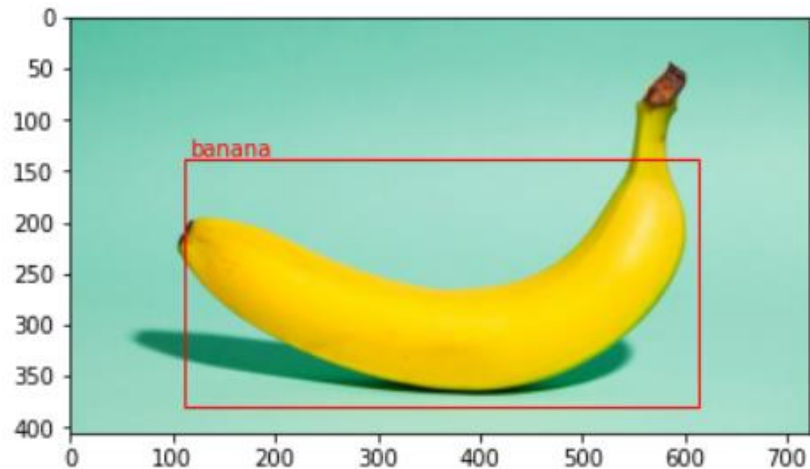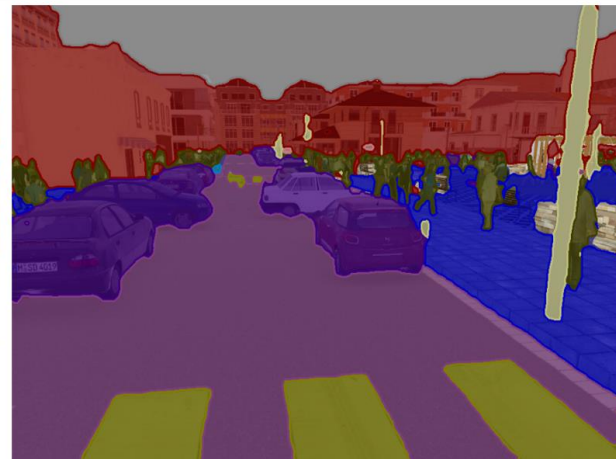# Image Segmentation 101

Image Segmentation

- Image Classification
  - tells us WHAT is shown on an image
- Object Detection
  - tells us WHAT and WHERE it is on an image (bounding box)

Image Segmentation

- Prediction of classes for <u>each pixel</u> rather than for a complete image
- Applicable for
    - Medical imaging
    - Satellite image processing
    - Autonomous driving
    - …

Source: https://medium.com/nanonets/how-to-do-image-segmentation-using-deep-learning-c673cc5862ef

Image Segmentation

- use color image (HxWx3) or grayscale (HxWx1) and return segmentation mask (HxWx1)

Input

Semantic Labels

Source: https://www.jeremyjordan.me/semantic-segmentation/

Image Segmentation

- use color image (HxWx3) or grayscale (HxWx1) and return segmentation mask (HxWx5)

Source: https://www.jeremyjordan.me/semantic-segmentation/
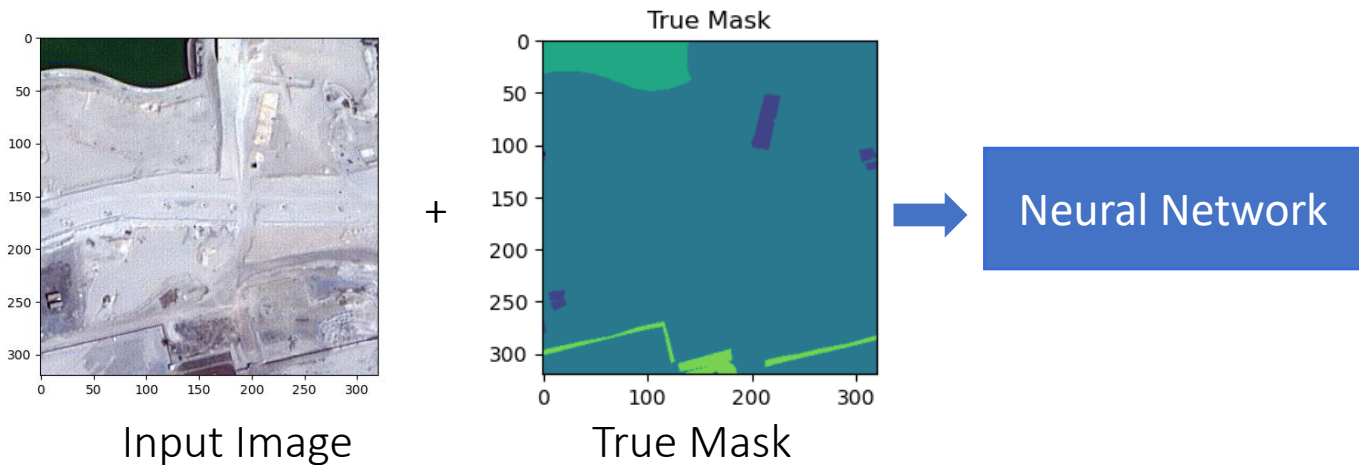
Image Segmentation

(a)   Image

Source: Changhao Chen, et. al „A Survey on Deep Learning for Localization and Mapping: Towards the Age of Spatial Machine Intelligence"

Image Segmentation

- satellite images
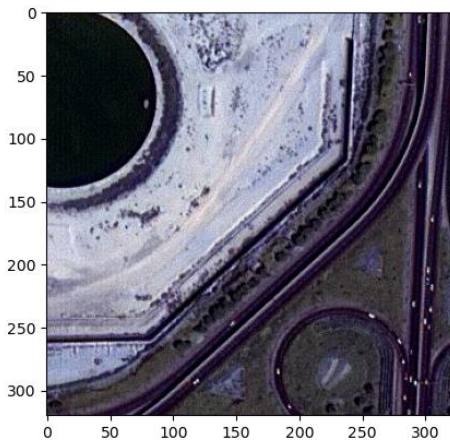- 6 classes: building, land, road, vegetation, water, unlabeled

Input Image   +   True Mask   →   Neural Network

Image Segmentation

What we will develop in this course

- satellite images
- 6 classes: building, land, road, vegetation, water, unlabeled

Input Image

Neural Network

Predicted Mask