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Inferential statistics and test theory (3ST2002)

Filières concernées	Nombre d'heures	Validation	Crédits ECTS
Master en statistique	**Cours: 4 ph**	**Voir ci-dessous**	6

ph=période hebdomadaire, pg=période globale, j=jour, dj=demi-jour, h=heure, min=minute

Période d'enseignement:

- Semestre Automne

Equipe enseignante

Professeur : Jean-Yves Dauxois
INSA Toulouse, Dpt de Génie mathématique,
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Objectifs

Introducing the theoretical background of Mathematical Statistics. Learning how to build, judge the performance, improve and compare the statistical procedures of point estimation, interval estimation and hypotheses testing.

Contenu

1. Statistical model
a. Definition, parametric and nonparametric models
b. Sampling models
c. Exponential families
d. Location-scale families
2. Point estimation
a. Statistics and estimators
b. Classical methods of obtaining estimators: empirical estimation, method of moments, maximum likelihood method
c. Criteria to judge the performance of estimators: consistancy, bias, risk, Fisher information, Cramer-Rao inequality
d. Improving estimators: sufficient statistic, Rao-Blackwell and Lehmann-Scheffé theo-rems
e. Asymptotic behaviour: Asymptotic normality, elta-method, the particular cases of the empirical estimators, the maximum likelihood estimators and method of moments estimators
3. Interval estimation
a. Exacts confidence intervals
b. Asymptotic confidence intervals
4. Testing statistical hypothesis
a. Introduction and definition : hypothesis, test statistics and critical regions, type I and type II errors, level of significance, power, p-value, bias, UMP tests, asymptotics tests
b. Parametric tests: Neyman-Pearson Lemma, nonrandomized and randomized tests
c. The particular case of gaussian samples: Hypothesis about the mean, hypothesis about the variance
d. Nonparamétrics tests: Kolmogorov test, Khi2 tests, Kolmogorov-Smirnov test, Mann-Whitney test

Forme de l'évaluation

2 hours written exam at any exams session.

Documentation

J. Shao, Mathematical Statistics, 2nde edition, Springer, 2003
R. Bartoszynski and M. Niewiadomska-Bugaj, Probability and Statistical Inference, Wiley series in Probability and Statistics, 1996.

Pré-requis

Probability Theory

Forme de l'enseignement

- 6 ECTS credits
- Compulsory course for master in statistics

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- Autumn Semester
- Course : 2 hours / Exercises : 2 hours