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Machine Learning Vasicek Model Calibration with Gaussian Processes

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Abstract

In this article, we calibrate the Vasicek interest rate model under the risk neutral measure by learning the model parameters using Gaussian processes for machine learning regression. The calibration is done by maximizing the likelihood of zero coupon bond log prices, using mean and covariance functions computed analytically, as well as likelihood derivatives with respect to the parameters. The maximization method used is the conjugate gradients. The only prices needed for calibration are zero coupon bond prices and the parameters are directly obtained in the arbitrage free risk neutral measure.

Keywords:

Arbitrage free risk neutral measure | Calibration | Gaussian processes for machine learning | Vasicek interest rate model | Zero coupon bond prices

Mathematics Subject Classification:

Primary 91G80 | Secondary 91G30, 60G15, 68T05

Notes

See Rasmussen (2004) for a short introduction to the Gaussian distributions over functions framework.