A PyTorch Reproduction of HCN

Co-occurrence Feature Learning from Skeleton Data for Action Recognition and Detection with Hierarchical Aggregation.
Chao Li, Qiaoyong Zhong, Di Xie, Shiliang Pu, IJCAI 2018.

Arxiv Preprint

Features

1. Dataset

- ☑ NTU RGB+D: Cross View (CV), Cross Subject (CS)
- ☐ SBU Kinect Interaction
- ☐ PKU-MMD

2. Tasks

- ☑ Action recognition
- ☐ Action detection

3. Visualization

- Visdom supported.

Prerequisites

Our code is based on **Python3.5**. There are a few dependencies to run the code in the following:

- Python >= 3.5
- **PyTorch == 0.4.0**
- torchnet
- Visdom
- Other version info about some Python packages can be found in `requirements.txt`

Usage

Data preparation

NTU RGB+D

To transform raw NTU RGB+D data into numpy array (memmap format) by this command:

```
python ./feeder/ntu_gendata.py --data_path <path for raw skeleton dataset>
--out_folder <path for new dataset>
```

Other Datasets

Not supported now.

Training

Before you start the training, you have to launch visdom server.

```
python -m visdom
```

To train the model, you should note that:

- `--dataset_dir` is the **parents path** for **all** the datasets,
- `--num` the number of experiments trials (type: list).

```
python main.py --dataset_dir <parents path for all the datasets> --mode
train --model_name HCN --dataset_name NTU-RGB-D-CV --num 01
```

To run a new trial with different parameters, you need to:

- Firstly, run the above training command with a new trial number, e.g, `--num 03` , thus you will got an error.
- Secondly, copy a parameters file from the `./HCN/experiments/NTU-RGB-D-CV/HCN01/params.json` to the path of your new trial `"./HCN/experiments/NTU-RGB-D-CV/HCN03/params.json"` and modify it as you want.
- At last, run the above training command again, it will works.

Testing

```
python main.py --dataset_dir <parents path for all the datasets> --mode
test --load True --model_name HCN --dataset_name NTU-RGB-D-CV --num 01
```

Load and Training

You also can load a half trained model, and start training it from a specific checkpoint by the following command:

```
python main.py --dataset_dir <parents path for all the datasets> --mode
load_train --load True --model_name HCN --dataset_name NTU-RGB-D-CV --num
01 --load_model <path for  trained model>
```

Results

Table

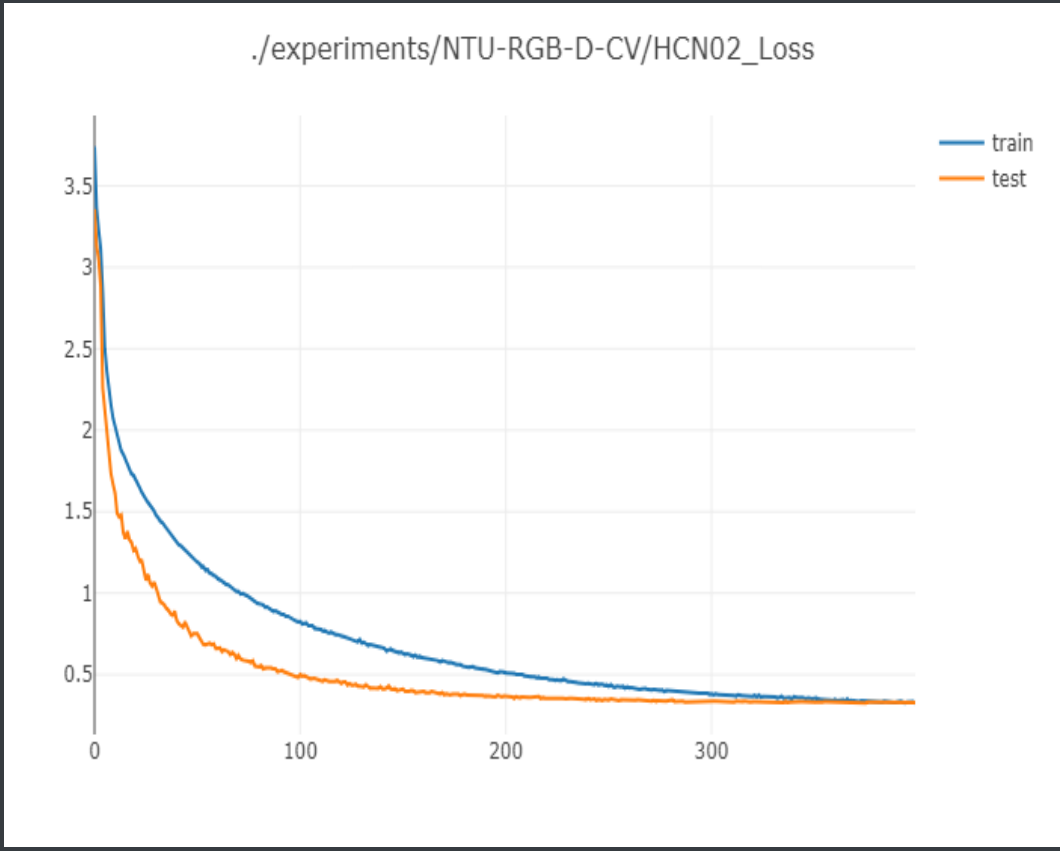
The expected **Top-1 accuracy** of the model for NTU-RGD+D are shown here (There is an **accuracy gap**. I am not the author of original HCN paper, the repo was reproduced according to the paper text and have not been tuned carefully):

