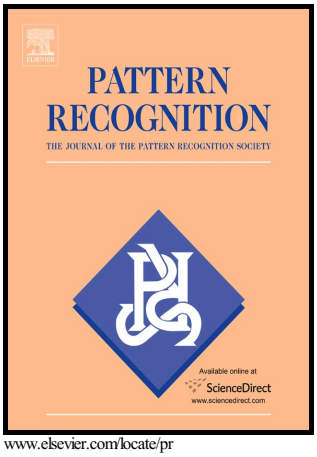

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Computation of Heterogeneous Object Co-embeddings from Relational Measurements

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Abstract

Dimensionality reduction and data embedding methods generate low dimensional representations of a single type of homogeneous data objects. In this work, we examine the problem of generating co-embeddings or pattern representations from two different types of objects within a joint common space of controlled dimensionality, where the only available information is assumed to be a set of pairwise relations or similarities between instances of the two groups. We propose a new method that models the embedding of each object type symmetrically to the other type, subject to flexible scale constraints and weighting parameters. The embedding generation relies on an efficient optimization despatched using matrix decomposition, that is also extended to support multidimensional co-embeddings. We also propose a scheme of heuristically reducing the parameters of the model, and a simple way of measuring the conformity between the original object relations and the ones re-estimated from the co-embeddings, in order to achieve model selection by identifying the optimal model parameters with a simple search procedure. The capabilities of the proposed method are demonstrated with multiple synthetic and real-world datasets from the text mining domain. The experimental results and comparative analyses indicate that the proposed algorithm outperforms existing methods for co-embedding generation.

Keywords: co-embedding generation, relational information, heterogeneous object analysis, joint space projection.

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