Statistics and Regression
2022-2023

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General

Intermediate level statistics course on selected topics of statistical inference, applied regression and computational statistics. The course alternates front classes and lab activity where the methodology discussed is applied on real and simulated data. The software R will be used (no prior knowledge of R is assumed).

Prerequisites

The students should be familiar with the topics covered in the first two chapters of Hogg and Craig (IV ed).

List of topics covered

Statistical distributions: binomial and Poisson. Gamma, chi-square, normal, t and F distribution.

Sampling theory and distribution of the sample mean and sample variance. Convergence in distribution and convergence in probability to a constant. The central limit theorem.

Topics in computational statistics: random number generation, the method of Montecarlo, the Bootstrap.

Estimation: the maximum likelihood method. Statistical Hypotheses: uniformly most powerful tests and likelihood ratio tests.

The linear regression model: estimation, hypothesis testing and applications.

Evaluation

Class work: 30% final test: 70%.

References

Laura M. Chihara, Tim C. Hesterberg. *Mathematical Statistics with Resampling and R*. Wiley, 2011.

Robert V. Hogg, Allen Craig, Joseph W. McKean, *Introduction to Mathematical Statistics*, Pearson Education, 2005 (or Robert V. Hogg, Allen Craig, *Introduction to Mathematical Statistics*, MacMillan, 1978).

Christian. P. Robert, George Casella, *Introducing Monte Carlo Methods with R*. Springer, 2009.