CloudyPoints

A Monocular Depth Estimation Tool and 3D Point Cloud Generator

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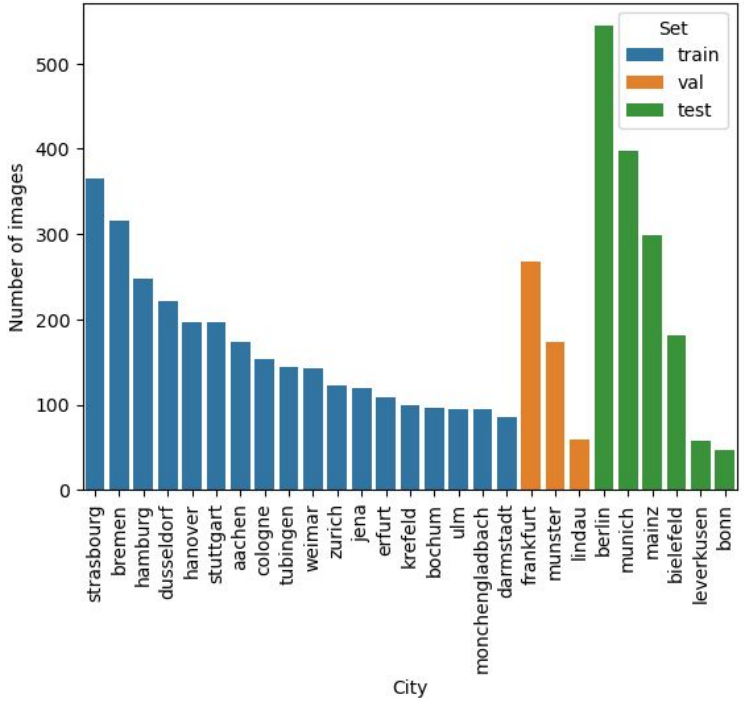
Project Description

- Monocular Depth Estimation (MDE)
  - Estimates depth in RGB image
- Outdoor Scenes
- Cityscapes Dataset
- Applications
  - Autonomous systems
  - Video surveillance
  - Augmented and virtual reality

https://www.cityscapes-dataset.com/

Cityscapes Dataset

- Urban street scenes
  - German cities
- Stereo camera
  - Left and right image
  - Disparity
- 5000 images
  - Training set: 2975
  - Validation set: 500
  - Test set: 1525

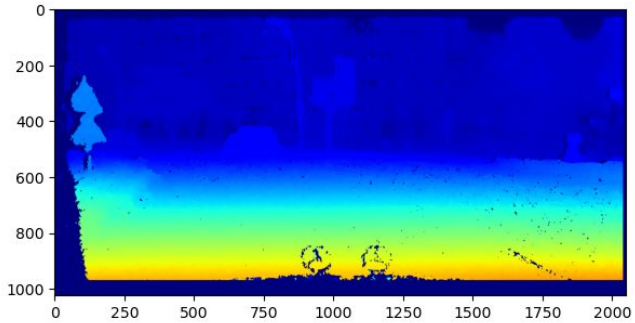


Cityscapes Dataset

- Image Size 2048 x 1024
- Sample image
  - Aachen
  - Hanover

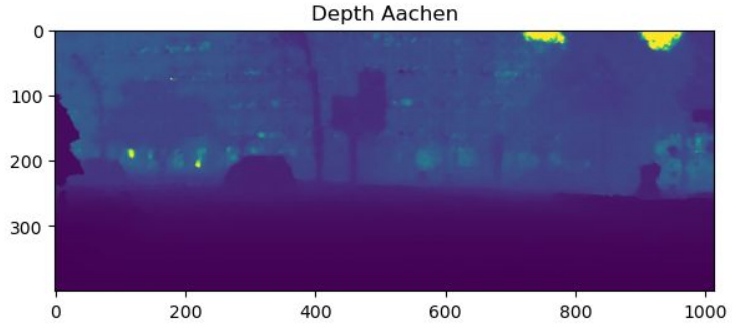
Cityscapes Dataset

- Disparity
  - Used to create depth
  - Missing information in the left side and bottom
  - Double mercedes emblem
  - Noise and spots



Data Preparation

- Depth map
  - Crop
  - Inpainting
  - Blur to decrease noise
  - Clip at max 500
- Resize to height 400
  - Less storage
  - Faster model training

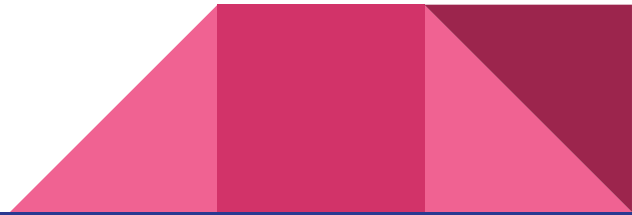


Models

- intel-isl/MiDaS/DPT_Hybrid (122M)
- inel-isl/MiDaS_small (22.3M)

Metrics: (Trained for 15 epochs)

1. Structural Similarity Index Measure (SSIM): (0.90 – 0.88)
2. L1Loss: (0.027 – 0.032)

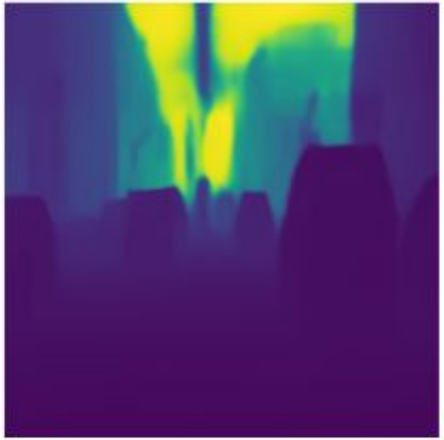


Output Example

RGB image

Ground Truth Depth map

Predicted Depth Map



Thank you