

1135-VN-1953      **Devin Willmott\*** ([devin.willmott@uky.edu](mailto:devin.willmott@uky.edu)), **David Murrugarra** and **Qiang Ye**. *RNA State Inference with Deep Recurrent Neural Networks*.

The problem of determining which nucleotides of an RNA sequence exist in base pairs, which we refer to as RNA state inference, can be approached with a variety of machine learning techniques. Successful state inference of RNA sequences can be used to gain insights into the related problem of secondary structure inference. Typical tools for this task, such as hidden Markov models, exhibit poor performance in RNA state inference, owing in part to their inability to recognize nonlocal dependencies. Bidirectional long short-term memory (LSTM) neural networks have emerged as a powerful tool that can model global nonlinear sequence dependencies and have achieved state-of-the-art performance on many sequential classification problems. This paper presents a method for RNA state inference centered around convolutions and LSTM networks. Our method achieves highly accurate state inference predictions and significantly outperforms hidden Markov models on a test sets of RNA sequences with a broad range of lengths, MFE accuracies, and nonuniform patterns of paired and unpaired regions. (Received September 25, 2017)