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Applying both hybrid restricted Boltzmann machine and deep convolution neural networks to low-resolution face image recognition

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Due to the difficulty of finding the specific features of faces, in computer vision, low-resolution face image recognition is one of the challenging problems and the accuracy of recognition is still quite low. We were trying to solve this problem using deep learning techniques. Two major parts are used for the proposed method; first the restricted Boltzmann machine is used to preprocess the face images, then the deep convolution neural network is used to do classification. The data set was combined from the Georgia Institute of Technology, Aleix Martinez, and Robert Benavente. Based on this combined data, we conducted the training and testing processes. The proposed method is the first method that combines restricted Boltzmann machine and deep convolution neural networks to do low-resolution face image recognition. From the experimental results, compared to existing methods, the proposed method greatly improves the accuracy of recognition. The proposed method is shown in Figure

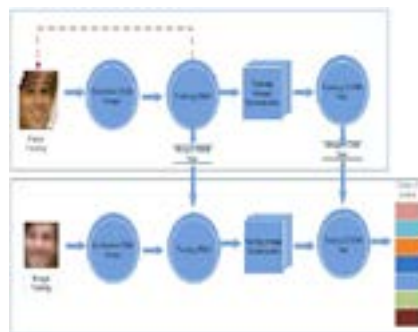


Figure: The scheme of the proposed method.

Recent Publications:

1. Jian M and Lam K M (2015) Simultaneous hallucination and recognition of low-resolution faces based on singular value decomposition. *IEEE Transactions on Circuits and Systems for Video Technology* 25(11):1761–1772.
2. Turk M and Pentland A (1991) Eigen faces for recognition. *Journal of Cognitive Neuroscience* 3(1):71–86.
3. Zou W W W and Yuen P C (2012) Very low resolution face recognition problem. *IEEE Transactions on Image Processing* 21(1):327–340.
4. Ren C X, Dai D Q and Yan H (2012) Coupled kernel embedding for low-resolution face image recognition. *IEEE Transactions on Image Processing* 21(8):3770–3783.
5. Liu C and Wechsler H (2002) Gabor feature based classification using the enhanced fisher linear discriminant model for face recognition. *IEEE Transactions on Image Processing* 11(4):467–476.

Biography

Shi Jinn Horng received the BS degree in Electronic Engineering from National Taiwan Institute of Technology, Taiwan; his MS degree in Information Engineering from National Central University, Taiwan, and the PhD degree in Computer Science from National Tsing Hua University, Taiwan, in 1980, 1984, and 1989, respectively. Currently, he is a Chair Professor in the Department of Computer Science and Information Engineering, National Taiwan University of Science and Technology. His research interests include Deep Learning, Biometric Recognitions and Image Processing.

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