Monte Carlo Methods in Natural Sciences, in Engineering and in Economics

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## **Ensemble Kalman Methods for Inverse Problems**

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Many problems in the physical sciences require the determination of an unknown field from a finite set of indirect measurements. Examples include oceanography, oil recovery, water resource management and weather forecasting. This may be formulated as a least squares problem to match the model output to the data. I will demonstrate

that ideas from the Ensemble Kalman Filter can be adapted to solve such problems: by running multiple interacting copies of the model, and exposing their output to the (suitably randomized) data, derivative free minimization tool is constructed. A key theoretical result is described and this is used to

a derivative-free minimization tool is constructed. A key theoretical result is described and this is used to motivate a series of experiments which demonstrate the efficacy of the algorithm.

Introductory reading and references may be found in: http://arxiv.org/abs/1209.2736 http://arxiv.org/abs/1212.1779 http://arxiv.org/abs/1107.4118

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