

**Exploring Hierarchical Structures for Recommender Systems**

**Abstract:**

Items in real-world recommender systems exhibit certain hierarchical structures. Similarly, user preferences also present hierarchical structures. Recent studies show that incorporating the hierarchy of items or user preferences can improve the performance of recommender systems. However, hierarchical structures are often not explicitly available, especially those of user preferences. Thus, there’s a gap between the importance of hierarchies and their availability. In this paper, we investigate the problem of exploring the implicit hierarchical structures for recommender systems when they are not explicitly available. We propose a novel recommendation framework to bridge the gap, which enables us to explore the implicit hierarchies of users and items simultaneously. We then extend the framework to integrate explicit hierarchies when they are available, which gives a unified framework for both explicit and implicit hierarchical structures. Experimental results on real-world datasets demonstrate the effectiveness of the proposed framework by incorporating implicit and explicit structures.

**Existing System:**

Items in the same genre or sub-genre of the hierarchical structure share some properties and thus are likely to receive similar ratings, which has been demonstrated helpful to improve the performance of recommender systems. Studied hierarchical structures of user profiles for recommender systems. Exploited the intrinsic hierarchical structure of the itemspace to tackle the data sparsity problem. Recent study also suggests that relationship among sibling nodes of hierarchies could also be useful.

However, the aforementioned methods assume that hierarchical structures are explicitly available while in realworld, explicit hierarchical structures are often unavailable, especially those of users preferences. We call the hierarchical structure that cannot be explicitly obtained as implicit hierarchical structures, meaning that we know the existence of the hierarchical structures but we don’t have the explicit structure in hand. One example is hierarchical structures of user preferences, whose preference hierarchy is difficult to obtain. None of the aforementioned paper studies implicit hierarchical structures; while implicit hierarchical structures have potential to improve recommendation performance.

**Proposed System:**

We propose a novel framework which can incorporate implicit hierarchical structures of users and items for recommendation. We further extend the framework to capture explicit hierarchical structures when the structures are explicitly available, which gives us a unified and flexible recommendation framework that can exploit both implicit and explicit hierarchical structures. A close structure to hierarchy is ontology, which is very precise and can improve the performance of recommender systems. However, it is hard/slow to use; while hierarchies are easier to be adopted for recommender systems.