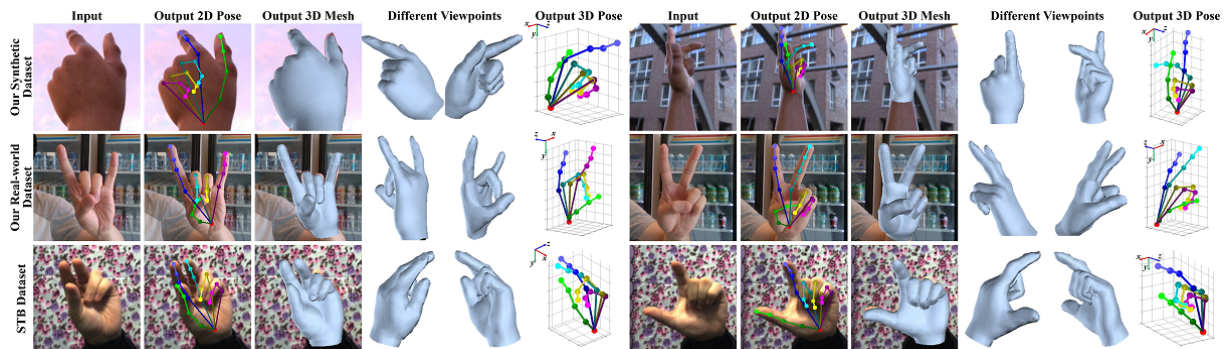

3D Hand Shape and Pose Estimation from a Single RGB Image

Open source of our CVPR 2019 paper “3D Hand Shape and Pose Estimation from a Single RGB Image”



Introduction

This work is based on our CVPR 2019 paper. You can also check our project webpage and supplementary video for a deeper introduction.

This work addresses a novel and challenging problem of estimating the full 3D hand shape and pose from a single RGB image. Most current methods in 3D hand analysis from monocular RGB images only focus on estimating the 3D locations of hand keypoints, which cannot fully express the 3D shape of hand. In contrast, we propose a Graph Convolutional Neural Network (Graph CNN) based method to reconstruct a full 3D mesh of hand surface that contains richer information of both 3D hand shape and pose. To train networks with full supervision, we create a large-scale synthetic dataset containing both ground truth 3D meshes and 3D poses. When fine-tuning the networks on real-world datasets without 3D ground truth, we propose a weakly-supervised approach by leveraging the depth map as a weak supervision in training. Through extensive evaluations on our proposed new datasets and two public datasets, we show that our proposed method can produce accurate and reasonable 3D hand mesh, and can achieve superior 3D hand pose estimation accuracy when compared with state-of-the-art methods.

Citation

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

```
1 @inproceedings{ge2019handshapepose,
2   title={3D Hand Shape and Pose Estimation from a Single RGB Image},
3   author={Ge, Lihao and Ren, Zhou and Li, Yuncheng and Xue, Zehao and
         Wang, Yingying and Cai, Jianfei and Yuan, Junsong},
```

```
4   booktitle={CVPR},  
5   year={2019}  
6 }
```

Installation

1. Install pytorch >= v0.4.0 following official instruction.
2. Clone this repo, and we'll call the directory that you cloned as `${HAND_ROOT}`.
3. Install dependencies: `pip install -r requirements.txt`

Running the code

1. Evaluate on our real-world dataset and visualize the results of hand mesh and pose. `python eval_script.py --config-file "configs/eval_real_world_testset.yaml"` The visualization results will be saved to `${HAND_ROOT}/output/configs/eval_real_world_testset.yaml/`
2. Evaluate on STB dataset.

Download STB dataset to `${HAND_ROOT}/data/STB`.

Run the following script: `python eval_script.py --config-file "configs/eval_STB_dataset.yaml"` The pose estimation results will be saved to `${HAND_ROOT}/output/configs/eval_STB_dataset.yaml/`

3D hand shape and pose dataset

We release the 3D hand shape and pose dataset. It contains a large scale synthetic image dataset for training and validation, and a small real-world image dataset for testing. For details, please go to the data folder in this repository.