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Course title: Computer Graphics

3 April 2018

Review on SIGGRAPH 2017 papers

I pick three topics to learn about from SIGGRAPH 2017 papers, namely

Learning to Move, Clever Solids and Being Discrete About Geometry Processing

1. Learning to Move

This topic is about animation, which studies how to control, specify and

represent objects' motion. Animation includes techniques on deforming the

geometry of objects, and then change the models of objects from time to time to

make them "learn to move". In the paper Learning to Schedule Control Fragments

for Physics-Based Characters Using Deep Q-Learning, researchers introduce an

approach to control characters by using DQN (Deep Q-Network), which is the

combination of Q-learning and neural networks. In another paper, DeepLoco:

Dynamic Locomotion Skills Using Hierarchical Deep, researchers adopt a two-

level hierarchical control framework to learn physics-based locomotion skills.

Low-level controllers learn from massive samples to realize robust walking gaits,

while the high-level controllers further learn to make decisions according to high-

dimensional inputs. With controllers of two levels, researchers divide and conquer

the problem of helping objects to learn to move and finally manage to have an

object do certain locomotion like trailing through terrains and kicking a soccer ball towards a target location etc.

2. Clever Solids

This topic studies about physics simulation in computer graphics. The paper, A Multi-Scale Model for Simulating Liquid-Hair Interactions introduces solution to simulate liquid and wet hairs. To simulate a physical object, works can be divided into 3 steps roughly, namely finding possible models to describe the physical scenario, discretizing continuous parameters like time and position and finally finding approximate solution to the formulas of simulating the scenarios. Two important sorts of physical simulation are rigid simulation and fluid simulation. Physical simulation includes collision detection, friction, granular material and so on. Research on simulating liquid and wet hair above is an example of fluid simulation (However, this paper is included in the topic named Clever "Solids", where other several papers are also on fluid simulation. I guess the editor simply cluster all papers on physical simulation together.). Fluid simulation also covers the simulation of gas, viscoelastic fluid, explosion, bubble, foam and wave etc.

3. Being Discrete About Geometry Processing

In this topic, technique of discrete geometry is discussed. Discrete geometry is usually mentioned together with combinatorial geometry. They study combinatorial properties and constructive geometric objects. In computer graphics, discrete geometry is used to digitizes 3D objects with points, lines and

triangles. With finite considerable triangles, we can construct linear approximation to surfaces, which are always smooth in reality. The SIGGRAPH papers "Bounding Proxies for Shape Approximation" advise that the topology of the shape should be simplified in the first place in order to prevent the subsequent geometric optimization from topological locks.

Work Cited

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