Neural Networks for Images and 3D Shapes

Summary

ConvNets and Images

Main Topics

- Fundamentals
  - Locally Connected Layer / Stationarity / Templates (block, architecture)
- ConvNets in Detail
  - Convolutional Layer / Pooling Layer (receptive field) / Contrast Normalization
- Types of Convolutional Networks
  - Analysis ConvNet / Full ConvNet / Training
- CNN Architectures
  - LeNet / AlexNet / VGG / ResNet

Neural 3D Networks

Main Topics

- Representation and 3D Networks
  - Continuous (Implicit) / Discrete (Extrinsic, Intrinsic) / Conversion of Representation
- Discrete Extrinsic (RGB-D , Voxel Grids)
  - Convolution / Volumetric Analysis / Volumetric Synthesis
- Discrete Intrinsic (Point Clouds, Meshes)
  - Point Clouds (Permutation & Xform Invariance) / Meshes (Eigendecomposition, Spectral CNN)
- 3D Deep Learning Applications
  - Classification / Segmentation / Detection / Generation / Reconstruction
- Datasets and Platforms
  - ShapeNet / ScanNet / Etc ..
- Differentiable Rendering
  - Graphics Layers / Rendering Ops / Rendering in the Loop / Architecture