

# Learning Learning Algorithms

Luís A. Alexandre

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## 1 Abstract

The most important point in an intelligent system (human or otherwise) is the ability to learn. Most learning algorithms are hand-crafted by humans. This is limiting in the sense that the learning algorithm used in a particular task and with a given learning machine may not be the most appropriate learning method for that particular task / machine: it is just one method that as produced good results in the past in other settings.

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 learning methods.

T2: Implement a method to learn learning algorithms.

T3: Make extensive evaluation on public data sets.

T4: Write the thesis and a scientific paper.

## 4 Schedule

<b>Task</b>	<b>Start date</b>	<b>Duration</b>
T1	2017-10-01	2 months
T2	2017-12-01	3 months
T3	2018-03-01	1 month
T4	2018-04-01	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] 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.
- [3] Leigh Sheneman and Arend Hintze. Machine learned learning machines. *CoRR*, abs/1705.10201, 2017.