A NEW ALGORITHM FOR FIXED DESIGN REGRESSION AND DENOISING

F. Comte[1] and Y. Rozenholc[2]

[1] *MAP5, UMR CNRS 8145, Université Paris 5, 45 rue des Saints-Pères, 75270 Paris cedex 06, France,* e-mail: fabienne.comte@univ-paris5.fr
[2] *LPMA, UMR CNRS 7599, Université Paris VII, 175 rue du Chevaleret, 75013 Paris, France and Université du Maine, Le Mans, France,* e-mail: rozen@math.jussieu.fr

Abstract. In this paper, we present a new algorithm to estimate a regression function in a fixed design regression model, by piecewise (standard and trigonometric) polynomials computed with an automatic choice of the knots of the subdivision and of the degrees of the polynomials on each sub-interval. First we give the theoretical background underlying the method: the theoretical performances of our penalized least-squares estimator are based on non-asymptotic evaluations of a mean-square type risk. Then we explain how the algorithm is built and possibly accelerated (to face the case when the number of observations is great), how the penalty term is chosen and why it contains some constants requiring an empirical calibration. Lastly, a comparison with some well-known or recent wavelet methods is made: this brings out that our algorithm behaves in a very competitive way in term of denoising and of compression.

Key words and phrases: Least-squares regression, piecewise polynomials, adaptive estimation, model selection, dynamical programming, algorithm for denoising.