Associated learning: A methodology to decompose end-to-end backpropagation on CNN, RNN, and transformer

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Abstract

We study associated learning (AL), an alternative methodology to end-to-end backpropagation (BP). We introduce the workflow to convert a neural network into an AL-form network such that AL can be used to learn parameters for various types of neural networks. We compare AL and BP on some of the most successful neural networks: convolutional neural networks, recurrent neural networks, and Transformers. Experimental results show that AL consistently outperforms BP on open datasets. We discuss possible reasons for AL's success, its limitations, and AL's newly discovered properties. Our implementation is available at https://github.com/Hibb-bb/AL.