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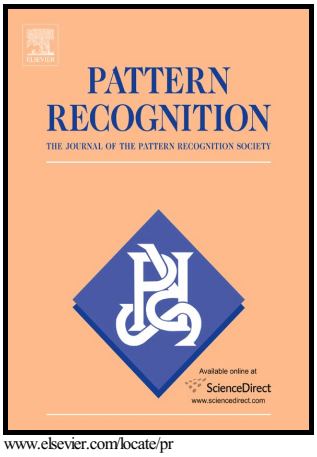

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Xuan Zhou[a,1], Xin Gao[b,1], Jiajun Wang[a,*], Hui Yu[a], Zhiyong Wang[c], Zheru Chi[d,e]

[a]*School of Electronic and Information Engineering, Soochow University, Suzhou 215006, P.R.China*
[b]*Suzhou Institute of Biomedical Engineering and Technology, Chinese Academy of Science, Suzhou 215163, P.R.China*
[c]*School of Information Technologies, The University of Sydney, NSW 2006, Australia*
[d]*Department of Electronic and Information Engineering, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong*
[e]*PolyU Shenzhen Research Institute, Shenzhen, P.R.China*

Abstract

Feature selection has played a critical role in image classification, since it is able to remove irrelevant and redundant features and to eventually reduce the dimensionality of feature space. Although existing feature selection methods have achieved promising progress, human factors have seldom been taken into account. To tackle such a problem, a novel two-stage feature selection method is proposed for image classification by taking human factors into account and leveraging the value of eye tracking data. In the coarse selection stage, with the help of eye tracking data, Regions of Interests (ROIs) from the human perspective are first identified to represent an image with visual features. Then, with an improved quantum genetic algorithm (IQGA) that incorporates a novel mutation strategy for alleviating the premature convergence, a subset of features are obtained for the subsequent fine selection. In the fine selection stage, a hybrid method is proposed to integrate the efficiency of the minimal-Redundancy-Maximal-Relevance (mRMR) and the effectiveness of the Support Vector Machine based Recursive Feature Elimination (SVM-RFE). In particular, the ranking criterion of the SVM-RFE is improved by incorporating the ranking information obtained from the mRMR. Comprehensive experimental results in two benchmark datasets demonstrate that eye tracking data are of great importance to improve the performance of feature selection for image classification.

Keywords: Eye tracking, Feature selection, Quantum genetic algorithm (QGA), mRMR, SVM-RFE

*Corresponding Author: jjwang@suda.edu.cn, Tel: (+86) 0512 6522 1873, Fax: (+86) 0512 6787 1211
[1]Xuan Zhou and Xin Gao contributed equally to this study