The key objective of sparse and redundant representations is all about the introduction of a highly elegant data model with well-defined mathematical foundations. The structure of this model has been emerged from the conventional transforms represented in redundant unitary form. This draws out a new flavor of treatment to data. The appeal of this model is attributed to compact representation it facilitates. A lot of freedom persists in model adaptation to fit the data depending on the application.

Many models are available aiming to serve the data of interest. Models can be given as mathematical descriptions or the conditions that the underlying signal of interest are believed to obey. Models that are available in image processing are Discrete Cosine Transform (DCT), Principal Component Analysis (PCA), wiener filtering, anisotropic diffusion, etc. Posing a new model requires a delicate attention to attain the simplest possible and reliable model while justifying the actual content of the data. To this Sparseland model emerges out as a new universal data model serving many applications in image processing.
A class of applications in image processing demand the recovery of clean image from the naturally available perturbed images, which are treated as inverse problems. Some examples of such problems are image deblurring, image inpainting, etc. This paper discusses sparse approach to an inverse problem with image deblurring as a case study. The comparison of various shrinkage algorithms supporting sparse approach, used to serve this application is discussed along with the key constraints involved in these algorithms.

References


Index Terms

Computer Science

Image Processing

Keywords

Unconstrained convex problems, Sparse solutions, Inverse problems, Optimization, Regularization, Shrinkage algorithms