

2019-1 Deep Learning Homework #5

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Deadline: June 6

Please prepare the report for the following questions as detail as possible and send it to dkkang@gmail.com.

1. Using the code from <https://github.com/cbfinn/maml>, do the following procedures:
 - (a) Generate sinusoid data, where the amplitude varies within $[0.1, 5.0]$ and the phase varies within $[0.1, 5.0]$.
 - (b) Perform MAML on your sinusoid data using $k = 1, 5$, and 10 data samples and analyze the model performances by calculating the mean square error (MSE) value.
 - (c) Visualize your baseline and prediction values (pre-update, 1 gradient step and 10 gradient step) by using the graph. (You may have 3 different figures with 4 graphs in each figure)
 - (d) Perform MAML on the omniglot dataset using $k = 1$ and 5-shot for each $n = 5$ and 20-way learning and analyze its performance.
 - (e) From the experiment you did in 1(d), you will have the parameter values from the inner loop, θ'_i , which basically are the set of the neural network weights for each task τ_i . Get the θ'_i for two different tasks (for example the weight from τ_1 and τ_2) then calculate the difference by using the euclidean distance.

Please refer to the MAML paper [1] to get the more explanations about some notations.

2. Using the code in <https://github.com/jik0730/Meta-SGD-pytorch>, perform the Meta-SGD to the omniglot dataset using $k = 1$ and 5-shot for each $n = 5$ and 20-way learning and analyze its performance. Then give the analysis of the result compared to MAML you have done in 1(d).

References

- [1] Chelsea Finn, Pieter Abbeel, and Sergey Levine. Model-Agnostic Meta-Learning for Fast Adaptation of Deep Networks. *Proceedings of the 34th International Conference on Machine Learning*. Sydney, Australia, 2017.