**Probabilistic ODE Solvers**

Hans Kersting, Max Planck Institute for Intelligent Systems

In recent years, probabilistic numerical methods for ODEs—i.e. solvers that output a probability measure over the analytical solution—have received rising attention. This talk will present an overview over existing methods and discuss its varying properties, while putting special emphasis on Bayesian ODE Filtering. This method uses Gaussian (Kalman) filtering to solve ODEs and has grown out of machine learning, where computations consist of both numerical as well as statistical parts and where researchers have hence become aware of the need for a quantification of numerical errors in a language compatible with statistics, i.e. in the language of probability theory. Since the integration into a cost—sensitive machine learning system puts constraints on the complexity of the probabilistic addendum to classical ODE solvers, a careful calibration of the trade-off between accurate non-parametric uncertainty quantification and computational speed is necessary, and this talk will discuss where Bayesian ODE Filtering lies within the spectrum of probabilistic ODE solvers.