

Learning Learning Algorithms

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1 Abstract

The most important point in an intelligent system (human or otherwise) is the ability to learn.

Most, if not all, learning algorithms are hand-crafted by humans.

In this thesis we will take a closer look into learning algorithms: what algorithms are available, what are their main features, but we will be specially interested in developing new learning algorithms from a biologically inspired framework, such as genetic algorithms: we want to learn learning algorithms.

Our focus will be in studying algorithms that can be used on neural networks.

We are particularly interested in following the directions in [1–3].

2 Goals

There are two main goals in this thesis: first, a systematical analysis of available learning algorithms; second, developing (learning) new learning algorithms with focus on application to (deep) neural networks.

A good knowledge of programming, probabilities and English language is necessary.

3 Tasks

T1: State-of-the-art in learning methods.

T2: Implement a framework to learn learning algorithms.

T3: Make extensive evaluation on public data sets.

T4: Write the thesis and a scientific paper.

4 Schedule

Task	Start date	Duration
T1	2016-10-01	2 months
T2	2016-12-01	3 months
T4	2017-03-01	1 month
T5	2017-04-01	3 months

References

- [1] Marcin Andrychowicz, Misha Denil, Sergio Gomez, Matthew W. Hoffman, David Pfau, Tom Schaul, and Nando de Freitas. Learning to learn by gradient descent by gradient descent. *CoRR*, abs/1606.04474, 2016.
- [2] Maria-Florina Balcan, Avrim Blum, and Santosh Vempala. Efficient representations for life-long learning and autoencoding. *CoRR*, abs/1411.1490, 2014.
- [3] Luca Bertinetto, João F. Henriques, Jack Valmadre, Philip H. S. Torr, and Andrea Vedaldi. Learning feed-forward one-shot learners. *CoRR*, abs/1606.05233, 2016.