# Convex optimization in digital image processing

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*Abstract*

Sparse representation has demonstrated to be a powerful model for signals and images. In this model, a given signal is expressed as a linear combination using a few non-zero coefficients in an appropriate basis-function. Images, for instance, have sparse representation in both the Discrete Cosine Transform (DCT) and the Discrete Wavelet Transform (DWT) domain, as testified for the JPEG and JPEG-2000 standards. Consequently, several well-known signal and image processing problems can be posed as demanding sparse solutions to underdetermined systems of linear equations. In order to solve these type of problems, we present a new method that solves an equivalent convex optimization problem based on the continuation principle. Additionally, we show that our method achieves state-of-the-art performance in compressed sensing reconstruction and digital image deblurring applications.