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Paper Title	A Review on Developing Machine Learning Algorithms for Constraint Physical Systems of Cybersecurity Threats
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Abstract & Keyword	<i>This thesis explores two computational approaches to learn and simulate complex physical systems exhibiting constraint characteristics. The target applications encompass both solids and fluids. On the solid side, we proposed a new family of data-driven simulators to predict the behaviors of an unknown physical system by learning its underpinning constraints. We devised a neural projection operator facilitated by an embedded recursive neural network to interactively enforce the learned underpinning constraints and to predict its various physical behaviors. Our method can automatically uncover a broad range of constraints from observation point data, such as length, angle, bending, collision, boundary effects, and their combinations, in the context of a diverse set of physical systems including rigid bodies, ropes, articulated bodies, and multi-object collisions. On the fluid side, we proposed a gauge numerical simulator to model fluid phenomena using Clebsch wave functions. Our method combines the expressive power of Clebsch wave functions to represent coherent vortical structures and the generality of gauge methods to accommodate a broad array of fluid phenomena. We devised a transformed wave function as the system's gauge variable to improve a fluid simulator's vorticity generation and preservation ability. We showcase our method by simulating various types of incompressible flow phenomena, including complex vortex filament dynamics, fluids with different obstacles, and surface-tension flow.</i> Keyword :- Machine Learning, Cybersecurity, Cybersecurity Threat Detection, Cyber-Physical Systems, Constrained Physical Systems.
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