权评分的Item-based协同过滤算法[J]. *现代图书情报技术*, 2008, 24(11): 60-64
- [9] 马丽. 基于群体兴趣偏向度的数字图书馆协同过滤技术研究*[J]. *现代图书情报技术*, 2007, 2(10): 19-22
- [10] 陶剑文. 基于多Agent的智能推荐算法设计*[J]. *现代图书情报技术*, 2006, 1(12): 49-53
- [11] 马文峰, 高凤荣, 王珊. 论数字图书馆个性化信息推荐系统*[J]. *现代图书情报技术*, 2003, 19(2): 16-18