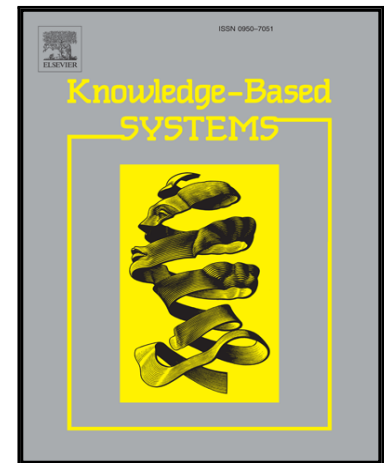


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“Like Charges Repulsion and Opposite Charges Attraction” Law based Multilinear Subspace Analysis for Face Recognition

Fei Wu¹, Xiao-Yuan Jing^{1,2}, Songsong Wu¹, and Guangwei Gao³

¹*College of Automation, Nanjing University of Posts and Telecommunications, Nanjing, 210046, China*

²*School of Computer, Wuhan University, Wuhan, 430072, China*

³*Institute of Advanced Technology, Nanjing University of Posts and Telecommunications, Nanjing, 210046, China*

The Corresponding Authors: {wufei_8888, jingxy_2000}@126.com

Abstract

Multiple image variations occur in natural face images, such as the changes of pose, illumination, occlusion and expression. For non-specific variations based face recognition, learning effective features is an important research topic. Subspace learning is a widely used face recognition technique; however, numerous subspace analysis methods do not fully utilize the prior information of facial variations. Tensor-based multilinear subspace analysis methods can take advantage of the prior information, but they need to be further improved. With respect to a single facial variation, we observe that the image samples belonging to the same variation-state but different classes tend to cluster together, whereas those belonging to different variation-states but the same class tend to remain separate. This is adverse to classification. In this paper, motivated by the idea of charge law, “like charges repulsion and opposite charges attraction”, in which like and opposite charges are regarded as same and different variation-states, respectively, we propose a non-specific variations based discriminant analysis (NVDA) criterion. It searches for an optimal discriminant subspace in which samples belonging to same variation-state but different classes are separable, whereas those belonging to different variation-states but same class cluster together. We then propose a novel face recognition approach called non-specific variations based multi-subspace analysis (NVMSA), which serially utilizes NVDA criterion to learn

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