Robust Bayesian Inference for Distributed Sensor Networks

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Deploy drone fleet to inspect hazardous area before sending first responders

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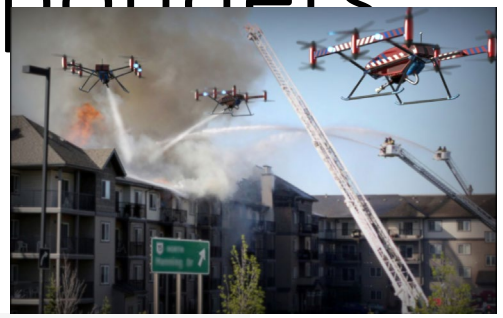
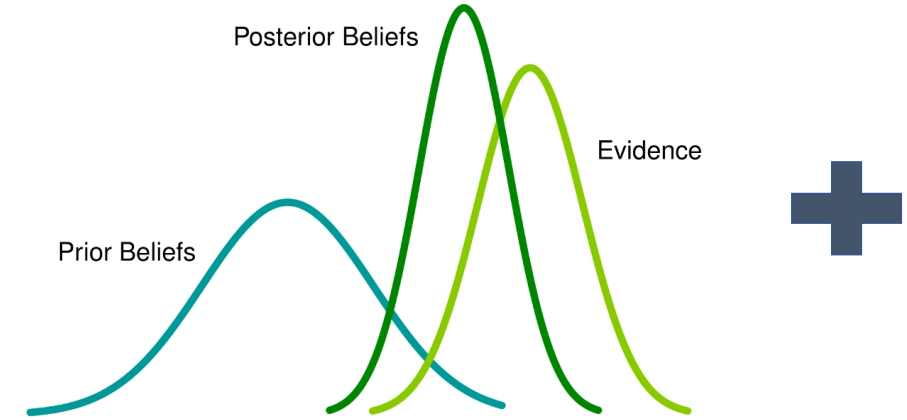
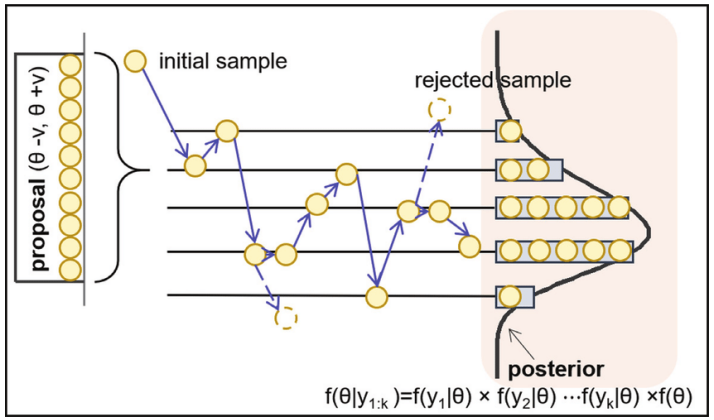


Aug 12, 2015, Tianjin Port Explosion

Drones need to collaborate and exchange information without a human directing actions

Bayesian inference methods enable collaborative learning





- Hamiltonian Monte Carlo (HMC)
- Metropolis-adjusted Langevin algorithm(MALA)
- Stochastic gradient Langevin dynamics(SGLD)
- Distributed Langevin Dynamics(DLD)
- …..

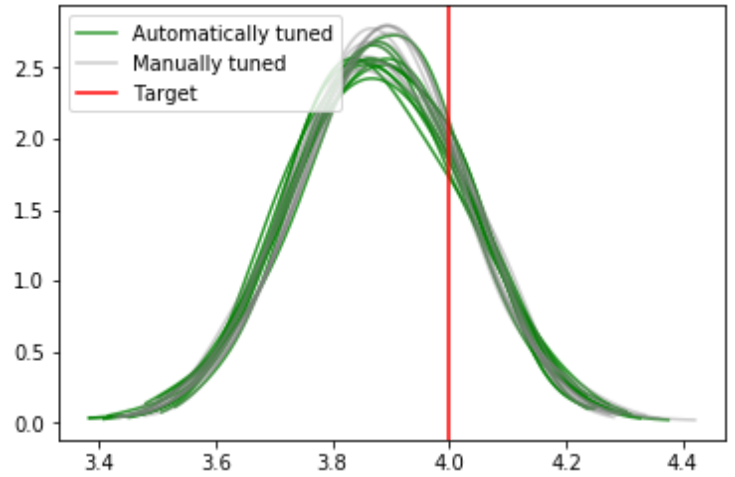
Drawback: manual tuning and parameter calibration

Our work: automating parameter calibration

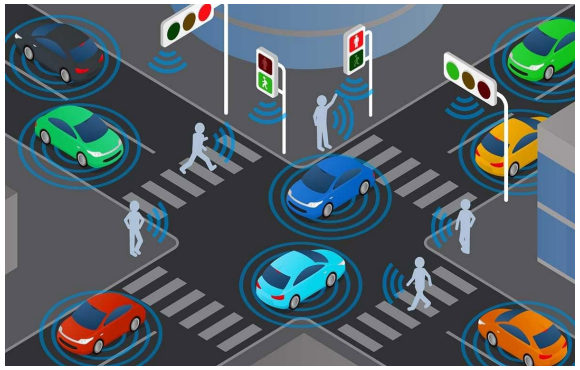
Subsampling MH
Dual averaging optimization

+

Distributed Langevin Dynamics



Self-driving cars



Drones

Smart grid sensor