MASTER'S DEGREE THESIS

Dipartimento di Informatica
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Abstract

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Introduction

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Background

2.1 Deep Recurrent Neural Networks

Deep Learning had a great impact on the field of machine learning and artificial intelligence. When we consider a deep learning model, we are referring to a model that has multiple layers of neurons. The most common type of deep learning model is the Multilayer Perceptron (MLP), which consists of multiple layers of fully connected neurons. By adding layers to these models we are able to learn representation at different scales, each layer take the pattern from the previous layers and is capable to learn a more complex pattern. In this work, we will focus on a set of deep learning models known as Recurrent Neural Networks (RNNs). RNNs are a type of neural network that is designed to handle sequential data. Depth in these architectures usually referes to the number of timestep we unroll the network trough time (or sequence). But we can add depth in more than one way, one of those is to stack multiple layers of RNNs on top of each other sequentially.

citations needed

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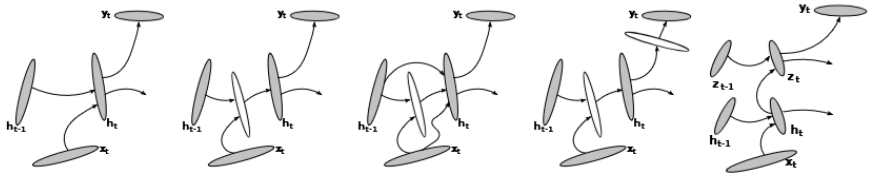

Figure 2: Illustrations of four different recurrent neural networks (RNN). (a) A conventional RNN. (b) Deep Transition (DT) RNN. (b*) DT-RNN with shortcut connections (c) Deep Transition, Deep Output (DOT) RNN. (d) Stacked RNN

FIGURE 2.1: Depths in Neural Network

2.2 Deep Reservoir Computing

Reservoir Computing (RC) is a framework introduced by , that is designed to simplify the training of Recurrent Neural Networks. The main point is that we do not need to train the recurrent connections of the network, but only an output layer called the readout.

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Chapter 3

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