ビジュアルコンピューティングセミナー2023-3

下記の要領で，Chandrajit Bajaj 先生の講演会を開催しますのでご参集ください．

日 時：2023 年 7 月 12 日（水）16：30-18：00

場 所：慶應義塾大学矢上キャンパス 14 棟セミナールーム 2 (14-212)

講 師：Prof. Chandrajit Bajaj

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題 目：Principled Learning to Model our Dynamic Environments

要 旨：Can computers be programmed to learn to model progressive approximations of the underlying dynamical processes of specific environments, through interaction (i.e. spatio-temporal sensing). We answer this in the affirmative with a proviso that not all the Hamiltonian models of environmental processes are learnable at optimal fidelity. Computers equipped with stable numerical solvers (some, possibly simultaneously learnable), are at the mercy of the noise and uncertainty of the sensed environmental observations. Can nevertheless be programmed to stably train, cross-validate and test stochastic PDE (partial differential equation) neural operators. The learning is along optimally controlled pathways that satisfy a form of the Hamilton-Jacobi-Bellman equation. In this talk, I shall explain a framework of learning Hamiltonian models (Hamiltonians) as a partially observable controlled Markov decision process model (COMDP) and based on the Pontryagin's maximum principle. The COMDP model learning trajectory operates on a constrained manifold that satisfy the conservation laws of the underlying physics, via application of Noether's theorem. The COMDP includes learning dynamic stabilizing control satisfying learned Lyapunov functions for error bounded, convergent solutions, and additionally produces sparse approximations that avoid overfitting. This talk shall show a few examples of such learned spatio-temporal models of dynamic environments, with various approximations of dynamic shape and function. This is joint work with my students Taemin Heo, Minh Nguyen, and Yi Wang.

略 歴：Prof. Chandrajit Bajaj is the director of the Center for Computational Visualization, at the Oden Institute for Computational and Engineering Sciences and a Professor of Computer Sciences at the University of Texas at Austin. He holds the Computational Applied Mathematics Chair in Visualization. He is also an affiliate faculty member of Mathematics, Computational Neuroscience and Electrical Engineering. He is currently on the editorial boards for the International Journal of Computational Geometry and Applications, and the ACM Computing Surveys, and past editorial member of the SIAM Journal on Imaging Sciences. He was awarded a distinguished alumnus award from the Indian Institute of Technology, Delhi, (IIT, Delhi). He is also a Fellow of The American Association for the Advancement of Science (AAAS), Fellow of the Association for Computing Machinery (ACM), Fellow of the Institute of Electrical and Electronic Engineers (IEEE), and Fellow of the Society of Industrial and Applied Mathematics (SIAM). He has won the University of Texas Faculty research award, the Dean Research Assignment award, and also thrice won the University of Texas, Institute of Computational Engineering and Sciences, Moncreif Grand Challenge research award. http://www.cs.utexas.edu/~bajaj

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