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Automated Bayesian System Identification with NARX Models

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(Submitted on 12 Mar 2013)

We introduce GP-FNARX: a new model for nonlinear system identification based on a nonlinear autoregressive exogenous model (NARX) with filtered regressors (F) where the nonlinear regression problem is tackled using Gaussian processes (GP). We integrate data pre-processing with system identification into a fully automated procedure that goes from raw data to an identified model without human intervention. Moreover, we obtain a Bayesian model of the system's dynamics which is able to report its uncertainty in regions where the data is scarce. The automated approach, the modeling of uncertainty and its relatively low computational cost make GP-FNARX a good candidate for applications in robotics and adaptive control tasks.

Subjects: **Artificial Intelligence (cs.AI)**; Robotics (cs.RO); Systems and Control (cs.SY); Machine Learning (stat.ML)

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