
Support Vector Machines with Hard Shape Constraints*

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Abstract

Shape constraints enable one to incorporate prior knowledge into predictive models in a principled way with numerous successful applications. Including this side information in a hard fashion (for instance, at each point of an interval) for rich function classes however is a quite challenging task. I am going to present a convex optimization framework to encode hard affine constraints on function values and derivatives in the flexible family of kernel machines. The efficiency of the approach will be demonstrated in joint quantile regression (analysis of aircraft departures), convoy localization and safety-critical control (piloting a submarine vehicle while avoiding obstacles).

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