

Inverse modelling using trans-dimensional Markov Chain Monte Carlo

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In many modelling problems in the physical science, the number of parameters is fixed in advance. While suitable for deterministic forward modelling, this can be limiting for inverse modelling. In this case, arguments can be used to bound the maximum number of parameters that need to be considered or the number of unknowns is set at some arbitrary value. Ideally we would like to treat the number of unknowns itself directly as an unknown. This leads to a transdimensional problem, that is, one where the dimension of the parameter space is a variable to be solved for. I will present a brief overview of an approach used to solve such problems, and illustrate its application to a range of problems such as the inference of past climate from geochemical data in boreholes, construction of seismic tomography models, and the decomposition of geochronological data to identify mixture components.