

HKU-TCL Joint Research Centre for AI Workshop

Speaker:

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Title:

Incorporating Geometric Priors for Data-driven 3D Estimation and Forecasting with Deep Learning

Abstract:

3D geometry estimation and forecasting play an essential role for intelligent systems to carry out physical interactions with the environment. Though deep convolutional neural networks on their own have obtained considerable success in data-driven 3D geometry estimation and forecasting, our investigations show that their performance is still not satisfactory regarding result quality and model generalization.

In this talk, I will discuss our recent efforts in advancing this area by incorporating geometric priors into deep learning. I will first present our work on integrating geometric consistency of depth and surface normal into deep convolutional neural networks for high-quality 3D geometry estimation. Then, I will talk about our domain-invariant stereo matching network, embracing domain normalization and non-local graph-based filters, to achieve robust stereo matching across different data domains. Finally, I will elaborate on our 3D motion decomposition framework, including camera motion prediction and 3D object motion prediction, for RGBD scene forecasting.