ON THE ESTIMATION OF THE TUNING PARAMETER IN REGULARIZED LINEAR REGRESSION MODELS

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In the regularized linear regression models the appropriate choice of the tuning parameter plays a dominant role in the selection of the correct model. Most statistical methods employ the tool of the generalized cross-validation (GCV) for the selection of values of this parameter. In this work, we are concerned with the estimation of this parameter rather than its direct computation. We study numerical methods based on extrapolation for estimating the GCV function. Error estimates developed from the solution of linear systems are also employed and tested. We apply simulations for different statistical designs and we report the Type I and Type II error rates in order to compare the behaviour of the proposed method with the corresponding estimates of the tuning parameter which are obtained by minimizing the exact GCV function.

References

[1] E. Androulakis, C. Koukouvinos, K. Mylona, *Tuning Parameter Estimation in Penalized Least Squares Methodology*, Communications in Statistics - Simulation and Computation 40:9 (2011), pp. 1444–1457.

[2] P. Craven, G. Wahba, *Smoothing noisy data with spline functions*, Numerical Mathematics 31 (1979), pp. 377–403.

[3] J. Fan, R. Li, *Variable selection via nonconcave penalized likelihood and its oracle properties*, J. Amer. Statist. Assos. 96 (2001), pp. 1348–1360.

[4] M. Mitrouli, P. Roupa, *Estimates for the generalized cross-validation function via an extrapolation and statistical approach*, Calcolo 55(3) (2018), pp. 1–25.