北京大学前沿计算研究中心
Center on Frontiers of Computing Studies, Peking University

学术报告

Deep Learning for Physics Simulations

Prof. Nils Thuerey

Technical University of Munich

2018年11月30日 星期五 10:10am

北京大学 静园五院 101

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Abstract:

In this talk Professor Thuerey will focus on the possibilities that arise from recent advances in the area of deep learning for accelerating and improving physics simulations. Professor Thuerey will focus on fluids, which encompass a large class of materials we encounter in our everyday lives. In addition to being ubiquitous, the underlying physical model, the Navier-Stokes equations, at the same time represent a challenging, non-linear advection-diffusion PDE that poses interesting challenges for deep learning methods.

Professor Thuerey will explain and discuss several research projects from their lab that focus on temporal predictions of physical functions, temporally coherent adversarial training, and predictions of steady-state turbulence solutions. Among other things, it turns out to be useful to make the learning process aware of the underlying physical principles. Here, especially the transport component of the Navier-Stokes equations plays a crucial role. Nils will also give an outlook about open challenges in the area of deep learning for physical problems. Most importantly, trained models could serve as priors for a variety of inverse and control problems.

Biography:

Nils Thuerey is an Associate-Professor at the Technical University of Munich (TUM). He works in the field of computer graphics, with a particular emphasis on physics simulations and deep learning algorithms. One focus area of his research targets the simulation of fluid phenomena, such as water and smoke, which find applications as visual effects in computer generated movies and digital games. Examples of his work are novel algorithms to make simulations easier to increase the amount of turbulent detail.

After studying computer science, Nils Thuerey acquired a PhD for his work on liquid simulations in 2006. He received both degrees from the University of Erlangen-Nuremberg. Until 2010 he held a position as a post-doctoral researcher at ETH Zurich. He received a tech-Oscar from the AMPAS in 2013 for his research on controllable smoke effects. Subsequently, he worked for three years as R&D lead at ScanlineVFX, before he started at TUM in October 2013.

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