Model	Normalized Sequence Length	FC Neuron Numbers	NTU RGB+D Cross Subject (%)	NTU RGB+D Cross View (%)
HCN[1]	32	256	**86.5**	**91.1**
HCN	32	256	84.2	89.2
HCN	64	512	84.9*	90.9*

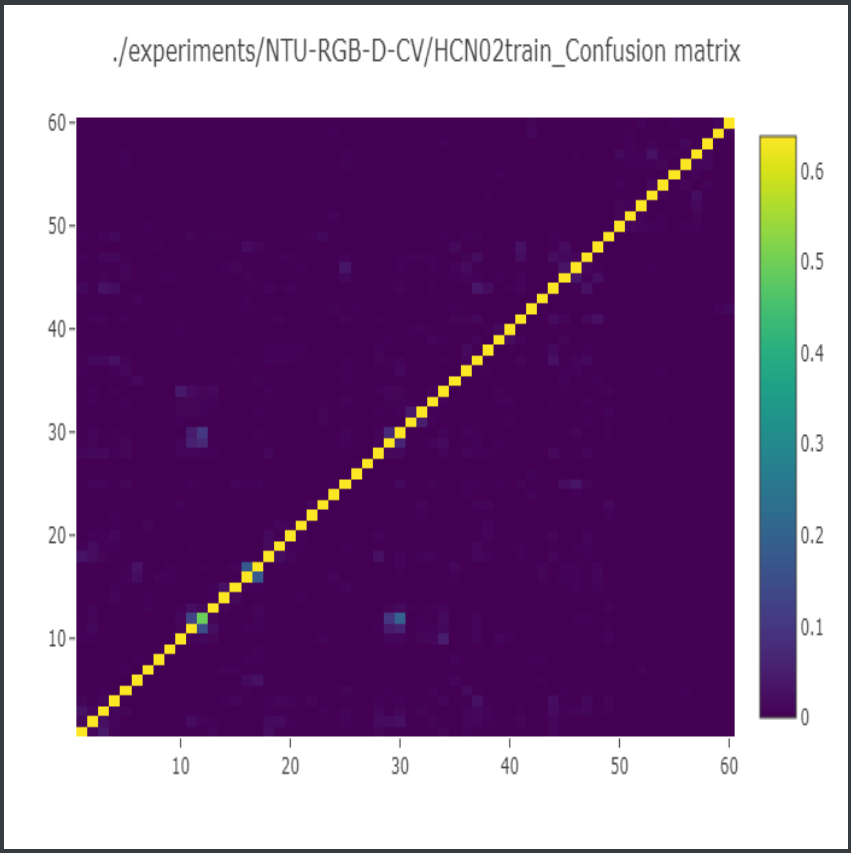
[1] http://arxiv.org/pdf/1804.06055.pdf

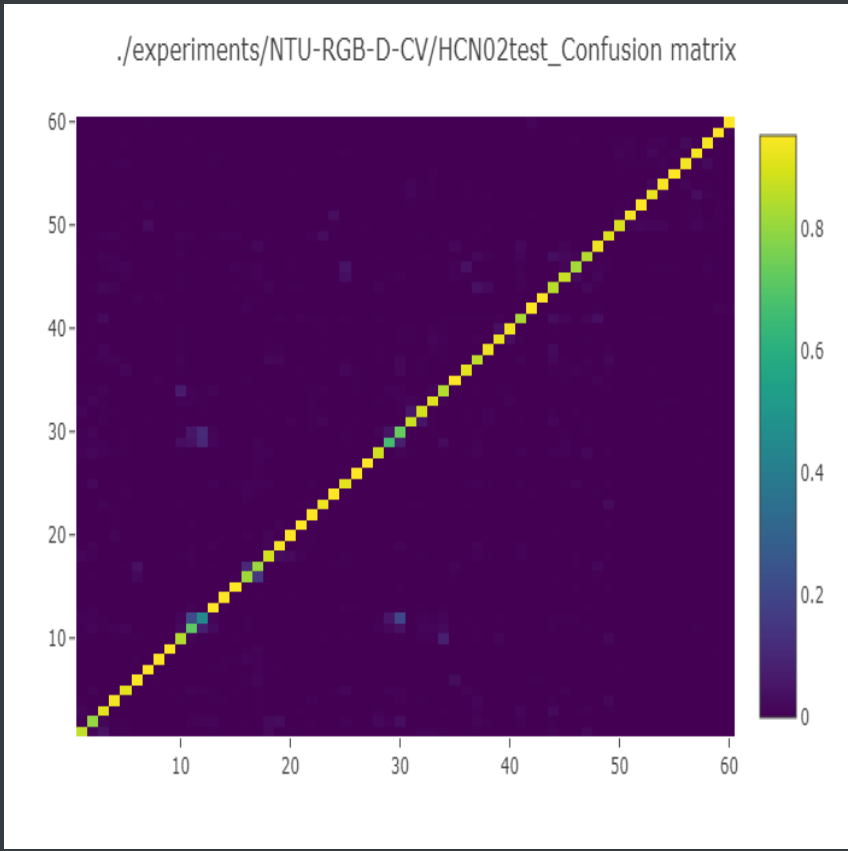
Figures

- Loss & accuracy[CV]

