Monte Carlo Filtering using Kernel Embedding of Distributions*

Motonobu Kanagawa

Abstract

Kernel embedding of distributions is a nonparametric method for representing and estimating distributions using reproducing kernels, which has various applications in machine learning and statistics. In this talk, I will present a filtering algorithm for a state-space model based on kernel embedding. Specifically, I will focus on the following setting: (i) the observation model is unknown even in parametric form, but state-observation examples are given as training data, while (ii) a good model for state-transition is known. The proposed filter has potential applications in fields that involve complex observation processes, such as robotics and brain-computer interface. As an illustrative application, the proposed filter is applied to the robot localization problem, which is a fundamental task in robotics.

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