Statistics > Machine Learning

Linear Latent Force Models using Gaussian Processes

Mauricio A. Álvarez, David Luengo, Neil D. Lawrence

(Submitted on 13 Jul 2011)

Purely data driven approaches for machine learning present difficulties when data is scarce relative to the complexity of the model or when the model is forced to extrapolate. On the other hand, purely mechanistic approaches need to identify and specify all the interactions in the problem at hand (which may not be feasible) and still leave the issue of how to parameterize the system. In this paper, we present a hybrid approach using Gaussian processes and differential equations to combine data driven modelling with a physical model of the system. We show how different, physically-inspired, kernel functions can be developed through sensible, simple, mechanistic assumptions about the underlying system. The versatility of our approach is illustrated with three case studies from motion capture, computational biology and geostatistics.

Comments:	20 pages, 2 figures. Extended technical report of the Conference Paper "Latent force models" in D. van Dyk and M. Welling (eds) Proceedings of the Twelfth International Workshop on Artificial Intelligence and Statistics, JMLR W&CP 5, Clearwater Beach, FL, pp 9--16
Subjects:	**Machine Learning (stat.ML)**; Artificial Intelligence (cs.AI)
Cite as:	**arXiv:1107.2699 [stat.ML]**
	(or **arXiv:1107.2699v1 [stat.ML]** for this version)

Submission history

From: Mauricio A. Álvarez [view email]
[v1] Wed, 13 Jul 2011 23:26:42 GMT (462kb,D)

Which authors of this paper are endorsers?