TensorFlow Requirement 1.x TensorFlow 2 Not Supported

vid2depth

Unsupervised Learning of Depth and Ego-Motion from Monocular Video Using 3D Geometric Constraints

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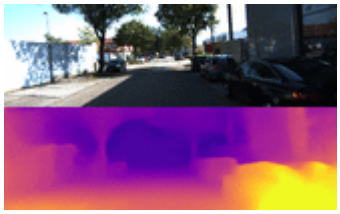
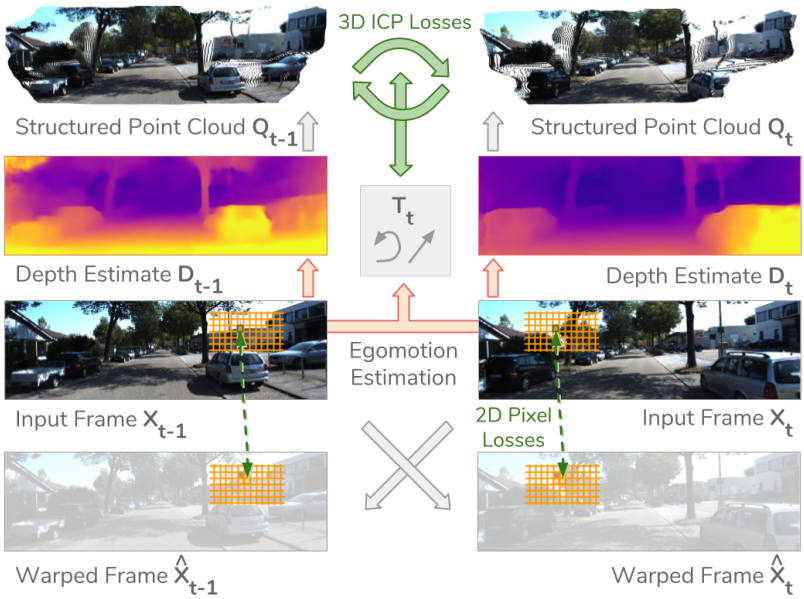
CVPR 2018

Project website: https://sites.google.com/view/vid2depth

ArXiv: https://arxiv.org/pdf/1802.05522.pdf





Update: TF2 version.

Please see https://github.com/IAMAI/vid2depth_tf2 for a TF2 implementation of vid2depth.

1. Installation

Requirements

Python Packages

```
mkvirtualenv venv  # Optionally create a virtual environment.
pip install absl-py
pip install matplotlib
pip install numpy
pip install scipy
pip install tensorflow
```

Download vid2depth

```
git clone --depth 1 https://github.com/tensorflow/models.git
```

2. Datasets

Download KITTI dataset (174GB)

```
mkdir -p ~/vid2depth/kitti-raw-uncompressed
cd ~/vid2depth/kitti-raw-uncompressed
wget
https://raw.githubusercontent.com/mrharicot/monodepth/master/utils/kitti_archives_to_d

wget -i kitti_archives_to_download.txt
unzip "*.zip"
```

Download Cityscapes dataset (110GB) (optional)

You will need to register in order to download the data. Download the following files:

- leftImg8bit_sequence_trainvaltest.zip
- camera_trainvaltest.zip

Download Bike dataset (34GB) (optional)

Please see https://research.google/tools/datasets/bike-video/ for info on the bike video dataset.

Special thanks to Guangming Wang for helping us restore this dataset after it was accidentally deleted.

```
mkdir -p ~/vid2depth/bike-uncompressed
cd ~/vid2depth/bike-uncompressed
wget https://storage.googleapis.com/vid2depth/dataset/BikeVideoDataset.tar
tar xvf BikeVideoDataset.tar
```

3. Inference

Download trained model

```
mkdir -p ~/vid2depth/trained-model
cd ~/vid2depth/trained-model
```

```
wget https://storage.cloud.google.com/vid2depth/model/model-119496.zip
unzip model-119496.zip
```

Run inference

```
cd tensorflow/models/research/vid2depth
python inference.py \
  --kitti_dir ~/vid2depth/kitti-raw-uncompressed \
  --output_dir ~/vid2depth/inference \
  --kitti_video 2011_09_26/2011_09_26_drive_0009_sync \
  --model_ckpt ~/vid2depth/trained-model/model-119496
```

4. Training

Prepare KITTI training sequences

```
# Prepare training sequences.
cd tensorflow/models/research/vid2depth
python dataset/gen_data.py \
  --dataset_name kitti_raw_eigen \
  --dataset_dir ~/vid2depth/kitti-raw-uncompressed \
  --data_dir ~/vid2depth/data/kitti_raw_eigen \
  --seq_length 3
```

Prepare Cityscapes training sequences (optional)

```
# Prepare training sequences.
cd tensorflow/models/research/vid2depth
python dataset/gen_data.py \
  --dataset_name cityscapes \
  --dataset_dir ~/vid2depth/cityscapes-uncompressed \
  --data_dir ~/vid2depth/data/cityscapes \
  --seq_length 3
```

Prepare Bike training sequences (optional)

```
# Prepare training sequences.
cd tensorflow/models/research/vid2depth
python dataset/gen_data.py \
  --dataset_name bike \
  --dataset_dir ~/vid2depth/bike-uncompressed \
  --data_dir ~/vid2depth/data/bike \
  --seq_length 3
```

Compile the ICP op

The pre-trained model is trained using the ICP loss. It is possible to run inference on this pre-trained model without compiling the ICP op. It is also possible to train a new model from scratch without compiling the ICP op by setting the icp loss to zero.

If you would like to compile the op and run a new training job using it, please use the CMakeLists.txt file at https://github.com/IAMAI/vid2depth_tf2/tree/master/ops.

Run training

```
# Train
cd tensorflow/models/research/vid2depth
python train.py \
  --data_dir ~/vid2depth/data/kitti_raw_eigen \
  --seq_length 3 \
  --reconstr_weight 0.85 \
  --smooth_weight 0.05 \
  --ssim_weight 0.15 \
  --icp_weight 0 \
  --checkpoint_dir ~/vid2depth/checkpoints
```

Reference

If you find our work useful in your research please consider citing our paper:

```
@inproceedings{mahjourian2018unsupervised,
  title={Unsupervised Learning of Depth and Ego-Motion from Monocular Video Using 3D Geometric Constraints},
    author={Mahjourian, Reza and Wicke, Martin and Angelova, Anelia},
    booktitle = {CVPR},
    year={2018}
}
```

Contact

To ask questions or report issues please open an issue on the tensorflow/models issues tracker. Please assign issues to @rezama.

Credits

This implementation is derived from SfMLearner by Tinghui Zhou.