HyperNOMAD: Hyperparameter Optimization of Deep Neural Networks using Mesh Adaptive Direct Search

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Abstract

The performance of deep neural networks is highly sensitive to the choice of the hyperparameters that define the structure of the network and the learning process. Tuning a deep neural network might be difficult and time-consuming. This explains the necessity of automating the calibration of these hyperparameters. Derivative-free optimization is a field that develops methods designed to optimize time-consuming functions without relying on derivatives.
In this seminar, the notion of hyperparameter optimization and artificial neural newtork are briefly introduced.
Later on, the HyperNOMAD package is presented, an extension of the NOMAD software that applies the MADS algorithm to simultaneously tune the hyperparameters responsible for both the architecture and the learning process of a deep neural network (DNN). Before showing the performance of HyperNOMAD, the MADS workflow and its convergence guarantees are explored.
HyperNOMAD is tested on the MNIST, Fashion-MNIST, and CIFAR-10 datasets and achieves results comparable to the current state of the art.

References

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[2] Abramson, Mark Audet, Charles Dennis, J. Le Digabel, Sébastien. (2009). OrthoMADS: a deterministic MADS instance with orthogonal directions. SIAM Journal on Optimization.