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**MARTINA NEUMAN**, University of Vienna

*Efficient Learning Using Spiking Neural Networks Equipped With Affine Encoders and Decoders*

We study the learning problem associated with spiking neural networks. Specifically, we consider hypothesis sets of spiking neural networks with affine temporal encoders and decoders and simple spiking neurons having only positive synaptic weights. We demonstrate that the positivity of the weights continues to enable a wide range of expressivity results, including an efficient sorting property, a rate-optimal approximation of smooth functions or approximation without the curse of dimensionality. Moreover, positive-weight spiking neural networks are shown to depend continuously on their parameters which facilitates classical covering number-based generalization statements. Finally, we observe that from a generalization perspective, contrary to feedforward neural networks or previous results for general spiking neural networks, the depth has little to no adverse effect on the generalization capabilities.