

ESTIMATION OF TIME-DEPENDENT PARAMETERS IN SDEs-BASED MODELS USING NEURAL NETWORKS

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Estimation of time-dependent parameters in SDE-based models using neural networks is a complex problem that has important applications in many fields, for example, finances or energy consumption. Estimating time-dependent parameters is a challenge due to the multitude of estimated values, and the most common approach is simplification using a piecewise-constant function. In the presentation, we focus on estimating parameters in multivariate regression and stochastic differential equations (SDEs), our most practical cases. In a more general setting provided in our paper, we introduce the estimation technique of unknown parameters based on a discrete sampling of Markov processes. Specifically, we propose a novel approach based on neural networks to estimate time-dependent parameters in SDEs, which allows us to model the temporal evolution of the system more accurately and efficiently. The crucial part is formulating the loss function based on the maximum likelihood approach, which enables us to translate our approximation task into an optimization problem and use deep learning techniques and the implementation framework. We demonstrate the effectiveness of our approach through a series of experiments. Overall, our work contributes to the growing body of research on parameter estimation in SDE-based models and provides a valuable tool for researchers and practitioners in many fields.

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