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**Concentration inequalities for diffusion processes and their application to adaptive drift estimation**

We derive exponential bounds for the deviation probabilities of the supremum of general (additive) functionals and the local time process of scalar diffusion processes. Our approach substantially relies on combining the device of martingale approximation and moment bounds which are obtained by the generic chaining method. As a concrete statistical application, we consider the question of estimating the drift function for a large class of ergodic diffusion processes. The unknown drift is supposed to belong to a nonparametric class of smooth functions of unknown order. We suggest a fully data-driven procedure which allows for rate-optimal drift estimation with respect to sup-norm risk and, at the same time, yields an asymptotically efficient estimator of the invariant density of the diffusion.