Meta Auxiliary Learning

This repository contains the source code to support the paper: Self-Supervised Generalisation with Meta Auxiliary Learning, introduced by Shikun Liu, Andrew J. Davison and Edward Johns.

Requirements

MAXL was written in `python 3.7` and `pytorch 1.0`. We recommend running the code through the same version while we believe the code should also work (or can be easily revised) within other versions.

Models & Datasets

This repository includes three models `model_vgg_single.py`, `model_vgg_human.py` and `model_vgg_maxl.py` representing baselines `Single`, `Human` and our proposed algorithm `MAXL` with backbone architecture `VGG-16`. These three models are trained with `4-level CIFAR-100 dataset` which should easily reproduce part of the results in Figure 3.

In `create_dataset.py`, we define an extended version of CIFAR-100 with 4-level hierarchy built on the original CIFAR100 class in `torchvision.datasets` (see the full table for semantic classes in Appendix A). To fetch one batch of input data with kth hiearchical labels as defined below, we have `train_data` which represents the input images and `train_label` which represents the 4-level hiearchical labels: `train_label[:, k], k = 0, 1, 2, 3` fetches 3, 10, 20 and 100-classes respectively.

```
train_data, train_label[:, k] = cifar100_train_dataset.next()
```

Training MAXL

The source code provided gives an example of training primary task of 20 classes `train_label[:, 2]` and auxiliary task of 100 classes `train_label[:, 3]` with hierarchical strcuture `\psi[i]=5`. You may revise the code easily to evaluate other hierarchies and play with other datasets found in `torchvision.datasets`. Note that: make sure `len(psi)` be the number of primary classes, and `sum(psi)` is the number of auxiliary classes, e.g. `psi = [2,3,4]` representing total 3 priamry classes and total 9 auxilairy classes by splitting each primary class into 2, 3, and 4 different auxilairy classes.

Training MAXL from scratch typically requires 30 hours in GTX 1080, and training the baselines methods `Single` and `Human` requires 4 hours from scratch.

Citation

If you found this code/work to be useful in your own research, please considering citing the following:

```
@article{liu2019maxl,
  title={Self-Supervised Generalisation with Meta Auxiliary Learning},
  author={Liu, Shikun and Davison, Andrew J and Johns, Edward},
  journal={arXiv preprint arXiv:1901.08933},
  year={2019}
}
```

Contact

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