

Hamiltonian MC

A novel algorithm for Bayesian inference

- Drs. Gelman, Betancourt and collaborators adapted Hamiltonian Monte Carlo (HMC) methods to computationally implement Bayesian inference. HMC, initially developed by physicists, was brought to statistics by Radford Neal.

Stan

Hamiltonian computational implementation for diverse interfaces

- Dr. Gelman's team developed *Stan*, a probabilistic programming language to build complex Bayesian models in several environments including *Stata*, *Mathlab*, *Python*, *Julia* and *R*. Ben Goodrich wrote the prototypes of all multivariate codes.

rstan

Stan implementation in the software environment R

- Dr. Goodrich joined Drs. Gelman, Guo and collaborators in the development of *rstan*, the interface to access *Stan* from the statistical programming environment R and continues to be a lead maintainer also initiating the development of *rstanarm*.

rstanarm

Accessible software for complex hierarchical modelling

- The project team developed *rstanarm*, our software prototype. *rstanarm* estimates common regression models, with familiar conventions, calling *Stan*'s HMC algorithms to make this advanced algorithm accessible to data scientists.

shinystan

Interactive exploration of Markov chain Monte Carlo simulations

- The project team conceived and developed the prototype software package *shinystan*, a graphical user interface to interactively explore any model fit using a Markov chain Monte Carlo algorithm to assist in model tuning and optimization.