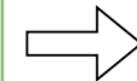


Symbolic inference

Closed-form model
 $p(\mathbf{x} | \boldsymbol{\theta}), p(\boldsymbol{\theta})$

Symbolic algebra, conjugate priors, ...



Exact explicit posteriors
 $p(\boldsymbol{\theta} | \mathbf{x}_o)$

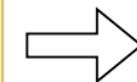
Likelihood-based inference

Explicit model
 $L(\boldsymbol{\theta}) \equiv p(\mathbf{x}_o | \boldsymbol{\theta})p(\boldsymbol{\theta})$

Density evaluation
 $L(\boldsymbol{\theta}), \nabla \log L(\boldsymbol{\theta})$

Proposals $\boldsymbol{\theta}$

MCMC, HMC, VI, ...



$\boldsymbol{\theta} \sim p(\boldsymbol{\theta} | \mathbf{x}_o)$

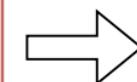
Simulation-based inference

Implicit model
 $\boldsymbol{\theta}, \mathbf{x} \sim p(\mathbf{x} | \boldsymbol{\theta})p(\boldsymbol{\theta})$

Simulator samples
 $\mathbf{x}, \boldsymbol{\theta}$

(Proposals $\boldsymbol{\theta}$)

ABC, NPE, NRE, ...



$q_\phi(\boldsymbol{\theta} | \mathbf{x}) \approx p(\boldsymbol{\theta} | \mathbf{x})$

$\boldsymbol{\theta} \sim q_\phi(\boldsymbol{\theta} | \mathbf{x}_o)$

Approximate implicit posteriors

Explicit: Evaluable probability density

Implicit: Only accessible via sampling

Accessible models:

Symbolic inference \subset Likelihood-based inference \subset Simulation-based inference