Segmentation

Image segmentation

- Group pixels
  - Same object
  - Same "stuff"
  - Same part

Semantic segmentation

- Group pixels according to their semantic class
- Does not distinguish identities
- Segments objects and stuff
- Easiest to train and evaluate

Instance segmentation

- Segment only objects
- Segment and label each instance
- Extension of object detection

Panoptic segmentation

- Segment instances and stuff
- Combines semantic and instance segmentation in a single task
- Evaluation tricky

Datasets: MS COCO

- 80 classes
- 200k images
- 1.5M objects
- Both instance and stuff labels

Microsoft coco: Common objects in context, Lin et al., ECCV 2014

Driving datasets

- Semantic segmention
  - Cityscapes
  - Mapillary

Image source : Cityscapes dataset

The Cityscapes Dataset for Semantic Urban Scene Understanding, Cordts et al., CVPR 2016
The Mapillary Vistas Dataset for Semantic Understanding of Street Scenes, Neuhold et al., ICCV 2017

Datasets: Simulators

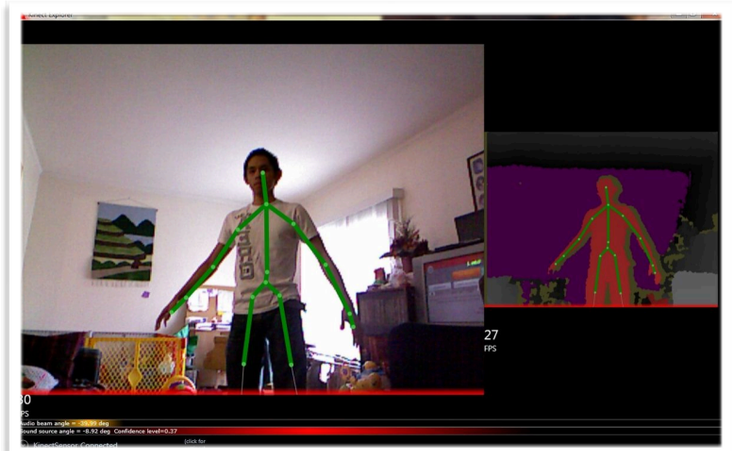
- Segmentation at no additional cost from rendering engine

- Examples
  - GTA V
  - Carla
  - Habitat

Playing for data: Ground truth from computer games, Richter et al., ECCV 2016
Free supervision from video games, Krähenbühl, CVPR 2018

Applications

- Assisted driving



- MS Kinect body tracking

- Computer graphics (matting)

Image source: Deep Image Matting, Xu et al., https://arxiv.org/pdf/1703.03872.pdf