Safe Active Learning for Time-Series Modeling with Gaussian Processes

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Abstract: Learning time-series models is useful for many applications, such as simulation and forecasting. In this study, we consider the problem of actively learning time-series models while taking given safety constraints into account. For time-series modeling we employ a Gaussian process with a nonlinear exogenous input structure. The proposed approach generates data appropriate for time series model learning, i.e. input and output trajectories, by dynamically exploring the input space. The approach parametrizes the input trajectory as consecutive trajectory sections, which are determined stepwise given safety requirements and past observations. We analyze the proposed algorithm and evaluate it empirically on a technical application. The results show the effectiveness of our approach in a realistic technical use case.

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Keywords: Safe Active Learning; Dynamics Modeling

Bibliography

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