

Sparse And Redundant Representations From Theory To Applications In Signal And Image Processing Author Michael Elad Oct 2010

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Sparse And Redundant Representations From

The field of sparse and redundant representation modeling has gone through a major revolution in the past two decades. This started with a series of algorithms for approximating the sparsest solutions of linear systems of equations, later to be followed by surprising theoretical results that guarantee these algorithms' performance.

Sparse and Redundant Representations: From Theory to ...

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Sparse and Redundant Representations - From Theory to ...

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This textbook introduces sparse and redundant representations with a focus on applications in signal and image processing. The theoretical and numerical foundations are tackled before the applications are discussed. Mathematical modeling for signal sources is discussed along with how to use the proper model for tasks such as denoising, restoration, separation, interpolation and extrapolation, compression, sampling, analysis and synthesis, detection, recognition, and more.

Sparse and Redundant Representations | Guide books

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Sparse and Redundant Representations: From Theory to ...

Sparse and Redundant Representation-Based Smart Meter Data Compression and Pattern Extraction Abstract: Smart meters play vital roles in the aspects of the management and operation of smart grids such as demand response, energy efficiency improvement, and electricity pricing.

Sparse and Redundant Representation-Based Smart Meter Data ...

The vector \hat{x} is the representation (sparse/redundant) of the desired signal x . The core idea: while few (L out of K) atoms can be merged to form the true signal, the noise cannot be fitted well. Thus, we obtain an effective projection of the noise onto a very low-dimensional space, thus getting denoising effect.

Sparse & Redundant Representation Modeling of Images ...

Abstract—We address the image denoising problem, where zero-mean white and homogeneous Gaussian additive noise is to be removed from a given image. The approach taken is based on sparse and redundant representations over trained dictionaries. Using the K-SVD algorithm, we obtain a dictionary that describes the image content effectively.

3736 IEEE TRANSACTIONS ON IMAGE PROCESSING, VOL. 15, NO ...

Sparse decomposition Noiseless observations. Consider a linear system of equations $y = Dx$, where D is an underdetermined $n \times m$ matrix ($n < m$) and $y \in \mathbb{R}^n$. The matrix (typically assumed to be full-rank) is referred to as the dictionary, and x is a signal of interest. The core sparse representation problem is defined as the quest for the sparsest possible representation satisfying $y = Dx$.

Sparse approximation - Wikipedia

Image Denoising Via Sparse and Redundant Representations Over Learned Dictionaries Abstract: We address the image denoising problem, where zero-mean white and homogeneous Gaussian additive noise is to be removed from a given image. The approach taken is based on sparse and redundant representations over trained dictionaries.

Image Denoising Via Sparse and Redundant Representations ...

Sparse and Redundant Signal Representation, and Its Role in Image Processing = 24 $D\alpha = x$ BP and MP Equivalence Given a signal x with a representation $x = D\alpha$, Assuming that D , BP and MP are Guaranteed to find the sparsest solution. $x = D\alpha$ (0.51 1 M) 0 Donoho & E. ('02) $\alpha < +$ Gribonval & Nielsen ('03)

Sparse & Redundant Signal Representation, and its Role in ...

The field of sparse and redundant representation modeling has gone through a major revolution in the past two decades. This started with a series of algorithms for approximating the sparsest solutions of linear systems of equations, later to be followed by surprising theoretical results that guarantee these algorithms' performance.

Sparse and Redundant Representations | SpringerLink

In the first stage, sparse and redundant representation is used to approximate the log-image. The K-SVD algorithm is used to train a redundant dictionary, which can describe the log-image sparsity. Then in the second stage, we use the total variation (TV) method to amend the image obtained.

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Multiplicative noise removal via sparse and redundant ...

o We start with a 8-by-8 pixels patch and represent it using 256 numbers – This is a redundant representation o However, out of those 256 elements in the representation, only 3 are non-zeros – This is a sparse representation o Bottom line in this case: 64 numbers representing the patch are replaced by 6 (3 for the indices of the non-zeros, and 3 for their entries)

Sparse Representations and the Basis Pursuit Algorithm

A sparse representation of image structures such as edges, corners, and textures requires using a large dictionary of vectors. Section 5.5.1 describes redundant dictionaries of directional wavelets and curvelets. Matching pursuit decompositions over two-dimensional directional Gabor wavelets are introduced in [105].

Sparse Representation - an overview | ScienceDirect Topics

The topics are multi-resolution based wavelet frames and applications to image processing, sparse and redundant representation modeling of images and simulation of elasticity, biomechanics, and virtual surgery. Recent advances in image processing, compressed sensing and sparse representation are discussed.

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As it turns out, the field of image processing is one of the main beneficiaries from the recent progress made in the theory and practice of sparse and redundant representations. We discuss ways to...

On the Role of Sparse and Redundant Representations in ...

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Sparse and Redundant Representations: From Theory to ...

REGISTRATION REQUESTED. Due to space limitations, please register/RSVP at /programs/srs05/rsvp.htm Due to the large number of applications for the workshop on Sparse Representation in Redundant Systems (May 9-13), we regret that RSVP is now closed to new applicants.

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