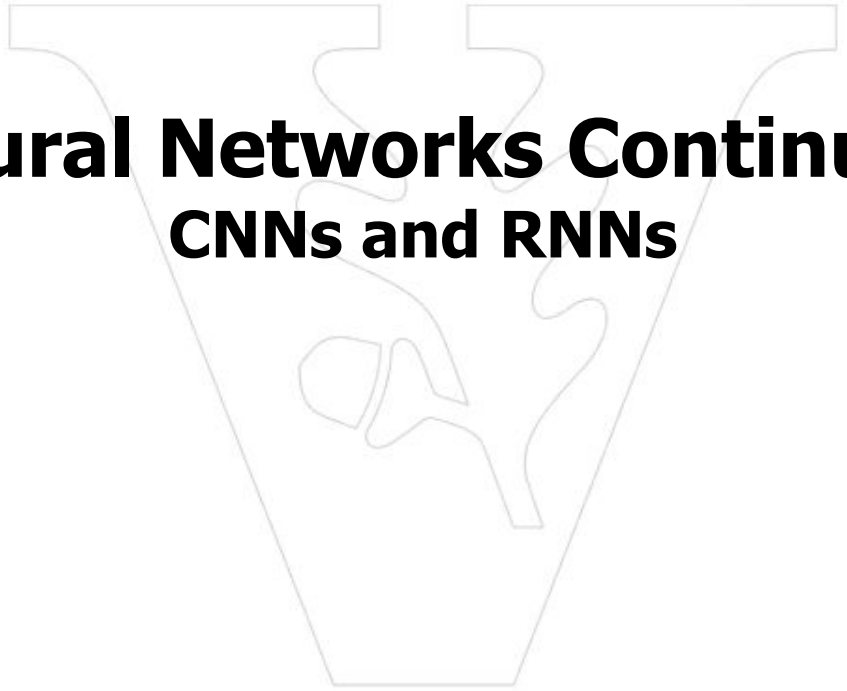




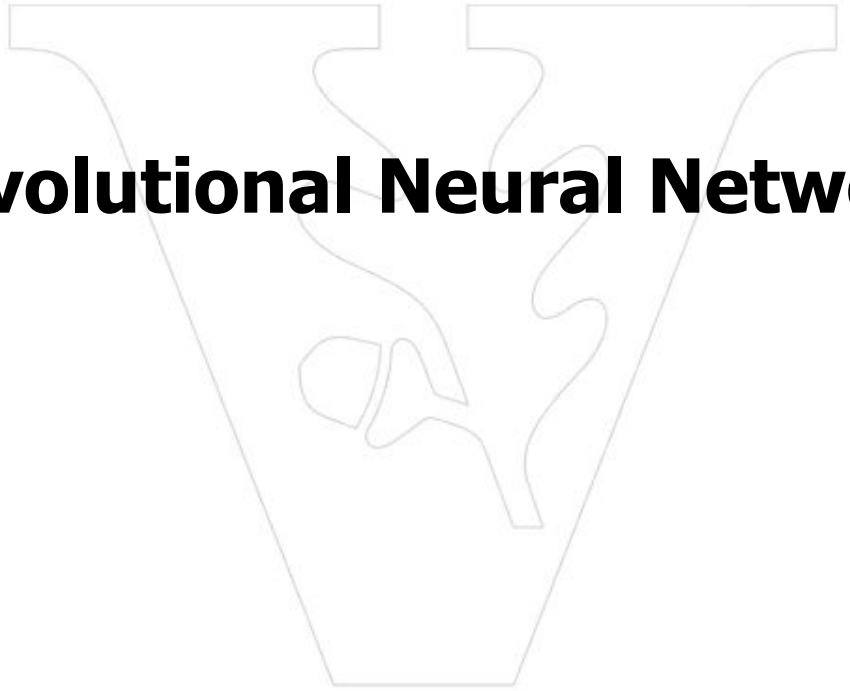
Neural Networks Continued

CNNs and RNNs

Overview

- Convolutional Neural Networks
  - Basics
  - Convolution, Pooling Layers
- Recurrent Neural Networks
- Hands-on Examples and Demos





Convolutional Neural Networks

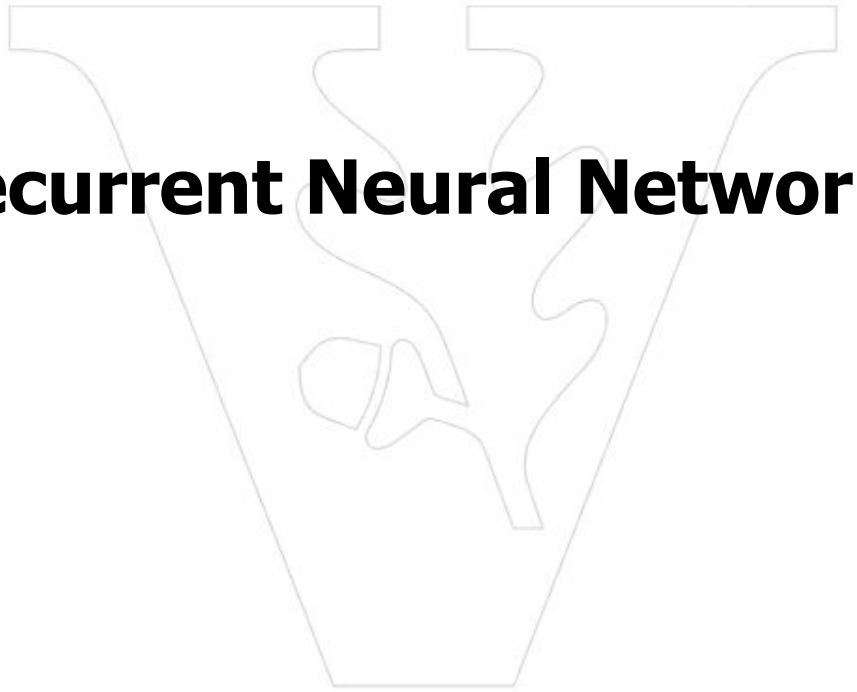
Basics

- As we mentioned last week, a neural network is simply a sequence of differentiable functions (represented as “layers”).
- A convolutional neural network is a neural network containing convolution layers.
- Useful when data is 2 or 3 dimensional - such as image data - where the layout provides meaningful information for the given task.

Convolution, Pooling Layers

- See Slides 2-20 Here





Recurrent Neural Networks

Basics

- Standard (feed-forward) neural networks are stateless.
- Recurrent neural networks are used to incorporate state into the neural network.
- Useful for variable length input such as text and can be used for single or variable length
- Watch out for exploding/vanishing gradients - backpropagation through time can exacerbate this...

More Details...

- See Slides 11-44 Here



Demos and Hands-On Examples

Demos and Resources

- Training an image classifier with PyTorch
- Image Segmentation with PyTorch
- Classifying Names with Character-Level RNN
- Unreasonable Effectiveness of Recurrent Neural Networks
- Using an RNN for Imitating Human Goals in Minecraft
- A Recipe for Training Neural Networks
- Yes, you should understand backprop
- Automatic Differentiation in NetsBlox

Additional Topics

- Visualizing Learned Features
  - GradCAM, etc
- Training Neural Networks with CMAES
- Dynamic vs Static Computational Graphs