Data-Driven Learning of Dynamical Systems Using Discrete-Temporal Sobolev Networks

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Abstract: In this talk, we delve into the forefront of data-driven methodologies for understanding complex dynamical systems, focusing on the Lorentz system and the standard map. We have developed the innovative approach of Discrete-Temporal Sobolev Networks, to capture the intricate behaviors inherent in chaotic systems. This technique, rooted in the latest advancements in machine learning and neural networks, presents a novel framework for the data-driven learning of dynamical systems' trajectories. We will also demonstrate the models for the Lorentz system and the standard map, showcasing their potential to generalize and predict complex system dynamics.