Projects / Applied Subjects

Visual Computing
Neural Renderer

- **Build Renderer**
  - Access to deferred shading stages
  - Fast CUDA interface to DL models
  - Open playground to test DL algorithms with realtime graphics

- **Train Neural Nets**
  - Image-to-Image translation
  - Spatio-temporal coherence
  - Neural Textures

- **Useful to know:**
  - Basic Computer Graphics
  - Existing Renderer (Unity, UE4, ...)
  - Deep Learning (CNNs, GAN, AutoEncoder)
Blender Addon for Data Synthesis
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Our tool
- Blender addon for automated rendering.
- Based on SUNCG data set. (3D indoor scenes ~45K)
- Using Blender Python API

Topics
1. Detailing Indoor Scenes.
2. Point Cloud Generation (extend existing project).

Technologies
- Blender 2.8
- Python
- Blender Python API
Detailing Indoor Scenes

- Detailing Indoor Scenes by adding stuff to the scene
- Precomputation of priors (Indoor Scene Statistics).

Indoor Scene Statistics

3D Objects (from ShapeNet)

3D Indoor Scene (from SUNCG)

Detailed Indoor Scene
Point clouds by Photogrammetry simulation

Based on existing project.
- convert Mesh to point cloud (sampling random points)
- Filtering by camera test.

Simulation of Photogrammetry
- Extend filters to material properties, etc.
- Add noise and distortion.
Visual Preference Analysis

- Idea: Use neural nets to extract viewpoints from highly rated images
- Goal: A pipeline to load images, preprocess them and derive viewpoint statistics
- Technologies:
  - Possibly Tensorflow, PyTorch, MATLAB (depending on the backend networks)
LaTeX Library for Neural Networks

- Idea: Extend the graph visualization library to draw neural networks
- Goal: A small library for LaTeX, for fast and easy visualizations
- Technologies:
  - LaTeX, Overleaf
  - TikZ/PGF
  - Python(PythonTeX)
Reinforcement Learning Interface (alex.baeuerle@)

Idea
• Visualization for Reinforcement Learning
• General approach for different tasks

Technologies
• Tensorflow
• Some Visualization Technology

Thank you for your interest!