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Influence diagnostics for robust P-splines using scale mixture of normal distributions

Felipe Osorio

Abstract It has been well documented that the presence of outliers and/or extreme data can strongly affect smoothing via splines. This work proposes an alternative for accommodating outliers in penalized splines considering the maximum penalized likelihood estimation under the class of scale mixture of normal distributions. This family of distributions has been an interesting alternative to produce robust estimates, keeping the elegancy and simplicity of the maximum likelihood theory. The aim of this paper is to apply a variant of the EM algorithm for computing efficiently the penalized maximum likelihood estimates in the context of penalized splines. To highlight some aspects of the robustness of the proposed penalized estimators we consider the assessment of influential observations through case deletion and local influence methods. Numerical experiments were carried out to illustrate the good performance of the proposed technique.

Keywords Cook distance · Local influence · Penalized EM algorithm · Scale mixtures of normal distributions

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