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IPS Paper

Sequential Filtering using Deep Learning

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Brief Description

Advanced Machine Learning Techniques For General Nonlinear And Non-Gaussian Problems

Abstract

The filtering equations govern the evolution of the conditional distribution of a signal process given partial, and possibly noisy, observations arriving sequentially in time. Their numerical approximation plays a central role in many real-life applications, including numerical weather prediction, finance and engineering. In this work we combine this method a other PDE based approach with a neural network representation to produce an approximation of the unnormalised conditional distribution of the signal process.

We further develop a recursive normalisation procedure to recover the normalised conditional distribution of the signal process. The new scheme can be iterated over multiple time steps whilst keeping its asymptotic unbiasedness property intact. We test the neural network approximations with numerical approximation results for the Kalman and Benes filter.