NSF Workshop: Simulation Optimization

Sequential Monte Carlo Methods for Optimization

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Current research work

- **SMC Framework**
  - Construct a sequence of target distributions that converge to a uniform distribution concentrated on the global optima
  - Use Sequential Monte Carlo (SMC) methods to “track” this sequence of distributions with a population of samples
- **Example**
  - Sequential Monte Carlo Simulated Annealing: Use SMC methods to “track” a sequence of converging Boltzmann distributions
  - Faster cooling speed by increasing sample size
  - Much better than the standard SA; better than multi-start SA when the sample size is large enough

Current research work

- **A Filtering Perspective**
  - Sequentially estimate the unobserved state (optima) through the noisy observations (samples)
  - Use Sequential Monte Carlo (SMC) methods to “track” the filtering distributions
  - Unifying some randomized algorithms, such as Cross-Entropy method and Model Reference Adaptive Search

- **Future Research**
  - Finite-time performance analysis
  - SMC methods applied to stochastic/simulation optimization