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Extended Access Control and Recommendation Methods for Enterprise Knowledge Management System

Haoyi Wang[a], Xiaohui Guo[b], Yushun Fan[a,*], Jing Bi[a]

[a]*Department of Automation, Tsinghua University, Beijing 100084, China*
[b]*China Tobacco Guangxi Industrial Co. Ltd, Nanning 530001, China*

Abstract

Knowledge Management (KM) is one of the hotspots for research in the past decade. In most cases, the number of users in a Knowledge Management System (KMS) is very large, and they are from varied departments, even other companies. In this paper, some defects when existing methods about access control and recommendation are deployed in KMS are analyzed to show that these widely-used approaches need to be extended. To overcome the deficiencies of previous work, this paper proposes an extended Role-Based Access Control (RBAC) method and a hybrid recommendation approach for Knowledge Management System. Also, a real-life system is presented to verify the proposed methodology.

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Keywords: Knowledge Management; Access Control; Hybrid Recommendation; Collaborative Filtering

1. Introduction

With the fast change and high pace of modern life, today's corporations are facing fierce market competition. To deal with the fast-changing need of the market and the complex business environment, people came to realize the value of knowledge. Corporations tend to pay more and more attention on the subject of

* Corresponding author. Tel.: + 86-10-627896500 ; fax: +86-10-627896500
E-mail address: fanyus@tsinghua.edu.cn

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knowledge, thus shifting the business strategy from products-based to knowledge-based. Quintas et al. [1] stated Knowledge Management (KM) is a process of managing knowledge, which aim to manage existing and acquired knowledge assents to meet needs for now and develop opportunities in the future. After that, KM and Knowledge Management System (KMS) has been a focus in both academic and industrial fields.

When developing a Knowledge Management System recently, we find there are still some interesting topics about KMS which need to cover. To begin with, access control gives authority to access to certain restricted areas or resources. Compare with most IT systems, KMS tends to address on information sharing rather than authority limitation. As a result, traditional access control method such as Role-Based Access Control (RBAC) is probably not suitable for the situation of the access control for KMS. In addition, when recommendation method is used, KMS may provide more information to the algorithm compared with e-commerce or social network service. In order to expose users more potentially useful information, a hybrid recommendation method in knowledge recommendation based on collaborative filtering is proposed.

The rest of the paper is organized as follows. A brief review of study on access control and recommendation as well will be given in Section 2. Then their deficiencies are analyzed. Section 3 presents an introduction of the structure of the New Generation Knowledge Management System we are current developing. In section 4, the extended RBAC accessed control method is established. Section 5 proposes the hybrid knowledge recommendation method. Section 6 presents the conclusion and future work.

2. Related researches

RBAC has been very successful in both research and applications. Ferraiolo et al. [2] were the first to propose the model of RBAC, and the idea is users are connected with roles, and that it's roles rather than users that are connected with privileges. Sandhu et al. [3] proposed the model of RBAC96, which includes 4 different models, i.e., core RBAC (also known as RBAC0), hierarchical RBAC (RBAC1), constraint RBAC (RBAC2), and symmetric RBAC (RBAC3).

After that, lots of research works have been proposed to extend RBAC model. Luning Xia et al. [4] proposed the N-RBAC model to simplify the complexity of the role hierarchy structure by the use of a namespace. Lilin Ma et al. [5] established a structural model with the thought of layered management, which consists of 3 different aspects, i.e. access permission card, functional operation control and data access control. Qi Li et al. [6] proposed a novel RBAC model for decentralized and distributed systems, which can be applied to group-based applications with dynamic assignments.

Despite its simplicity and effectiveness, traditional RBAC may be not suitable for a knowledge management system. The access control of IT system should make a balance between authority limitation and information sharing. In most application situations, users tend to be strictly limited to certain authorities. In Knowledge Management System, however, in order to encourage knowledge utilization and innovation, the sharing of information should come first. In addition, tradition RBAC only defines a relatively simple relationship among different users with the concept of role. However, this may not be enough for current situation in KMS, where there may be dynamic virtual organizations as well as traditional departments.

Recommendation system has been widely investigated and adopted in the past decades. The approaches which recommendation systems use include data mining approaches, content based methods and collaborative filtering, etc. Among these approaches, collaborative filtering is the most popular one for the past few years and is widely used in various fields such as e-commerce, film community, music community and social networks due to its simplicity and high prediction accuracy. It can be divided into memory-based and model-based. [7] With this approach, the system can infer users' interests with pervious data (grades in most cases) and use this information to help users to find suitable information or item. The two general classes of collaborative filtering approaches which are commonly used are user-based methods and item-based methods.