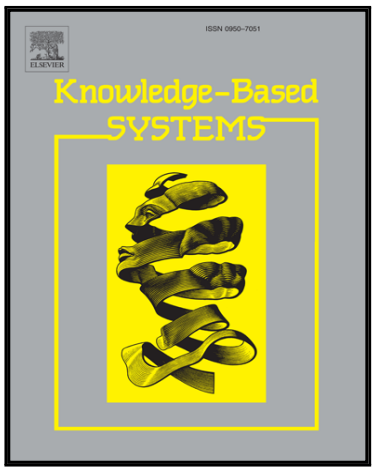

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A new Method for Image Super-Resolution with Multi-channel Constraints

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Abstract

Most recent learning-based image super-resolution (SR) methods have attracted much interest. This paper proposes a new SR method with multi-channel constraints, which integrates clustering, collaborative representation, and progressive multi-layer mapping relationships to reconstruct high-resolution (HR) color image. In order to collect chrominance information, the training patches from RGB channels are clustered into different subspaces, and a number of neighbor subsets are grouped. Then the optimization problem with color channel constraints is solved by using the classical gradient technique. Finally, a continuous reconstructive structure, which learns multi-layer mapping relationships between intermediate output and corresponding original HR image, is designed to obtain the desired HR image. Extensive experiments on several commonly used image SR testing datasets indicate that the proposed method achieves state-of-the-art image SR results.

Keywords: Super-resolution; Clustering; Collaborative representation; Multi-channel constraints; Learning

1. Introduction

It is well-known that high-resolution (HR) image can offer more details than its counterpart low-resolution (LR) image. These details should be critical in various fields, such as remote sensing [19, 20, 33], medical diagnostic [10], intelligent surveillance [34, 43], and so on. However, the images are always degraded or ropy in reality, which means that these critical information may be smeary or obliterated. In order to reconstruct them, many super-resolution (SR) methods have been developed [39, 52]. Roughly, these existing SR methods can be divided into three categories: interpolation-based restorations, statistical approaches, and example-based methods.

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