

Bayesian inference for inverse problems in signal and image processing and applications

Ali MOHAMMAD-DJAFARI

Laboratoire des Signaux et Systèmes,
Unité mixte de recherche 8506 (CNRS-Supélec-UPS)
Supélec, Plateau de Moulon, 3 rue Joliot-Curie,
91192 Gif-sur-Yvette, France

djafari@lss.supelec.fr feron@lss.supelec.fr

Abstract

Probability theory and statistics are two main tools in signal and image processing. Bayesian inference has a privileged place in developing methods for inverse problems arising in signal and image processing which can be applied in real world applications. In this tutorial presentation, first I will briefly present the Bayesian estimation approach in signal and image processing. Then, I will show a few examples of inverse problems such as signal deconvolution, image restoration, tomographic image construction and show how the Bayesian estimation approach can be used to give solutions for these problems. Finally, I will focus on two recent research domain which are blind sources separation and data fusion problems and present new methods we developed recently and their applications.

key words:

Inverse problems, Bayesian estimation, Deconvolution, Image restoration, Computed tomography, Blind source separation, Data and Image Fusion.