TensorFlow Machine Learning Cookbook **Spring 2019**

Chapter 1: Getting Started with TensorFlow

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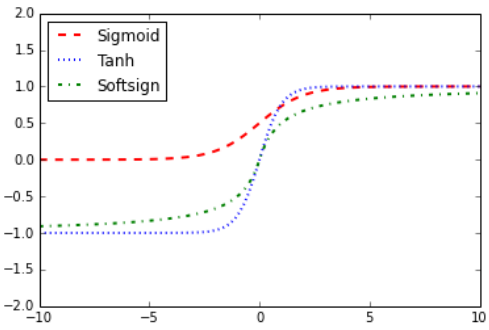
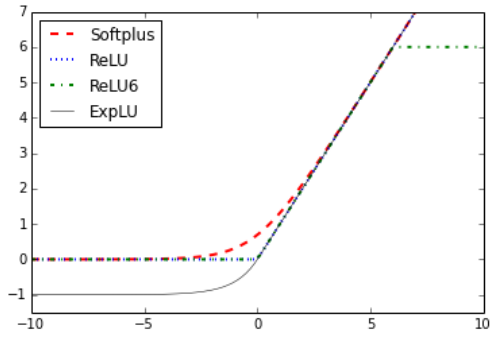
Disclaimer: *These notes have been subjected to the usual scrutiny reserved for formal publications.*

1.1 Activation Functions

The activation functions live in the neural network (nn) library in TensorFlow.



(a) Sigmoid, hyperbolic tangent, and softsign act func



(b) Softplus, ReLU, ReLU6, and exponential LU

Figure 1.1: Some Act Funcs

1. The rectified linear unit, known as ReLU, is the most common and basic way to introduce non-linearity into neural networks. This function is just called max(0,x). It is continuous, but not smooth.
2. To cap the linearly increasing part of the preceding ReLU activation function. Do this by nesting the max(0,x) function into a min() function, called the ReLU6 function.

   It is computationally faster, and does not suffer from vanishing (infinitesimally near zero) or exploding values.
3. Sigmoid, most common continuous and smooth activation function. Not used very often because of its tendency to zero-out the backpropagation terms during training.
4. Softplus function, is a smooth version of the ReLU function.

Some TensorFlow resources:

- A public Docker container that is kept current by TensorFlow is available on Dockerhub at `https://hub.docker.com/r/tensorflow/tensorflow/`
- TensorFlow has also made a site where you can visually explore training a neural network while changing the parameters and datasets. Visit `http://playground.tensorflow.org/` to explore how different settings affect the training of neural networks.