

# Kernel Methods in Particle Filtering

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Doctoral thesis - abstract

The thesis deals with the use of kernel density estimates in particle filtering. In particular, it examines the convergence of the kernel density estimates to the filtering densities. The estimates are constructed on the basis of an output from particle filtering. It is proved theoretically that using the standard kernel density estimation methodology is effective in the context of particle filtering, although particle filtering does not produce random samples from the filtering densities. The main theoretical results are: 1) specification of the upper bounds on the MISE error of the estimates of the filtering densities and their partial derivatives; 2) specification of the related lower bounds and 3) providing a suitable tool for checking persistence of the Sobolev character of the filtering densities over time. In addition, the thesis also focuses on designing kernels suitable for practical use.