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## A Novel Face Recognition Algorithm via Weighted Kernel Sparse Representation

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#### Abstract

Face recognition with Kernel Sparse Representation based Classification (KSRC) has shown its great classification performance, and as an extension of Sparse Representation based Classifier (SRC), KSRC resolved the problem that nonlinear distribution of face images. However, the locality structure of image data contains more discriminative information which is essential for classification does not be considered by KSRC. This paper proposes a novel face recognition algorithm called Weighted Kernel Sparse Representation based Classification (WKSRC). Firstly, each face image is mapped into kernel feature space with a kernel function, and dimensionality reduction method is applied to the feature space. And then, the matrix which denotes the similarity between the testing and training samples is obtained by Multiscale Retinex (MSR), which could reduce the influence of the illumination variations. Finally, the sparse coefficients for the testing sample are solved by optimization method and the classification result is obtained by minimizing the error between the original and reconstructed samples. The experiment results prove that the proposed WKSRC significantly improves the performance of face recognition compared with the existing algorithms. Moreover, the robustness to various illuminations and occlusions is also demonstrated, which proves the universality of our proposal.

Keywords: Face recognition, Multiscale Retinex, Sparse Representation, locality information

#### 1. Introduction

With the development of the modern science and technology, the requirements of the fast and effective automated authentication and identification are increasing rapidly. Among them, face recognition received significant attention in security areas and other applications, especially in information security domain [1] - [4]. As an important mean of identification in biometrics, face recognition has attracted great attentions in last decades and numerous algorithms have been proposed. Although most of them have made tremendous progress in variety applications and research fields, they are still facing great challenges such as variations of illumination, pose, expression and occlusion.

Face detection and face alignment have gradually developed into another research

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