A Modular Ecosystem for Research in Learning-based Receding Horizon Control

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***Abstract*— Robotics research right now is heavily shifting towards the use AI-based tools. This also applies specifically to the loco-manipulation field, where a substantial push towards pure learning-based control policies and pipelines is taking place. Nonetheless it is the authors belief that, given the current limitations of pure learning-based policies (e.g. safety guarantees, interpretability, ...), online model-based Trajectory Optimization should not be considered outdated yet. Our ultimate goal is to show the benefits of combining offline data-based policy design, specifically through Reinforcement Learning (RL), with online Motion Planning, i.e. Receding Horizon Control (RHC). Even though this kind of hybrid approaches are not entirely new, to the authors' knowledge, there is no specific tool currently available for search in this domain. To this purpose, we developed a modular software ecosystem, which is hereby presented briefly in all its main components and features. We care to stress that the framework is currently under active development, so features might not be stable of could be lacking. To facilitate usability and diffusion, we make all framework code open source under the GPLv2 license. To showcase the potential of the framework, we furthermore present a simplified proof-of-concept with our hybrid-wheeled quadruped Centauro.**

I. Introduction

II. State of the art: learning-based MPC and research tools

[1] [2] [3]

III. Framework overview and scope

IV. Conclusions, challenges and future work

References

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