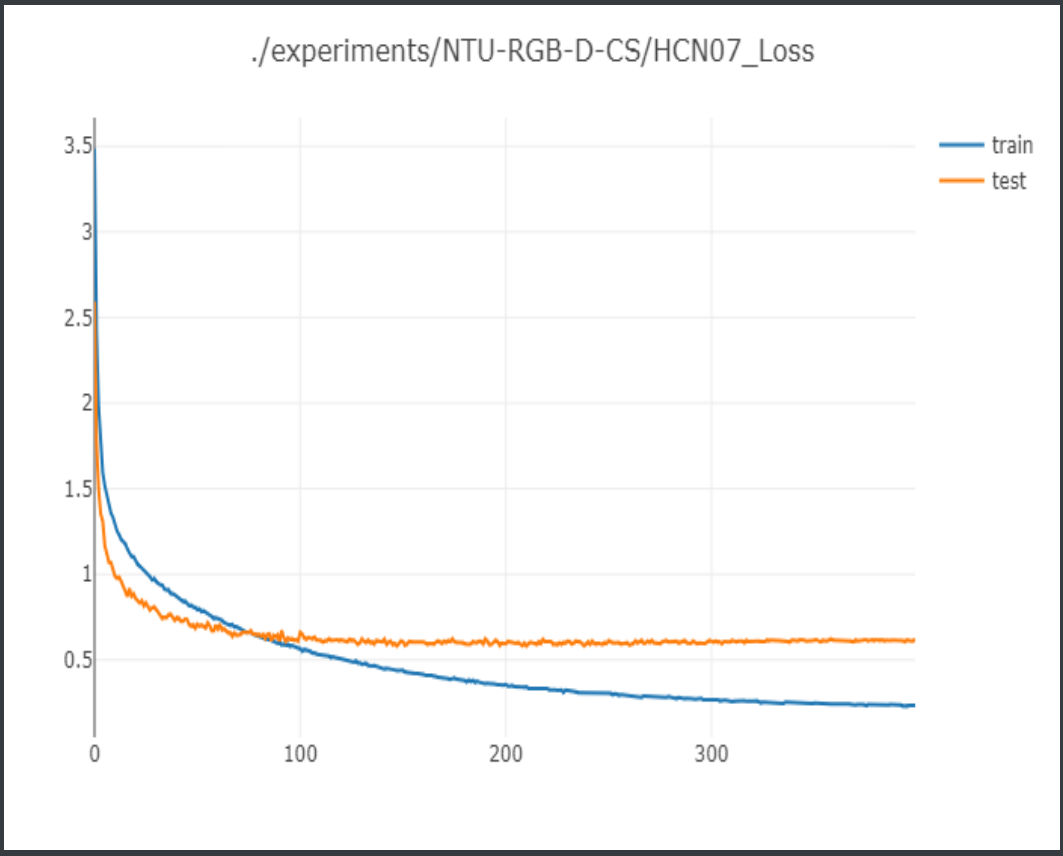


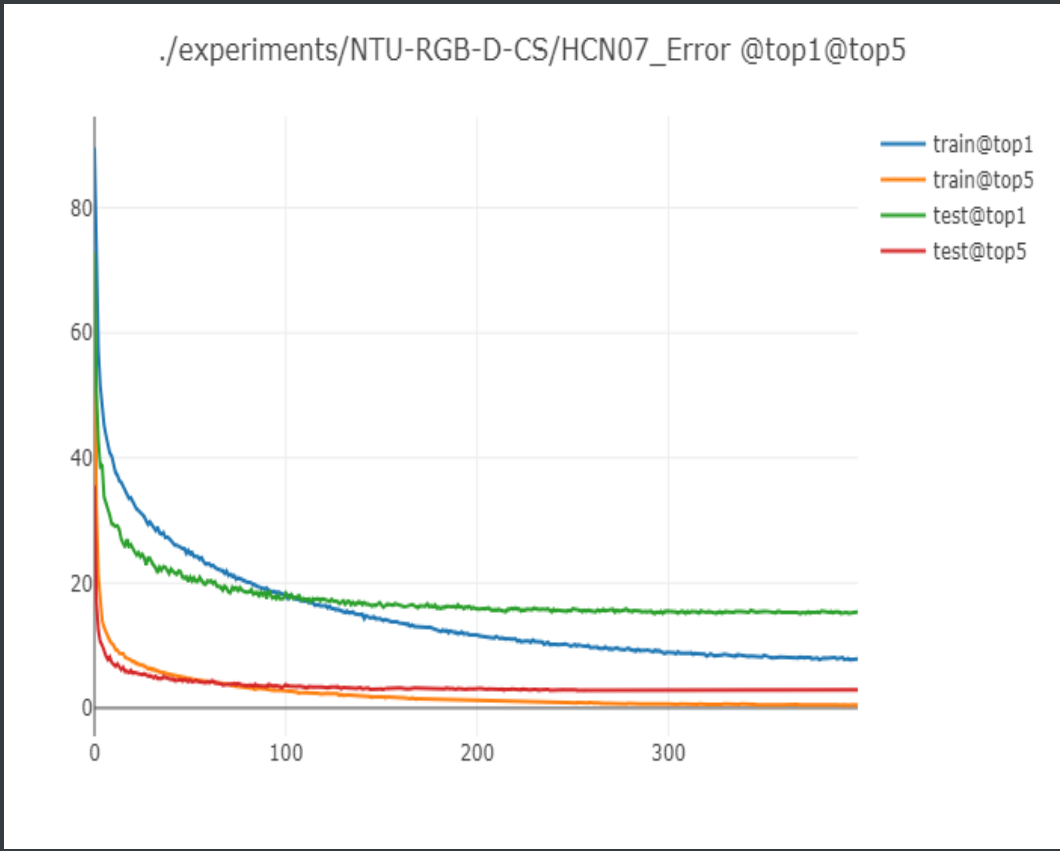
Confusion matrix





- Loss & accuracy[CS]





Reference

[1] Chao Li, Qiaoyong Zhong, Di Xie, Shiliang Pu. Co-occurrence Feature Learning from Skeleton Data for Action Recognition and Detection with Hierarchical Aggregation. IJCAI 2018.

[2] yysijie/st-gcn: referred for some code of dataset processing.