Meta-Learning: A New Way to Learn and Comparison of Machine-Learning Vs Meta-Learning.

Introduction

In this project, we use one of the meta-learning techniques to classify images using mini-ImageNet- a subset of Imagenet, which was proposed in [1] for the research of few-shot learning. The dataset contains that 64, 16, and 20 classes for meta-learning training, validation, and testing respectively. The number of images in the mini-ImageNet is 60,000 of size 84x84 RGB with 600 samples per class.

Dependencies

- Python 3, Keras, Tensorflow

Basic usage

The repository is currently compatible with TensorFlow-2.2.0 and makes use of the Keras API using the tensorflow.keras library.

- clone the repository and enter the folder

Sample Data

Images from the mini-ImageNet before taking center crop and resizing to 84x84

Algorithm-MAML

Random initialization of the parameters of the neural network for the discrete datasets will disturb its ability to converge into the optimized solution. Paper [2] demonstrated how the MAML model can improve the accuracy of the LSTM based MTL model. The main concept of paper [2] is to train the initial parameters of the model so that the model has to show the best performance by updating the parameter in a few gradient steps on the novel tasks after training with a small number of data.

Implementation

The implementation of the MAML algorithm on Mini-Image Net is done by using learn2learn library which is based on Pytorch.

Reference

[1]Oriol Vinyals, Charles Blundell, Timothy Lillicrap, Koray Kavukcuoglu, and Daan Wierstra.: Matching networks for one-shot learning. In Proceedings of the 30 th International Conference on Neural Information Processing Systems (NIPS'16). Curran Associates Inc., RedHook, NY, USA(2016) 3637–3645.

[2]Chelsea Finn, Pieter Abbeel, and Sergey Levine.: Model-agnostic meta-learning for fast adaptation of deep networks. In Proceedings of the 34 th International Conference on Machine Learning - Volume 70 (ICML'17). JMLR.org (2017).