ID de Contribution: **22** Type: **Stage de M2 (5mois)**

Dynamic model Learning for Model Predictive Control of Nonlinear Systems

This position explores the intersection of Control Theory (CT) and Machine Learning (ML) to enhance the control of nonlinear systems. While CT employs model-based strategies for stabilization and estimation, it struggles with the complexities of nonlinear models, especially regarding noisy data and uncertainties. This research proposes leveraging ML advancements to create data-driven representations of dynamic systems, integrating these with traditional control methods.
The proposition focuses on improving model predictive controllers (MPC), known for their effectiveness but high computational demands. In contrast, model-free methods like reinforcement learning are less computationally intensive but lack robust theoretical foundations. The goal is to simplify nonlinear MPC optimization using coordinate transformations, facilitated by ML algorithms, to yield linear or affine representations.The research will initially focus on finding transformations to represent nonlinear systems in a latent linear space.The work can continue as part of a PhD by demonstrating that these representations can support MPC controller design with reduced complexity. Collaborations with industrial partners will apply the findings to real-world energy system challenges, validating the effectiveness of the proposed strategies and contributing to advancements in both fields.

Master

EEEA

Laboratoire d'accueil

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