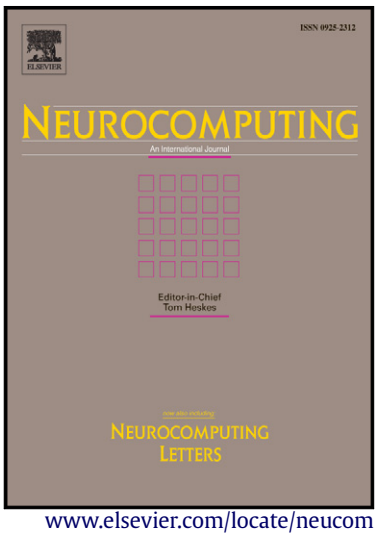

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Image Quality Assessment: A Sparse Learning Way

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Abstract

Full reference image quality assessment is very important for many image processing applications. The challenge of image quality assessment lies in two aspects: 1) formulating perceptual meaningful features and 2) finding a way to pool them into a single quality score. A novel two-step approach is proposed to address these problems. In the first step, sparse representations of local image patches are computed to simulate the low level characteristic of the *human vision system* (HVS) and represent the meaningful image structures. The differences between the representations of distorted and undistorted patches are utilized to measure the local distortion. In the second step, these local distortion measurements are fused into a single image quality score by using *kernel ridge regression* (KRR). Kernel ridge regression can mimic the complex high level behaviors of human vision system and is shown to be an effective way to learn the relationship between local quality measurements and quality score. The contributions of this paper would be summarized as follows: 1) Extracting approximate perceptual meaningful features in image quality assessment is transformed as a sparse representation problem. In this case, the sparse representation coefficients can reflect the salient local structures and give local quality assessments. 2) The KRR is utilized to pool the local quality assessments into a single image quality score. Thus, the nonlinear relationship between the objective model outputs and the subjective quality ratings can be learned by exploiting the KRR. 3) Extensive experiments are conducted on six public databases. Compared with other approaches, the proposed approach has achieved the best performance, which demonstrates the effectiveness and robustness of the proposed approach.

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