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Control variates with neural networks

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In lattice QCD, the precision of results is often hampered by the inherent uncertainty of stochastic methods. Recently, control variates methods have emerged as a promising solution for such noise. Traditional control variates have been used to mitigate this issue, but they rely on educated guesses, which can be limiting. In this talk, I will introduce a neural network approach to parametrize control variates, eliminating the need for guesswork. Using 1+1 dimensional scalar field theory as a testbed, I will demonstrate significant variance reduction, particularly in the strong coupling regime. Also, I will discuss applications of neural control variates on gauge theories.

Primary author: OH, Hyunwoo

Presenter: OH, Hyunwoo

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