

Short Biography of
Ali Mohammad-Djafari

Research director in CNRS, France



Ali Mohammad-Djafari received the B.Sc. degree in electrical engineering from Polytechnique of Teheran, in 1975, the diploma degree (M.Sc.) from Ecole Supérieure d'Electricité (SUPELEC), Gif sur Yvette, France, in 1977 and the "Docteur-Ingénieur" (Ph.D.) degree and "Doctorat d'Etat" in Physics, from the University of Paris Sud 11 (UPS), Orsay, France, respectively in 1981 and 1987.

He was Associate Professor at UPS for two years (1981-1983). Since 1984, he has a permanent position at "Centre National de la Recherche Scientifique (CNRS)" and works at "Laboratoire des signaux et systèmes (L2S)" at SUPELEC. He was a visiting Associate Professor at University of Notre Dame, Indiana, USA during 1997-1998. From 1998 to 2002, he has been at the head of Signal and Image Processing division at this laboratory.

Presently, he is "Directeur de recherche" and his main scientific interests are in developing new probabilistic methods based on Bayesian inference, Information Theory and Maximum Entropy approaches for Inverse Problems in general in all aspects of data processing, and more specifically in imaging and vision: image reconstruction, signal and image deconvolution, blind source separation, sources localization, data fusion, multi and hyper spectral image segmentation. The main application domains of his interests are Computed Tomography (X rays, PET, SPECT, MRI, microwave, ultrasound and eddy current imaging) either for medical imaging or for non destructive testing (NDT) in industry, multivariate and multi dimensional data, signal and image processing, data mining, clustering, classification and machine learning methods for biological or medical applications.

He has supervised more than fifty M.Sc. Research projects, more than 15 Ph.D. Thesis and about 10 Post-doc research activities. In 2012, he is supervising 6 Ph.D. Thesis. He has more than 40 full journal papers and more than 200 papers in national and international conferences. He has organized or co-organized about 10 international workshops and conferences. He has been expert for a great number of French national and international projects. Since 1988 he has many teaching activities in M.Sc. And Ph.D. Level in SUPELEC and University of Paris.

He also participated and managed many industrial contracts with many French national industries such as EDF and Thales or R & D great institutions such as CEA and INSERM as well as the regional (such as Digiteo), national (such as ANR) and European projects (such as ERASYSBIO).

For an overview and acces to more details of his activities and publications, please see his web page: <http://djafari.free.fr> and <http://publicationslist.org/djafari>

Title:

Sparsity in signal and image processing: from modeling and representation to reconstruction and processing

Abstract:

Sparse signal and image representation and modeling has recently been the focus of many researchers in many applications and has been used in signal and image reconstruction from direct sparse samples. The main idea is to use an over-complete basis with the desired properties and project the interested signal or image on that basis in the optimal way of keeping the least number of coefficients.

Sparse signal and image representation also has been used as prior modeling in inverse problems arising in different signal and image processing, in particular, medical or industrial imaging systems. As understood, in inverse problems, the main difficulties are the fact that we do not have direct samples (observations) and the ill-posedness of the inversion. Regularization methods have been proposed to introduce prior information and in particular the sparsity of the solution. The Bayesian estimation approach with the sparsity enforcing of the solutions to inverse problems is the focus of this tutorial.

This keynote and tutorial talk is an overview and synthetic presentation of these methods and techniques both in signal and image representation and in inverse problems such as signal deconvolution, image restoration and image reconstruction in Computed Tomography.

Main reference:

Bayesian approach with prior models which enforce sparsity in signal and image processing, *EURASIP Journal on Advances in Signal Processing* 2012, **2012**:52 doi:10.1186/1687-6180-2012-52
<http://asp.eurasipjournals.com/content/2012/1/52>