Cognitive Science and AI: Assignment 4

Toward Few Shot Deep Learning

April 14, 2022

One of the main divergences between human learning and deep learning is sample efficiency. Humans and animals are capable of learning in a fast way, not requiring many samples in a lot of cases, something that is absent in the majority of deep learning networks. This could be due to multiple reasons, humans employ advanced transfer learning of skills from one task to another, creating abstract and compositional representations that can be used. Also, humans and animals have inductive bias mechanisms that are capable of learning a task one shot. This assignment is to explore fast learning mechanisms in machine learning that learn from a few examples, do zero shot/one shot learning. Possible mechanisms of fast learning include few shot learning in ML, meta-learning, hybrid architectures of parametric/non parametric learning, episodic reinforcement learning. A viva will be conducted later to ensure the student has understood the concept.

1 Dataset

The dataset to be used for the assignment can be downloaded from
https://github.com/brendenlake/omniglot/

2 Tasks

In this assignment, you are asked to implement a one-shot learning algorithm using Siamese Neural Networks and use Omniglot as your dataset.

3 Evaluation Metric

Final loss and accuracy on the test set.

4 Deliverables

Convergence times, final loss and accuracy on the test set along with relevant graphs reporting loss. Write a short description about the architecture of the network.