

RNN in tensorflow

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Abstract. Tensorflow is an open-source deep learning library developed by Google. It has been used in many areas such as image recognition, text to speech engine, pattern recognition and big data. This note provide an introductory concepts for computation using tensorflow.

Keywords: deep learning

1 Introduction

Feed-forward networks operate on fixed size vectors. For example, they map the pixels of 28×28 image to the probabilities of 10 possible classes. The computation happens in a fixed number of steps, namely the number of layers. In contrast, recurrent networks can operate on variable length sequences of vectors, either as input, output or both.

RNNs are basically arbitrary directed graphs of neurons and weights. Input neurons have on incoming connections because their activation is set by the input data anyway. The output neurons are just set of neurons in the graph that we read the prediction from. All other neurons in the graph are referred to as hidden neurons.

A basic RNN is shown in figure 2.

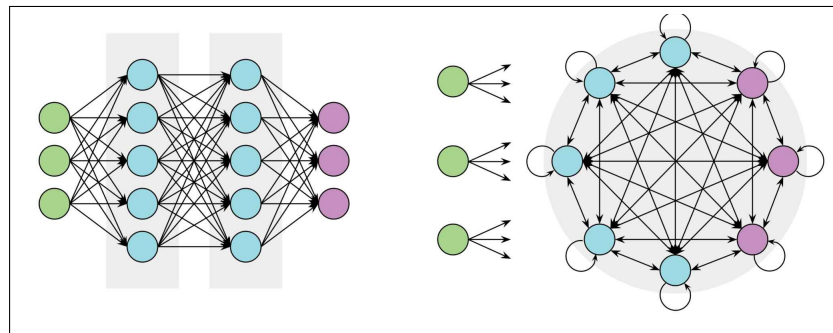


Fig. 1. A feed-forward network and a recurrent network

The state of an RNN depends on the current input and the previous state, which in turn depends on the input and state before that. Therefore, the state has indirect access to all previous inputs of the sequence and can be interpreted as a working memory.

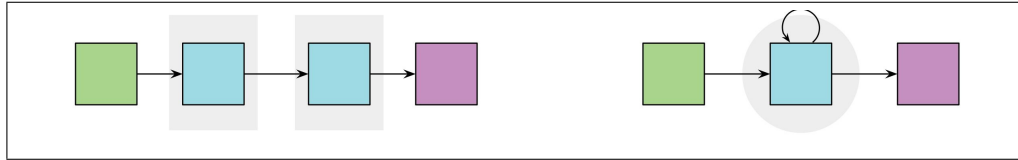


Fig. 2. A feed-forward network and a recurrent network