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Network-based recommendations in online commercial systems

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The rapid development of the Internet brings us an overwhelming amount of information. To find a relevant item, online users nowadays need to search from a vast number of items. The recommender system (RS) is one of the most effective ways to solve this information overload problem. In this thesis, we studied the recommender system from a physics perspective. This thesis starts with a brief overview of recommender systems. We also discussed the basic recommendation models. Since we focused on network-based recommendation, we presented in chapter 2 a general review of research on complex networks, including characteristics, topology, and evolving models. The next chapter introduced some recent research related to network-based information filtering. We proposed an evaluation method that uses a triple-folder data division framework to avoid the over-fitting issue, based on which we reexamined eighteen network-based recommendation methods using three representative datasets. Our results not only gave a more objective overview of the performance of the existing recommendation algorithms but also opened a new door to justify the effectiveness of recommendation algorithms with different numbers of parameters. In chapter 4, we introduced a motif-based recommendation method, which can precisely find the potential leaders for users in online news propagation systems such as Twitter, which has performed well in both recommendation accuracy and diversity. In chapter 5, we introduced 3 methods that can further enhance recommender systems. We conclude with an outlook and some final remarks in the last chapter.

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