

# Optimal Experimental Designs in R

Radoslav Harman

Comenius University in Bratislava, Slovakia

E-Mail: harman@fmph.uniba.sk

In the talk, we will present the algorithms and procedures implemented in the package `OptimalDesign` for the R environment which provides a toolbox for the computation of D-, A-, and IV-efficient exact and approximate designs of experiments on finite domains, for regression models with real-valued, uncorrelated observations. The package fills a gap in presently available R functions for experimental design optimization by implementing modern algorithms, including search heuristics for resource constrained designs ([1]), mathematical programming methods ([2], [3]), and convex optimization methods utilizing the sparsity of the optimum design solutions (similar to [4]). The capabilities of the package are shown on an example of computing approximate and exact A-optimal designs for the Scheffe mixture model with several constraints on the design space and on the weights.

## References

- [1] Harman, R., Bachratá, A., Filová, L. "Construction of efficient experimental designs under multiple resource constraints." *Applied Stochastic Models in Business and Industry* 32 (2016), pp. 3-17.
- [2] Harman, R., Filová, L. "Computing efficient exact designs of experiments using integer quadratic programming." *Computational Statistics & Data Analysis* 71 (2014), pp. 1159-1167.
- [3] Sagnol, G., Harman, R. "Computing exact D-optimal designs by mixed integer second order cone programming." *The Annals of Statistics* 43.5 (2015), pp. 2198-2224
- [4] Yu, Y. "D-optimal designs via a cocktail algorithm." *Statistics and Computing* 21.4 (2011), pp. 475-481.