Deep Recurrent Neural Network with Multiple Time scale and Its Real World Applications

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For recent years, the most prominent subfield of machine learning has been deep learning. Deep learning methods have taken a place not only in many professional academic areas such as computer vision, speech recognition and language processing, but also in industrial areas. Recent breakthroughs have been introducing and adapting, deep learning methods eventually defeating many classical state-of-art algorithms in many engineering application fields [1, 2]. Moreover, they have shed light to the brain-like artificial intelligence. Many of the successes in the deep learning algorithms have been informed, if not inspired, by the brain. These include the original neural networks, convolutional networks, evolutionary computation, and many others. A commonality is that they exploit simple fundamental principles in the brain and biology to great effect, often surpassing complex, human-designed approaches. The continued success of these methods suggest that the brain is a rich source of insight into learning that is yet to be exhausted, and should continue to be carefully investigated. In this talk, I will present another entry in the line of brain-inspired approaches to learning, in the form of a multiple-timescale approach to a hierarchical representation learning. Based on neuroscientific evidence [3], a multiple timescale method is applied to recurrent neural networks in language, implicit intention understanding and prediction of atrial fibrillation prediction, leading to significant improvements in performance.

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