ABSTRACT

The non-convex Minimax Concave (MC) penalty is proposed as a nonconvex relaxation of ℓ0 penalty for adaptive dictionary learning for achieving added robust and sparse representation. An online algorithm is developed to make the non-convex formulation computationally reasonable, and its convergence to be theoretically definite with image inpainting. Adaptive Morphological Component Analysis (AMCA) is used to capture the exact texture and cartoon contents of the images through fixed and learnt dictionaries for feasible computation. The approach is advantageous for its nature of parallel execution of image decomposition and local dictionary learning. Proposed adaptive dictionary learning outperforms all the approaches in terms of PSNR value, compression ratio and bit error rate.

An image quality measurement technique to analyse the quality of the image using Just Noticeable Difference (JND) is performed. By the basics of human physiological process, people can observe the change in the pixel value if it exceeds the threshold value. Hence along with the statistical properties between pixels, the perceptual characteristics in image processing should also be considered. Estimation of JND at pixel domain is found to be very convenient compared to subband domain. Experimental results prove that the proposed algorithms reconstruct the decompressed image similar to the original image that is undetectable by the observers.

Most of the existing image compression techniques are considering either structural or textural regions of the image, while the proposed technique, considers both the regions along with the adaptive dictionary learning. This approach outperforms all the other existing methods in terms of PSNR value, compression ratio and bit error rate which is also proved by measuring the image quality by using Just Noticeable Difference estimation.