Hamiltonian MC

A novel algorithm for Bayesian inference

- Dr. Gelman and collaborators adapted Hamiltonian Monte Carlo (HMC) methods to computationally implement complex hierarchical 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 enviroments 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 enviroment R and continues to be a lead maintainer also initating the development of *rstanarm.*

rstanarm

Accessible software for complex hierarchical modelling

- The project team developed the software prototype *rstanarm* estimating the common regression models using novel Hamiltonian Monte Carlo algorithms with familiar conventions makes this advanced algorithm accessible to data scientists.

shinystan

Interactive exploration of Markoc chain Monte Carlo simulations

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