few user labeled pixels at the starting frame of a video sequence, the class membership of the remaining pixels in the current and subsequent frames are estimated and propagated in an on-line fashion. In addition we will show how the Kalman Filter or predictor can be used to provide the labels of objects in motion. The update of the memberships is carried out mainly using the out-of-sample extension property of the model. In the experiments, we demonstrate the performance of the proposed method on real-life videos.

13. **Title:** Numerically reliable identification of complex systems
Authors: Robbert Voorhoeve (TU Eindhoven, The Netherlands)
Abstract: When identifying models of complex systems, numerical issues can arise. This is, for instance, evidenced by the use of different rational and data-dependent basis functions in the literature, which are used to improve numerical conditioning in frequency domain identification. These observations motivate a detailed analysis and development of numerically reliable algorithms. In this poster a comparison between a number of different methods is presented and new connections between them are highlighted. From these connections two new identification routines are formulated. The conditioning and convergence properties of the considered methods are investigated on simulated and experimental data. The results show interesting convergence differences between (nonlinear) least squares and instrumental variable methods. In addition, the results shed light on the conditioning associated with so-called frequency localizing basis functions, vector fitting algorithms, and data-dependent (bi)-orthonormal basis functions.

14. **Title:** Optimal basis pole selection of Orthonormal Basis Function based model structure via nonlinear optimization techniques
Authors: Ahmad Alrianes Bachnas, Roland Tóth and Siep Weiland (TU Eindhoven, The Netherlands)
Abstract: Orthonormal basis functions (OBFs) based model structure have several interesting properties as a candidate model in the field of system identification. One of the appealing properties of this model structure lies in the ability to describe dynamic behavior of LTI system in multiple operating regimes using a systematic model-uncertainty description. The key element to conduct system identification using OBFs model structure boils down to the selection of the basis functions, characterized by the so called OBFs poles, to give an efficient description of the system dynamics. This work intends to solve the optimal basis pole selection problem via Nonlinear optimization techniques. Several optimization strategies will be explored and compared with the already known solution such as Fuzzy Kolmogorov n-width maximization (FKcM) algorithm.

15. **Title:** Polynomial numerical linear algebra: pruning the curse of dimensionality
Authors: Antoine Vandermeersch and Bart De Moor (KU Leuven, Belgium)
Abstract: In recent years, research has explored the link between realization theory and computational algebra [Hanzon and Hazewinkel, 2006]. Descriptor systems in particular play a prominent role in this setting, in which the regular and singular state parts of a dynamical system show a strong resemblance to the concepts of affine solutions and solutions at infinity respectively, commonly found in the field of algebraic geometry. The central point of interest in translating a system of multivariate polynomial equations into a nD descriptor system consists of determining its roots by means of an eigenvalue problem. Generalized data structures in these algorithms such as the Macaulay matrix bring about an aggravated curse of dimensionality. In this poster we outline a strategy to exploit the structure of the complement space associated with a system of polynomial equations. In doing so, a significant portion of the rows and columns of the Macaulay matrix are pruned, negating the otherwise combinatorial growth associated with its construction. In the practical domain of large scale systems, such a pruning method paves the way for keeping the memory and computational requirements under control.

16. **Title:** Enforcing stability in Bayesian system identification
Authors: Diego Romeres, Gianluigi Pillonetto and Alessandro Chiuso (University of Padova, Italy)
Abstract: A new Bayesian approach to linear system identification has been proposed in a series of recent papers. The main idea is to frame linear system identification as predictor estimation in an infinite dimensional space. This approach guarantees the identification of stable predictors based on the prediction error minimization. Unluckily, the stability of the predictors does not guarantee the stability of the impulse response of the system. In this poster we propose and compare various techniques to guarantee that the final model identified following this Bayesian approach is stable. First, we consider the so-called ``LMI - constraint'' approach and adapt it to constrain the eigenvalues of the estimated model within the unit circle. A second possibility which is being considered is to ad to the ``classic'' Stable-Spline algorithm a penalty term, depending on the maximum absolute value of the eigenvalue of the system. This last technique has the advantage of being integrated directly inside the pre-existing optimization problem and not to simply post-process the estimated model to guarantee stability. Finally, we considered a Monte Carlo Markov Chain approach sampling in both the space of hyper-parameters and of impulse responses. Simulations results comparing these techniques will be provided. Furthermore, real applications in which these stability issues arise, such as identification of brain network from fMRI data, will be discussed.

17. **Title:** Identification of continuous-time models with arbitrary time-delay from sampled data
Authors: Fengwei Chen, Hugues Garnier and Marion Gilson (University of Lorraine, France)
Abstract: This poster presents a new approach to identify continuous-time systems with time-delay from regularly or irregularly sampled input-output data. It is based on the separable nonlinear least-squares method which combines in a bootstrap manner the iterative optimal instrumental variable method for transfer function model estimation with an adaptive gradient-based technique that searches for the optimal time-delay. Since the objective function may have many local minima, the initialization of the time-delay search requires special attention. Here, a low-pass ltering strategy is used to widen the convergence region around the global minimum. The proposed method has the advantages of low complexity. It can handle the case when the time-delay is not a multiple of the sampling interval and when the input-output data are non-uniformly sampled. Simulation results are included to show the performance of the proposed algorithm.

18. **Title:** Bayesian nonparametric identification of piecewise affine ARX systems
Authors: Johan Wågberg (Uppsala University, Sweden), Fredrik Lindsten (University of Cambridge, UK) and Thomas B. Schön (Uppsala University, Sweden)