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A biologically inspired spatio-chromatic feature for color object recognition

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Statement of the Problem: Color information has been acknowledged for its important role in object recognition and scene classification. How to describe the color characteristics and extract combined spatial and chromatic feature is a challenging task in computer vision. To deal with the description of colors, plenty of approaches have been proposed. To study our visual system and mimic its structure and mechanism has naturally been proposed in the research of perceiving colors.

Methodology: The color information processing is implemented under a biologically inspired hierarchical framework, where cone cells, single-opponent and double-opponent cells are simulated respectively to mimic the color perception of primate visual system. More detailed, so responses are obtained by linear combination of retinal cone-like responses generated by Gaussian functions. The receptive field of a do cell is seen as the overlap of two oriented cells with inverse phases, and the double-opponent channels are simulated with oriented filters of inverse phases. Then the robust SIFT feature is extended as a shape description on the processed opponent color channels to obtain a spatio-chromatic descriptor for color object recognition.

Findings: The biologically inspired method is tested for color object recognition task on two public datasets, and the results support the potential of the proposed approach.

Recent Publications

1. Tian Tian, Lang Gao, Weijing Song, Kim Kwang Raymond Choo and Jijun He (2017) Feature extraction and classification of VHR images with attribute profiles and convolutional neural networks. *Multimedia Tools and Applications* DOI: 10.1007/s11042-017-5331-4.
2. Tian Tian, Yun Zhang, kim-Kwang Raymond Choo and Weijing Song (2017) A biologically inspired spatio-chromatic feature for color object recognition. *Multimedia Tools and Applications* 76(18):18731-18747.
3. Tian Tian, Yun Zhang, Hao Dou and Hengjian Tong (2017) Land-use classification with biologically inspired color descriptor and sparse coding spatial pyramid matching. *Multimedia Tools and Applications* 76(21): 22943-22958.
4. Tian Tian, Fan Yang, Kun Zheng, Hong Yao, and Qian Gao (2017) A fast local image descriptor based on patch quantization. *Human-Centered Computing* 10745:64-75.

Biography

Tian Tian received her BS and PhD from Huazhong University of Science and Technology (HUST), China, and visited Oakland University as a Visiting Scholar in 2012. She is currently with School of Computer Science, China University of Geoscience, Wuhan, China. Her major interests include computer vision and remote sensing image processing, and she has worked on feature extraction and image classification methods since the research of postgraduate period. Currently, she focuses on local image descriptors, biologically inspired image processing and deep learning methods on remote sensing image classification.

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