Bayesian approximation for physical inverse problem

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Abstract

Here we focus on simulation-based Bayesian inference from electrical impedance tomography (EIT) data. We image an unknown convex polygonal insulating inclusion within an object, made of otherwise conducting material, using current/ voltage measurements on the surface of the object. This kind of problem can be classified as an inverse problem for non-invasive imaging. In the forward map we solve a partial differential equation (PDE) subject to boundary conditions. The statistical inverse problem is to summarize the posterior distribution of conductance at all points within the imaged object given the current applied on the boundary of the object and the corresponding boundary potentials. We apply an MCMC approach to the EIT inverse problem and demonstrate it on noisy simulated data. We will also talk about the coupling separation scheme to analyse the computational approximation of the likelihood.