

System Identification with Few Samples

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Abstract

System identification has long been a topic of interest in control community, and many classic algorithms are successively derived and proved to be asymptotically unbiased, such as the Ho-Kalman algorithm and the subspace methods. However, when only few or moderate amount of samples are available, the ill-conditionedness of certain algorithms are observed both in theory and in practice. In this talk, we first provide an analysis on the ill-conditioned problem, and prove that both the Ho-Kalman algorithm and the identification problem itself are ill-conditioned. Specifically, the result also shows that the system poles are hard to identify. Motivated by this observation, we then introduce a new identification algorithm by constructing another system with predefined system poles to approximate the input-output relationship of the true system. Both theoretical analysis and numerical results demonstrate the efficiency of the proposed algorithm.

Biography

Jiayun Li received her Bachelor of Engineering degree from Department of Automation, Tsinghua University, Beijing, China, in 2022. She is currently a second-year Ph.D. student in the Department of Automation, Tsinghua University. Her research interests include system identification with its applications in robotics.

All are welcome

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