Recommender Systems: Issues, Challenges, and Research Opportunities

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Abstract A recommender system is an Information Retrieval technology that improves access and proactively recommends relevant items to users by considering the users’ explicitly mentioned preferences and objective behaviors. A recommender system is one of the major techniques that handle information overload problem of Information Retrieval by suggesting users with appropriate and relevant items. Today, several recommender systems have been developed for different domains however, these are not precise enough to fulfil the information needs of users. Therefore, it is necessary to build high quality recommender systems. In designing such recommenders, designers face several issues and challenges that need proper attention. This paper investigates and reports the current trends, issues, challenges, and research opportunities in developing high-quality recommender systems. If properly followed, these issues and challenges will introduce new research avenues and the goal towards fine-tuned and high-quality recommender systems can be achieved.

Keywords Recommender system · Issues · Challenges · Content-based filtering · Collaborative filtering · Hybrid filtering

1 Introduction

The World Wide Web or simply the Web has brought numerous changes in the way we live and communicate with others. Today, we rely on the Web and its related technologies like web search engines that search and retrieve relevant information on almost any aspect of life. However, this change comes with the cost of information and cognitive overload on the user who is searching for relevant and reliable information on the Web. To cope with these issues, among other solutions,
a recommender system works as a helper in finding relevant and related items by making relevant suggestions to the users. These systems navigate the Web to come up with relevant suggestions for users based either on their explicitly mentioned preferences or objective behaviors [1]. Recommender systems are used in various domains including products, videos, images, articles, news, and books. In spite of numerous research and development advances, interest in this area is still broader because of the growing user demands. It is therefore necessary to build high-quality recommender systems for providing fine-tuned recommendations to users in a wide range of daily-life applications. In this regard, researchers and industry practitioners need to come forward and work on some of the prominent issues and challenges in the area of recommender systems, which are being presented in this research paper. Therefore, the objectives of the paper can be summarized as: a) to present the general concepts and techniques associated with different types of recommender systems so that novice researchers can get an idea of how a recommender system approaches relevant items in relation to the item being currently presented. b) To identify and present some of the prominent issues and challenges in the design and development of a fine-tuned recommender system. c) To present solutions, techniques, and research guidelines that might help in coping with some of these issues and in designing a fine-tuned recommender system.

Rest of the paper is organized as Section 2 presents general concepts and techniques related to recommender systems, Section 3 presents issues and challenges that recommender systems face, Section 4 presents some solutions and techniques to cope with these issues, and finally, Section 5 concludes our discussion.

2 General Concepts and Techniques

Recommender system recommends and suggest items to user by considering their objective behaviors and preferences [1]. A general model of a typical recommendation process is shown in Figure 1 highlighting the vital role of users and items in recommendation process.

![Fig. 1 General Model of Recommender Process](image-url)