UCLouvain

lstat2150

2024

Nonparametric statistics: smoothings methods

4.00 credits	15.0 h + 5.0 h	Q1

Teacher(s)	von Sachs Rainer ;
Language :	English
Place of the course	Louvain-la-Neuve
Prerequisites	Concepts and tools equivalent to those taught in teaching units LSTAT2020 Logiciels et programmation statistique de base LSTAT2120 Linear models
Main themes	Main themes The topics treated during this course are : 1. Nonparametric estimation of a distribution function 2. Nonparametric estimation of a density function : the kernel method 3. Nonparametric estimation of a regression function : - kernel estimation - local polynomial estimation - spline estimation The material will essentially be treated from an applied point of view of methodology. The student will study software applications of the proposed methods.
Learning outcomes	**At the end of this learning unit, the student is able to :** 1 Second course of general education in nonparametric statistics, which mainly focuses on smoothing methods.
Evaluation methods	A simulation project has to be prepared (in R) during the semester. An oral exam on the material of the course completes the evaluation.
Teaching methods	The course material is taught during classroom lectures completed by an R-tutorial.
Content	Introduction into nonparametric curve estimation: density estimation, nonparametric regression, kernel method, splines, local polynomials, bandwidth selection, estimation of derivatives, boundary treatments, multivariate aspects; comparison of different estimators via bias, variance and MSE.
Inline resources	https://moodle.uclouvain.be/course/view.php?id=2395
Bibliography	Fan, J. et Gijbels, I. (1996). Local polynomial modelling and its applications. Chapman & Hall, New York. Green, P.J. et Silverman, B.W. (2000). Nonparametric regression and generalized linear models. Chapman & Hall, New York. HÄRDLE, W. (1990): Applied Nonparametric Regression. Cambridge University Press, Cambridge. Hart, J.D. (1997). Nonparametric smoothing and lack-of-fit tests. Springer, New York. Loader, C. (1999). Local regression and likelihood. Springer, New York. Silverman, B.W. (1986) : Density Estimation for Statistics and Data Analysis. Chapman and Hall, London. Simonoff, J.S. (1996). Smoothing methods in Statistics. Springer.
Other infos	Prerequisites Basic knowledge about probability and statistics: descriptive statistics, calculating probabilities, distribution function, probability density, means, variances (conditionally or not), linear regression. It is advisable (but not necessary) to follow the course STAT2140 before.
Faculty or entity in charge	LSBA

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Data Science : Statistic	DATS2M	4		
Master [120] in Statistics: Biostatistics	BSTA2M	4		
Master [120] in Statistics: General	STAT2M	4		
Master [120] in Mathematical Engineering	MAP2M	4		
Master [120] in Economics: General	ECON2M	5		
Master [120] in Data Science Engineering	DATE2M	4		
Certificat d'université : Statistique et science des données (15/30 crédits)	STAT2FC	4		
Master [120] in Data Science: Information Technology	DATI2M	4		