Lecture 9 - Convolutional and Recurrent Neural Networks

Kyle Swanson

January 24, 2018

1 Introduction

Today we're going to be talking about convolutional and recurrent neural networks. Convolutional neural networks (CNNs) are designed specifically for working with images, while recurrent neural networks (RNNs) are built to process sequences and are therefore most often used in natural language processing. I think that both types of networks are best understood visually rather than mathematically, so I'm going to be using PowerPoint slides rather than writing on the whiteboard. I'll be using some of the slides from Stanford's class CS231n: Convolutional Neural Networks for Visual Recognition:

RNN: `http://cs231n.stanford.edu/slides/2017/cs231n_2017_lecture10.pdf`
CNN: `http://cs231n.stanford.edu/slides/2017/cs231n_2017_lecture5.pdf`

After discussing RNNs and CNNs, I'm going to discuss some of the research I've been doing at MIT, which involves using CNNs to detect breast cancer on mammograms. My slides are available here:

`https://github.com/swansonk14/IntroML/blob/master/Lectures/Masterclass%202%20-%20Introduction%20to%20Deep%20Learning.pdf`

The slides about my research start with the slide titled "Deep learning for breast cancer detection".

2 Visualizations

A visualization of fully connected neural networks: `http://playground.tensorflow.org`
A visualization of convolutional neural networks: `https://cs.stanford.edu/people/karpathy/convnetjs/demo/cifar10.html`