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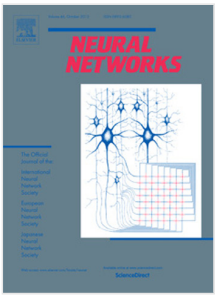

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Representation Learning via Dual-Autoencoder for Recommendation

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Abstract. Recommendation has provoked vast amount of attention and research in recent decades. Most previous works employ matrix factorization techniques to learn the latent factors of users and items. And many subsequent works consider external information, e.g., social relationships of users and items' attributions, to improve the recommendation performance under the matrix factorization framework. However, matrix factorization methods may not make full use of the limited information from rating or check-in matrices, and achieve unsatisfying results. Recently, deep learning has proven able to learn good representation in natural language processing, image classification, and so on. Along this line, we propose a new representation learning framework called *Re*commendation via *D*ual-*A*utoencoder (ReDa). In this framework, we simultaneously learn the new hidden representations of users and items using autoencoders, and minimize the deviations of training data by the learnt representations of users and items. Based on this framework, we develop a gradient descent method to learn hidden representations. Extensive experiments conducted on several real-world data sets demonstrate the effectiveness of our proposed method compared with state-of-the-art matrix factorization based methods.

Keywords: Matrix Factorization, Dual-Autoencoder, Recommendation, Representation Learning.

1 Introduction

In order to tackle the information overload problem, recommender systems are proposed to help users to find objects of interest by utilizing the user-item interaction information and/or content information associated with users and items. Recommender systems have attracted much attention from multiple disciplines, and many techniques have been proposed to build recommender systems [AT05,KB11]. It is also widely used in many E-commerce companies, such as for product sale on Amazon and movie rentals from Netflix [SJ+03].