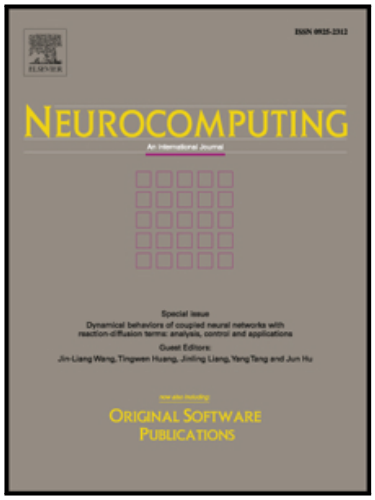
Communicated by Dr Yiming Ying

Accepted Manuscript



Graph-based Discriminative Nonnegative Matrix Factorization with label information

Huirong Li, Jiangshe Zhang, Guang Shi, Junmin Liu

PII: S0925-2312(17)30843-3
DOI: 10.1016/j.neucom.2017.04.067
Reference: NEUCOM 18440

To appear in: *Neurocomputing*

Received date: 16 December 2016
Revised date: 17 March 2017
Accepted date: 27 April 2017

Please cite this article as: Huirong Li, Jiangshe Zhang, Guang Shi, Junmin Liu, Graph-based Discriminative Nonnegative Matrix Factorization with label information, *Neurocomputing* (2017), doi: 10.1016/j.neucom.2017.04.067

Graph-based Discriminative Nonnegative Matrix Factorization with label information

Huirong Li[a,b], Jiangshe Zhang[a,], Guang Shi[a], Junmin Liu[a]

[a]*School of Mathematics and Statistics, Xi'an Jiaotong University, Xi'an 710049, China*
[b]*School of Mathematics and Computer Application, Shangluo University, Shangluo 726000, China*

Abstract

Nonnegative matrix factorization (NMF) is a very effective technique for image representation, which has been widely applied in computer vision and pattern recognition. This is because it can capture the underlying intrinsic structure of data by using its parts-based representations in the low dimensional space. However, NMF is an unsupervised learning method without utilizing both the available label information and the manifold geometrical structure of data space. In this paper, we propose a new semi-supervised graph-based discriminative nonnegative matrix factorization (GDNMF) method, which incorporates the local manifold regularization and the label information of the data into the NMF. GDNMF not only encodes the local geometrical structure of the data space by constructing K-nearest graph, but also takes into account the available label information. Thus, the discriminative abilities of clustering representations are greatly enhanced. Clustering experiments on five popular databases verify the effectiveness of our proposed GDNMF compared to the other state-of-the-art methods.

Keywords: Nonnegative matrix factorization, Semi-supervised learning, Label information, Image representation

1. Introduction

In many real-world applications such as machine learning and pattern recognition, we are often confronted with high dimensional data. To handle these data