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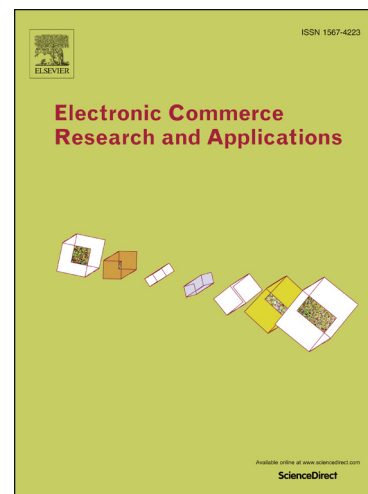
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DeRec: A Data-driven Approach to Accurate Recommendation with Deep Learning and Weighted Loss Function

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Abstract. Traditional recommendation techniques present various methods to measure similarity of users and items to characterize the preferences. However, different similarity measure focus on different aspects of user-item rating list and, this may cause incomplete information leveraged by similarity measure in users' preference characterization leading to low accuracy on recommendation. This paper proposes a deep learning approach, i.e. DeRec, to learn the latent item association from user-item rating list directly for predictive recommendation without employing a similarity measure. The loss of each item is weighted by its historical probability rated by users' past preferences, in which a deep learning neural network is adopted to predict a user's potential interest on the items using the user's historical items as input. We also develop two strategies to produce input vectors and output vectors as sampling by random (Ran-Strategy) and sampling by distribution (Pro-Strategy) to train the deep neural network with considering the sequential characteristics of items rated by users. Experiments on the App dataset and the MovieLens dataset demonstrate that the proposed DeRec approach outperforms traditional collaborative filtering methods in recommending Apps and movies in both MAP and MRR measures.

Keywords: DeRec; Data-Driven Approach; Deep Neural Network; Recommender System; Weighted Loss Function.

1 Introduction

Information overload problem is ubiquitous in online E-commerce systems. For instance, in online shopping platforms such as Taobao.com and Amazon.com, a huge number of products and services are available for purchase. Consequently, it is a time-consuming burden for online shoppers to retrieve satisfactory products and services from hundreds of thousands of options. Online App stores typically consist of thou-

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