

Complexity regularization via localized random penalties

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In this joint work with Gabor Lugosi (Pompeu Fabra University), model selection via penalized empirical loss minimization in nonparametric classification problems is studied.

Data-dependent penalties are constructed, which are based on estimates of the complexity of a small subclass of each model class, containing only those functions which have small empirical loss. The penalties are novel since the penalties considered in the literature are typically based on the entire model class.

Oracle inequalities using these penalties are established, and the advantage of the new penalties over the penalties based on the complexity of the whole model class is demonstrated.