Session 2: Modeling and Control
14:00 – 14:40, 14th, July

Model Structure Learning for LPV and Nonlinear System Identification using LS-SVMs
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In identification of Linear Parameter-Varying (LPV) and general nonlinear systems (NL), a number of center problems evolve around the posed priors on the assumed model class and efficient capturing and parameterization of the nonlinearities. For example, accurate parametric identification of LPV systems requires an optimal prior selection of a set of functional dependencies for the parameterization of the model coefficients on a so-called scheduling signal. Inaccurate selection leads to structural bias while over-parameterization results in a variance increase of the estimates. This corresponds to the classical bias-variance trade-off, but with a significantly larger degree of freedom and sensitivity in the LPV case. Hence, it is attractive to estimate the underlying model structure of LPV systems based on measured data, i.e., to learn the underlying dependencies of the model coefficients together with model orders.
In this talk, a brief overview will be given on some recent developments of model structure learning in the LPV and NL context, focusing on the use of l1-regularization based least-squares support vector machines (SVM's) and an instrumental SVM to handle general noise conditions.