Hyperbolic wavelet thresholding rules: the curse of dimensionality through the maxiset approach

Jean-Marc Freyermuth[*]*, Florent Autin*[†]*, Gerda Claeskens*[*]*, Rainer von Sachs*[◇]

[*] ORSTAT and Leuven Statistics Research Center, K.U.Leuven, Belgium, E-mail: Jean-Marc.Freyermuth@econ.kuleuven.be

[†] LATP1, université d'Aix Marseille, 1, France.

[*] ORSTAT and Leuven Statistics Research Center, K.U.Leuven, Belgium.

[◇] ISBA, Université Catholique de Louvain, Louvain-la-Neuve, Belgium.

In this talk we are interested in nonparametric multivariate function estimation. In Autin et al. (2012), we determine the maxisets of several estimators based on thresholding of the empirical hyperbolic wavelet coefficients. That is we determine the largest functional space over which the risk of these estimators converges at a chosen rate. It is known from the univariate setting that pooling information from geometric structures (horizontal/vertical blocks) in the coefficient domain allows to get 'large' maxisets (see e.g Autin et al. (2011a,b,c)). In the multidimensional setting, the situation is less straightforward. In a sense these estimators are much more exposed to the curse of dimensionality. However we identify cases where information pooling has a clear benefit. In particular, we identify some general structural constraints that can be related to compound models and to a 'minimal' level of anisotropy.

References

Autin, F., Claeskens, G., Freyermuth, J-M. (2012). Hyperbolic wavelet thresholding rules: the curse of dimensionality through the maxiset approach. *to appear in Applied an Computational Harmonic Analysis*.

Autin, F., Freyermuth, J-M., von Sachs, R. (2011a). Ideal denoising within a family of Tree Structured Wavelets. *Electronic Journal of Statistics*, vol. 5, 829-855.

Autin, F., Freyermuth, J-M., von Sachs, R. (2011b). Block-threshold-adapted estimators via a maxiset approach. *to appear in the Scandinavian Journal of Statistics.*

Autin, F., Freyermuth, J-M., von Sachs, R. (2011c) Combining thresholding rules: a new way to improve the performance of wavelet estimators. *Journal of Nonparametric Statistics*, vol. 24, no. 4, 905 - 922.