Understanding deep meta-learning

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Propositions

accompanying the dissertation

Understanding Deep Meta-Learning

Mike Huisman

1. The surprising performance gap between the meta-learner LSTM and MAML can be attributed to the use of processed inputs for the LSTM and the neglection of second-order gradients (Chapter 3)
2. Two important factors that contribute to the success of MAML and Reptile in few-shot learning scenarios are 1) their exposure to noisy training conditions induced by the shortage of data for the training tasks, and 2) the fact that they start learning new tasks from a good initialization of the output layer instead of a randomly initialized output layer (Chapter 4)
3. The classical LSTM approach fails to achieve a good few-shot learning performance on few-shot image classification problems because it intertwines the learning algorithm and input representation at the highest level of feature representations (post-CNN features) (Chapter 5)
4. The few-shot learning performance of gradient-based meta-learning algorithms can be improved by learning which subsets of parameters to adjust (Chapter 6)
5. It is unlikely that humans can update their optimization algorithm (adjust how neural connections are strengthened or weakened) akin to “learning to optimize” methods to increase their learning efficiency
6. Meta-learning alone, even in its broadest form of learning a learning algorithm, will not lead to artificial general intelligence
7. MAML is not biologically plausible
8. Model-based meta-learning is the most promising avenue for discovering novel and more efficient deep learning algorithms despite the popularity of optimization-based meta-learning algorithms such as MAML
9. Deep meta-learning can help unlock the full potential of deep neural networks in society by lowering the required amount of data for successfully deploying deep learning algorithms

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