STA 3180 Statistical Modelling: Markov Chain Monte Carlo

Topic: Markov Chain Monte Carlo

I. Introduction to Markov Chain Monte Carlo

A. Definition of Markov Chain Monte Carlo

B. Overview of MCMC algorithms

C. Examples of MCMC applications

II. MCMC Algorithms

A. Metropolis-Hastings Algorithm

1. Definition and overview
2. Steps in the algorithm
3. Good problem solving strategies:
    a. Understand the concept of the Metropolis-Hastings algorithm
    b. Be able to identify when it is appropriate to use the algorithm
    c. Understand the steps of the algorithm and how they work together

B. Gibbs Sampling

1. Definition and overview
2. Steps in the algorithm
3. Good problem solving strategies:
    a. Understand the concept of Gibbs sampling
    b. Be able to identify when it is appropriate to use the algorithm

c. Understand the steps of the algorithm and how they work together

III. MCMC Applications

A. Bayesian Inference

1. Definition and overview

2. Steps in the algorithm

3. Good problem solving strategies:

a. Understand the concept of Bayesian inference

b. Be able to identify when it is appropriate to use the algorithm

c. Understand the steps of the algorithm and how they work together

B. Maximum Likelihood Estimation

1. Definition and overview

2. Steps in the algorithm

3. Good problem solving strategies:

a. Understand the concept of maximum likelihood estimation

b. Be able to identify when it is appropriate to use the algorithm

c. Understand the steps of the algorithm and how they work together

IV. Conclusion

A. Summary of MCMC

B. Summary of MCMC algorithms

C. Summary of MCMC applications