Seminar

Non-standard topics in statistics, stochastics, decision theory and other areas of applied mathematics

List of possible topics (not exhaustive, partly including literature):

A) Item response theory (IRT) and measurement theory:

- Goodman scaling vs Rasch Scaling: The Rasch paradox

  Michell, J. (2008). Conjoint measurement and the Rasch paradox. Theory & Psychology

  Michell, J. (2008). Is psychometrics pathological science? Measurement

- Paradoxes e.g. in the multidimensional Rasch model

  Jordan, P. (2013). Paradoxien in quantitativen Model len der Individualdiagnostik. PhD thesis, Universität Hamburg. URL http://ediss.sub.uni- hamburg.de/volltexte/2013/6198/

  Jordan, P. and Spiess, M. (2012). Generalizations of paradoxical results in multidimensional item resp onse theory. Psychometrika

- On the possible psychophysical laws

  Luce, R. D. (1959). On the possible psychophysical laws. *Psychological review*

- (Theory of conjoint measurement (e.g., in the context of the Rasch Model), (advanced topic!))

  Michell, J. (2008). Conjoint measurement and the Rasch paradox. Theory & Psychology

  Kyngdon, A. (2008). The Rasch model from the perspective of the representational theory of measurement. Theory & Psychology

- Knowledge space theory

  Doignon, J. and Falmagne, J. (2012). Know ledge Spaces. Springer

  Doignon, J.-P. and Falmagne, J.-C. (1985). Spaces for the assessment of knowledge. International Journal of Man-Machine Studies

  Heller, J., Stefanutti, L., Anselmi, P., and Robusto, E. (2015). On the link b etween cognitive diagnostic mo dels and knowledge space theory. Psychometrika

- Cognitive diagnosis models

  DiBello, L. V. and Stout, W. (2007). Guest editors' intro duction and overview: IRT-based cognitive diagnostic mo dels and related metho ds. Journal of Educational Measurement

  Heller, J., Stefanutti, L., Anselmi, P., and Robusto, E. (2015). On the link b etween cognitive diagnostic mo dels and knowledge space theory. Psychometrika

- Analysis of non-standard data (e.g. ranking data)

Mayer Alvo, (2010) Statistical Methods for Ranking Data

Schollmeyer, G. (2017): Application of lower quantiles for complete lattices to ranking data: Analyzing outlyingness of preference orderings. Technical Report 208, Department of Statistics, LMU Munich.

Thompson, G. L. (1993). Generalized p ermutation p olytop es and exploratory graphical metho ds for ranked data. The Annals of Statistics

- Nonstandard methods of analysis (e.g., data depth) (possibly including analysis for non-standard data)

K. Mosler. Depth statistics. In C. Becker, R. Fried, and S. Kuhnt, editors, Robustness and Complex Data Structures: Festschrift in Honour of Ursula Gather

Y. Zuo and R. Serfling. General notions of statistical depth function. The Annals of Statistics

Schollmeyer, G. (2017): Application of lower quantiles for complete lattices to ranking data: Analyzing outlyingness of preference orderings. Technical Report 208, Department of Statistics, LMU Munich.

Marden, J. I. (1996). Analyzing and Modeling Rank Data. CRC Press

- Stochastic models for non-standard data (e.g., for ranking data)

Biernacki, C. and Jacques, J. (2013). A generative mo del for rank data based on insertion sort algorithm. Computational Statistics & Data Analysis

Jacques, J. and Biernacki, C. (2014). Mo del-based clustering for multivariate partial ranking data. Journal of Statistical Planning and Inference

Fligner, M. A. and Verducci, J. S. (1986). Distance based ranking mo dels. Journal of the Royal Statistical Society

Lee, M. D., Steyvers, M., and Miller, B. (2014). A cognitive mo del for aggregating p eople's rankings. PloS one

Marden, J. I. (1996). Analyzing and Modeling Rank Data. CRC Press

B) Data-oriented vs. model-oriented approaches in statistics:

- Parametric vs non-parametric methods
- Parametric vs robust methods
- Induction, deduction(, abduction) and transduction in machine learning and statistics (realism vs instrumentalism)

V. N. Vapnik. Estimation of dependences based on empirical data. Empirical inference science: Afterword of 2006 / Vladimir Vapnik. Springer

- (The Duhem-Quine problem in statistics)

C) Decision theory:

- (Generalized) Stochastic Dominance as an Approach to Decision Making under Uncertainty
- Decision Theory as a Coherence Test
- Case-based Decision Making
- The Decision Model of Savage

D) Revealed preference theory:

- Classical Abstract Choice Theory and the Concept of Rationalizability

E) Social choice theory:

- Possibilities and Impossibilities in the Theory of Social Choice: The theorems of Arrow and Sen and their consequences
- Manipulation of Voting Schemes: The Gibbard-Satterthwaite theorem and its consequences