Topics in nonparametric smoothing

Lecturer
Maarten JANSEN (Coordinator)

Course mnemonic
STAT-F418

ECTS credits
5 credits

Language(s) of instruction
English

Course period
First term

Campus
Plaine

Course content

This course studies wavelet based non-parametric smoothing. Topics may include (and are not limited to)

1. Introduction to wavelets: construction, lifting scheme, multiresolution, relation to Fourier analysis and to splines, variance control
2. Locality, sparsity and non-linear smoothing
3. Thresholding, threshold assessment: cross validation, minimax, Stein's Unbiased Risk Estimator, universal threshold, link to extreme value theory
4. Function spaces (Sobolev, Besov)
5. Bayesian smoothing
6. Compressed sensing

Objectives (and/or specific learning outcomes)

Understanding the benefits and limitations of advanced wavelet based nonparametric smoothing, comparing to competitors (splines, Fourier, kernel smoothing and local polynomials)

Teaching method and learning activities

Literature study and/or classes with focus on one or several aspects (theoretic, computational, application)

Contribution to the teaching profile

Methodological, theoretical, computational and practical aspects

References, bibliography and recommended reading

M. Jansen. *Wavelets from a Statistical Perspective. [https://www.routledge.com/Wavelets-from-a-Statistical-Perspective/Jansen/p/book/9781032200675]* CRC Press, 2022 (ISBN: 9781032200675)

Course notes

Université virtuelle

Other information

Place(s) of teaching

Plaine

Contact(s)

Maarten Jansen, see https://maarten.jansen.web.ulb.be/index.html for contact information

Evaluation method(s)

written examination

written examination

Open question with short answer

Open book examination

Main language(s) of evaluation

English

Programmes

Programmes proposing this course at the faculty of Sciences

MA-STAT | Master in Statistics : General | finalité Research General/unit 1

Programmes proposing this course at the Solvay Brussels School of Economics and Management

MA-ECOE | Master in Economics : Econometrics | finalité Research in Economics and statistics/unit 2