On training spiking neural networks by means of a novel quantum inspired machine learning method

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Abstract

In spite of the high potential shown by spiking neural networks (e.g., temporal patterns), training them remains an open and complex problem [1]. In practice, while in theory these networks are computationally as powerful as mainstream artificial neural networks [2], they have not reached the same accuracy levels yet. The major reason for such situation seems to be represented by the lack of adequate training algorithms for deep spiking neural networks, since spike signals are not differentiable, i.e. no direct way to compute a gradient is provided. Recently a novel training method, based on the (digital) simulation of certain quantum systems, has been suggested. It has already shown interesting advantages, among which the fact that no gradient is required to be computed. In this work, we apply this approach to the problem of training spiking neural networks and we show that this recent training method is capable of training deep and complex spiking neural networks on the MNIST data set.

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