Learning objectives

Aim of the course is introducing the students to advanced notions and methods of statistical inference. In particular, the course focuses on point and interval estimation and hypothesis testing, based on maximum likelihood approach.

Contents

Likelihood

Maximum likelihood estimators

Likelihood ratio test

Asymptotic tests

Sequential tests

Non parametric tests

Asymptotic confidence intervals

Likelihood confidence intervals
Non parametric confidence intervals

**Detailed program**

Likelihood
- Likelihood function
- Exponential family
- Sufficient statistics
- Lehmann-Scheffé Theorem
- Ancillarity
- Completeness

Maximum likelihood estimators
- Likelihood equations
- Observed versus expected Fisher information
- Cramér-Rao lower bound
- Rao-Blackwell Theorem
- Properties of likelihood estimators

Likelihood ratio test

Asymptotic tests

Sample size and power

Sequential tests

Non parametric tests

Asymptotic confidence intervals

Likelihood confidence intervals

Non parametric confidence intervals
Prerequisites

No formal prerequisites. In any case, for students who don't have a quantitative formation, it is recommended to take the course entitled "Introduction to statistical inference".

Teaching methods

The course consists of lectures on the theoretical topics of the class and practical exercises to illustrate their meaning. For some topics, a lab with SAS software will be proposed.

Assessment methods

Written exam. The exams consists of three theoretical questions and three exercises similar to the ones proposed during the class.

Textbooks and Reading Materials


Casella G., Berger L.R., Inference statistics, Duxbury, 2002 (2° ed.).

Semester

1° semester 2° period

Teaching language

Italian