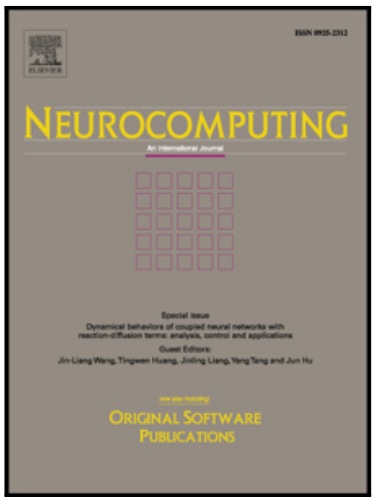

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Nonconvex Relaxation based Matrix Regression for Face Recognition with Structural Noise and Mixed Noise

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Abstract

For face recognition, sparse coding based classification methods have demonstrated the inspiring attraction in dealing with the pixel-level based sparse or gaussian noise, and nuclear norm based matrix regression (NMR) methods have shown the robustness in handling with the image-level based structural noise (e.g., occlusions, illuminations). Such regression methods have two limitations: one is that both ignore the label information of training samples and the similarity relationship between the training samples and the testing ones, the other is that nuclear norm as the rank relaxation can make the obtained solution deviate from the original matrix since its over-relaxations to larger singular values. To overcome both limitations, this paper presents nonconvex relaxation based matrix regression (NRMR) methods: one is called locality-constrained group sparsity regularized nonconvex matrix gamma norm regression model for the structural noise (NRMRS), and the other extends it to the locality-constrained group sparsity regularized matrix gamma and minimax concave plus (MCP) regression model for the mixed noise (NRMRM), i.e., structural noise plus sparse noise. Two variants of inexact augmented Lagrange multiplier (IALM) algorithms including nonconvex IALM (NC-IALM) and majorization-minization IALM (MM-IALM) are devised to solve the proposed models, respectively. Finally, experiments on Extended Yale B, AR and CUHKFS databases can show the superiority of our methods to face recognition with structural noise and mixed noise.

Keywords: Locality-constrained group sparsity, Nonconvex relaxation based matrix regression, IALM, Face recognition.