Consistent estimates of drift parameter, based on discrete observations, in the model involving fractional Brownian motion

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Abstract

We consider stochastic differential equation involving fractional Brownian motion and with unknown drift parameter. Using Girsanov theorem, we can find the form of maximum likelihood ratio, and, moreover, represent it directly via the observable process. The form of this representation is rather complicated. Note that, in spite the equation is considered in continuous time, real observations are discrete. In the simplest case the representation of maximum likelihood ratio can be simplified, we can discretize it and establish the convergence a.s. of the discretized version of maximum likelihood ratio to the true value of parameter in the framework of "high frequency data". In the general case we can use the same representation in spite of it is not now the maximum likelihood ratio and establish the strong consistency of this discretized estimate of the drift parameter as well. As an auxiliary result, we use the a.s. estimate of the asymptotic behavior of the fractional derivative of fractional Brownian motion on the bounded interval. Surprisingly, it has the logarithmic growth.