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Abstract

Subspace analysis or dimensionality reduction techniques are becoming very popular for many computer vision tasks such as image recognition. Most of such techniques deal with optimizing a cost function based on some criteria imposed on either projections of data or on the basis of projection space. NPP and ONPP are such linear methods that preserves local linear relationship within neighborhood, with two different constraints, normalized projection and orthogonal basis of subspace respectively. This article proposes a method ONPPn that finds a subspace which satisfies both the constraints namely, normalization and orthogonality. The article also provides two-dimensional variant of ONPPn. Experiments shows that ONPPn out performs its NPP and ONPP versions in image recognition tasks, where as 2D-ONPPn outperforms 2D-ONPP by huge margin but does not perform as good as 2D-NPP. 2D-NPP as well as 2D-ONPP are not suitable for reconstruction task, proposed method 2D-ONPPn over comes drawbacks of existing methods and is best suited for image reconstruction, too.

Keywords: Dimensionality Reduction, Orthogonality, Normalization, Neighborhood Preserving Projection

1. INTRODUCTION

Recognition or identification is widely used application in the field of machine learning, where a test data is to be labeled based on the samples present in the training data set. In last few decades there has been a huge increase in image data, increasing need of image recognition. Many methods have been developed for image recognition task including appearance-based methods which are widely studied in last decade. While working with the images in these methods, one is often confronted with *curse of*

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