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Estimation of quantiles in a simulation model based on artificial neural networks

Master's Thesis

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Estimation of quantiles in a simulation model based on artificial neural networks

Master-Thesis von Sevda Alaca

Fachbereich Mathematik
Stochastik

Abstract

A function $m : \mathbb{R}^d \to \mathbb{R}$ is considered, which is costly to compute. X is an $\mathbb{R}^d$-valued random variable with known distribution. A nonparametric estimation of a quantile $q_{m(X),\alpha}$ is regarded, where $m(X)$ also is a random variable. An order statistic estimate and also a Monte Carlo estimate is considered, where m is replaced by an estimate m_n, which is constructed with the use of an artificial neural network. Then the quantile $q_{m(X),\alpha}$ is estimated by the Monte Carlo estimate of $q_{m_n(X),\alpha}$. Furthermore, a general error bound on the error of this quantile estimate is given. The two estimates are compared to each other by applying them on simulated data.

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