Learn To Control The Learning Rate with Reinforcement Learning

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Here the learning rate of the sgd_env is dynamically adapted with a learned Reinforcement Learning agent.

The learning rate $\gamma \in [0.00001, 1]$ is adjusted in the log-space. We used a SAC Haarnoja et al. (2018) agent from the library stable-baselines3 Raffin et al. (2021) and trained it for 1000000 steps. For training we used $n_{instances} = 1000$ and a policy architecture of two hidden layers with 64 neurons each. We switch the instance each reset in a round-robin manner. No hyperparameters have been tuned.

References

Haarnoja, T., Zhou, A., Abbeel, P., and Levine, S. (2018). Soft actor-critic: Off-policy maximum entropy deep reinforcement learning with a stochastic actor. In Dy, J. G. and Krause, A., editors, *Proceedings of the 35th International Conference on Machine Learning, ICML 2018, Stockholmsmässan, Stockholm, Sweden, July 10-15, 2018*, volume 80 of *Proceedings of Machine Learning Research*, pages 1856–1865. PMLR.

Raffin, A., Hill, A., Gleave, A., Kanervisto, A., Ernestus, M., and Dormann, N. (2021). Stable-baselines3: Reliable reinforcement learning implementations. *Journal of Machine Learning Research*, 22(268):1–8.

