

Mathematical Statistics II

Maximum Likelihood Estimation

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1 Introduction

Overview

- The next approach we will discuss is Maximum Likelihood Estimation (MLE).
- As we will see, the MLE has several desirable properties, and as a result is often favored over approaches like the method of moments.
- The material for this section largely comes from Chapter 8.5 of Rice (2007), and various sections in Pawitan (2001).

2 Likelihood: an introduciton

What is likelihood?

- The term “likelihood” is often used colloquially to mean something analogous to probability. E.g., “What is the likelihood that it rains tomorrow?”
- When we use this term in statistics / mathematics, we mean something specific that isn’t the same thing as probability.
- The use of the term “likelihood” was first made by R. A. Fisher, who was the architect and primary proponent of “likelihood-based-inference”.
- We will start with the treatment of likelihood in the text “In all Likelihood” (Pawitan, 2001), which is a fantastic resource on the subject. (This will lead to some review...)

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References

- Pawitan Y (2001). *In all likelihood: statistical modelling and inference using likelihood*. Oxford University Press.
- Rice JA (2007). *Mathematical statistics and data analysis*, volume 371. 3 edition. Thomson/Brooks/Cole Belmont, CA. [1](#)