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A review of product based recommender systems used in online shopping platforms

W. P. A. Boteju[*]

Software Engineering Teaching Unit, Faculty of Science, University of Kelaniya, Sri Lanka
pubudub_2019@kln.ac.lk*

Online shopping platforms have drastically changed customer behaviour. Customers can make their choices far easier with the help of recommender systems which are an integral part of modern online shopping platforms. As a result of rapid growth in the number of products in the market and due to the complex lifestyle of people, choosing the right product, takes extra time and effort. Therefore, online shopping platforms provide users with recommender systems to help choose shopping items. A recommender system is a software tool used to recommend items of interest to users. Some recommender systems provide personalized recommendations by analysing user persona, personal interests, and requirements. In other words, there are personalized and non-personalized recommendation systems, though personalized recommender systems are becoming increasingly popular and the norm. For example, Netflix movie recommender systems, Amazon product recommender system are among many other generic book and music recommendation systems out there. In this study, we review some of the existing personalized recommender systems and analyse its strengths, weaknesses, and vulnerabilities. The basic components of a recommendation system are Items, Users, and Transactions. Apart from that, recommender systems use filtering methods such as collaborative filtering, knowledge-based filtering, constraint-based, content-based and community-based systems. The study investigated around 100 related research papers. There, we found 43 research studies based on a collaborative filtering approach, 31 based on knowledge-based, 8 studies using both methods as a hybrid approach, with the remaining 26 papers using other filtering methods. The acceptance rate of the personalized recommendations made by collaborative filtering is higher because recommendations are made based on user profile similarity and their purchasing behaviour. For example, 60% of movies are chosen by users based on Netflix's recommendations. This shows that collaborative filtering is effective for personalized recommendations. In contrast, the knowledge-based filtering method uses the description of the product and its properties/features with the profile of the user's preferences. For example, the Pandora music streaming service uses knowledge-based filtering for song recommendation and needs very little information to make similar recommendations. However, there are limitations in collaborative filtering and knowledge-based filtering methods. For example, key limitations of collaborative filtering are 'cold start problem', 'sparsity', and 'scalability'. Knowledge-based filtering shows limitations such as 'overspecialization' and 'domain-dependency'. Studies analysing hybrid recommendation methods have indicated better performance, in making recommendations. Further, we investigated some of the privacy issues and vulnerabilities in recommender systems. To our knowledge, only a handful of studies have investigated vulnerabilities of recommender systems. For example, Cyber-attacks can make significant damages to existing recommender systems. One study has simulated 6 inference attacks per user with 90% accuracy. Thus, security and privacy issues of existing recommender systems need to be explored and investigated. The review paper provides some valuable insights about the usability of existing recommender systems and their vulnerabilities. Future work will specifically focus on security issues of recommender systems and investigating novel systems such as GPT-3 empowered recommender systems.

Keywords: Collaborative Filtering, Online Shopping, Recommender Systems, Vulnerabilities