Universität Stuttgart
Institut für Systemtheorie und Regelungstechnik
Prof. Dr.–Ing. Frank Allgöwer

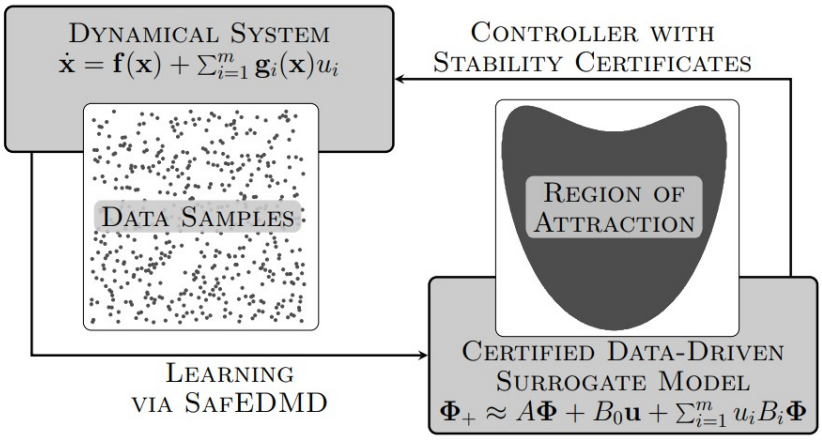
Open Thesis (MA)

Data-driven control for nonlinear systems using Koopman operator theory

Description:

This thesis would be based on the **S**tability- **a**nd certi**f**icate-oriented **E**xtended **D**ynamic **M**ode **D**ecomposition (SafEDMD)-framework, which provides a data-driven controller design for unknown nonlinear systems. In particular, the approach is based on the Koopman operator theory, which views the dynamics of a (controlled) nonlinear system as an infinite-dimensional (bi-)linear system. SafEDMD learns a bilinear surrogate model with guaranteed error bounds, which can be used for a robust controller design.

Although SafEDMD is already used with different controller designs, e.g., based on linear matrix inequalities, sum-of-squares optimization, or combined with model predictive control, there are still open questions. The topic of this thesis can be the investigation of different controller designs within the SafEDMD framework, e.g., when the surrogate model lacks certain stabilizability properties, or in terms of scalability and computational complexity.



Recommended prerequisites: *Data-driven control*, *Robust control*, *Linear matrix inequalities in control*

Supervisor:

Robin Strässer
Room 2.234

Area:

data-driven control
robust control
nonlinear control

Properties:

Type: MA

25% literature
60% theory
15% simulation

Beginning:

anytime

Further information on www.ist.uni-stuttgart.de/lehre/bama

Aushang vom November 19, 2024