

A SDE growth model: Nonparametric Estimation of the Drift and the Diffusion Coefficients

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Abstract: We study a stochastic differential equation (SDE) growth model to describe individual growth in random environments. In particular, in this work, we discuss the estimation of the drift and the diffusion coefficients using non-parametric methods. We illustrate the methodology by using bovine growth data.

Considering the diffusion process X_t , describing the weight of an animal at age t , characterized by the stochastic differential equation $dX_t = a(X_t)dt + b(X_t)dW_t$, with W_t being the Wiener process, we estimate the infinitesimal coefficients $a(x)$ and $b(x)$ nonparametrically. Our goal was to analyse which of the parametric models (with specific functional forms for $a(x)$ and $b(x)$) previously used by us to describe the evolution of bovine weight were good choices and also to see whether some alternative specific parametrized functional forms of $a(x)$ and $b(x)$ might be suggested for further parametric analysis of this data.