Learning Approaches to Estimate Depth from RGB

Lecture 5
What will we learn - Latest Approaches to Depth Estimation based on Machine Learning (DNNs)

- Why do we need new approaches?
- Paper1 -> CNNs for Depth estimation
- Paper2 -> Semantics for Depth Estimation
- Paper3 -> Differentiable Rendering for Depth Estimation
- Paper4 and Paper5 -> Learned Multi-view geometry
Stereo pair

\[ p_u - p'_u \propto \frac{B \cdot f}{z} \]

Disparity map / depth map

Courtesy figure: Silvio Savarese.
Meta - What is important in DNN research?

- Priors
- Data

+ →

- Architecture
- Loss
Kato et al. - “Neural 3D Mesh Renderer”, CVPR18
Rendering

3D model + Parameters
Kato et al. - “Neural 3D Mesh Renderer”, CVPR18
Godard et al. - “Unsupervised Monocular Depth Estimation with Left-Right Consistency”, CVPR17
Zhang et al. - LiStereo: Generate Dense Depth Maps from LIDAR and Stereo Imagery, arxiv
Question - What are Latest Trends in Learning Depth from RGB?
List four recent trends in "Depth from RGB/Stereo"?
What are Latest Trends in Learning Depth from RGB?

1. Large amount of data + Powerful parametric function approximators (DNNs)
2. Exploit semantics
3. Differentiable Rendering
4. Self supervision from stereo
5. Sparse supervision from Lidar