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F O R S C H U N G S P R A X I S
for
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On-line Gaussian Processes for Robotics

Problem description:

Gaussian Processes (GP) [1] are statistical modelling tools that has been successfully used in a number of robotics applications, such as imitation [2] and reinforcement learning [3]. On-line, incremental learning algorithms for GP have been also proposed in literature [4]. These algorithms are useful to update the learned parameters according to new incoming data. To face the increasing computational time problem, state-of-the-art incremental GP algorithms introduce criteria to sparsely represent incoming data [2, 4].

In this Forschungspraxis work the student has to implement a novel on-line GP algorithm by using fast inverse computation algorithms. Moreover, an approach will be developed to forget too old data.

Work schedule:

- Literature overview on standard and on-line GP
- Incremental GP algorithm implementation in Matlab
- Comparison with state-of-the-art approaches

Bibliography:

[1] C. E. Rasmussen and C. K. I. Williams. Gaussian processes for machine learning *MIT Press*, 2006.

[2] K. Kronander, S. M. Khansari Zadeh and A. Billard. Incremental Motion Learning with Locally Modulated Dynamical Systems *Robotics and Autonomous Systems*, 2015.

[3] M. P. Deisenroth and C. E. Rasmussen. PILCO: A Model-based and Data-Efficient Approach to Policy Search, in *International Conference on Machine Learning*, 2011.

[4] L. Csató. Gaussian Processes - Iterative Sparse Approximations *Aston University - PhD dissertation*, 2002.

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