Wiener Biometrische Sektion
der Internationalen Biometrischen Gesellschaft
Region Österreich – Schweiz

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Einladung zum

Biometrischen Kolloquium

am Donnerstag, 12. November 2009, 15.00 Uhr (s.t.)

in der Informatikbibliothek (Ebene 3, Raum 88.03.806) der
Besonderen Einrichtung für Medizinische Statistik und Informatik (MSI)
der Medizinischen Universität Wien
Spitalgasse 23, 1090 Wien

Vortragender:

Florian Frommlet (Universität Wien):

Asymptotic optimality of multiple testing and model selection procedures under sparsity

Wir freuen uns auf zahlreichen Besuch.

Thomas Lang
Präsident

Georg Heinze
Sekretär

Asymptotic optimality of multiple testing and model selection procedures under sparsity

Florian Frommlet

Asymptotic optimality of a large class of multiple testing rules is investigated using the framework of Bayesian Decision Theory. A normal scale mixture model is considered, leading to an asymptotic framework which can be naturally motivated under the assumption of sparsity, where the proportion of "true" alternatives converges to zero. Within this setup optimality of a rule is proved by showing that the ratio of its Bayes risk and that of the Bayes oracle (a rule which minimizes the Bayes risk) converges to one.

The class of fixed threshold multiple testing rules which are asymptotically optimal is fully characterized as well as the class of optimal rules controlling the Bayesian False Discovery Rate (BFDR). Furthermore conditions are provided under which the popular Benjamini-Hochberg and Bonferroni procedures are asymptotically optimal. It is shown that for a wide class of sparsity levels, the threshold of the former can be approximated very well by a non-random threshold.

Apart from multiple testing the problem of model selection for multiple regression under sparsity is considered. Under the assumption of orthogonality and for known variances results from multiple testing immediately translate into the regression setting, where the scale mixture model is extended to a more general class of priors. We illustrate asymptotic optimality properties of modified versions of the Bayesian Information Criterion (mBIC), where we specifically discuss modifications allowing to control FDR. Finally optimality of mBIC in the case of unknown variances is proven.