Bayesian inference

* Infer p(Y | X, D) from:
  + a given parametric model or likelihood function p(Y | X, Θ)
  + a prior distribution p(Θ) over the model parameters
  + a data set D ≡ (X,y)
* calculate posterior parameter distribution p(Θ|D)
  + “inference”
  + Often ass
  + 2 Methods: Variational inference, Monte Carlo integration
  + BTYDplus uses Monte Carlo integration: pnbd.mcmc.DrawParameters
* based on this parameter distribution, calculate the outcome distribution p(y|x,D)
  + “prediction”
  + mcmc.DrawFutureTransactions
* point estimate: E(y|x,D)
* intervals: quantile(y|x,D)

Ensemble methods:

* “intermediate step between Bayesian methods and pure point predictors”
* “trained models represent a sample in the parameter space and the aggregation is a kind of MC integration”
* “have a natural notion of uncertainty”

Needs true values?

Computational effort

Problem with small amount of data?

Frequentist approach?

Confidence interval or credible interval?

Which uncertainty do they tackle?