SYLLABUS DEL CORSO

Teoria dell'Inferenza Statistica

2122-1-F8204B002-F8204B004M

Learning objectives

The course aims at presenting the general concepts and methods of statistical inference with particular emphasis on point and set estimation, hypotheses testing and model selection. A likelihood-based approach to inference will be adopted.

At the end of the course the student should acquire the methodology underlying inferential statistics based on likelihood, should master the main exact and asymptotic properties of the inferential procedures based on likelihood and shuould be able to build and compare appropriate parametric statistical models, deriving proper inferential conclusions on the relative parameters.

Contents

Likelihood, Maximum likelihood estimators, Likelihood ratio based tests and confidence regions, Model selection.

Detailed program

a. Likelihood:

- Likelihood function.

- Likelihood principle.

b. Sufficient statistics and Exponential families

c. Maximum likelihood estimators:

- Likelihood equations

- Expected and observed Fisher information.

- Parametrizations

- Properties of maximum likelihood estimators, their asymptotic distribution

d. Likelihood -based tests: asymptotic distribution, important examples.

e. Likelihood-based confidence regions.

f. Extensions and modifications of the likelihood function.

g. Model selection criteria.

Prerequisites

Knowledge of probability theory as taught in the course "Probabilità applicata " and of statistical inference at the bachelor's degree level is required.

Teaching methods

Class lectures taught in Italian.

Lectures are aimed at deepening student's methodological background through the construction of specific parametric statistical models and the derivation of the corresponding inferential procedures based on likelihood. Discussion of results is aimed at a critical evaluation of the considered inferential methods.

Assessment methods

Written exam with exercises and optional oral assessment.

The written exam includes a theoretical question, to verify the understanding of the fundamental concepts taught in the course and the abiliy to formalize them in a rigourous way. I also inlcudes some exercises, aimed at verifyng

the comprehension of the tecniques taught in the course and the real capacity of properly applying them.

Textbooks and Reading Materials

• Azzalini A., Inferenza Statistica: un'introduzione basata sul concetto di verosimiglianza (2 ed.). Springer-Verlag, 2001

• Pace L., Salvan A., Introduzione alla statistica: inferenza, verosimiglianza, modelli. Cedam, Padova, 2001.

Semester

Second term (six weeks) of the first semester.

Teaching language

Italian