

# 9.02 Keras

# Keras

- High-level framework for building neural networks with only a few lines of code
- Front-end layer that depends on TensorFlow as a back-end library to do all its modelling and calculation work
- Industry best practices are built-in
- Default parameter settings in Keras are designed to give you good results in most cases

# TensorFlow

- Created by the Google Brain team, TensorFlow is an open-source library for numerical computation and large-scale machine learning.
- TensorFlow bundles together a slew of machine learning and deep learning (aka neural networking) models and algorithms and makes them useful by way of a common metaphor.
- It uses Python to provide a convenient front-end API for building applications with the framework, while executing those applications in high-performance C++.

# TensorFlow

- TensorFlow can train and run deep neural networks for handwritten digit classification, image recognition, word embeddings, recurrent neural networks, sequence-to-sequence models for machine translation, natural language processing, and PDE (partial differential equation) based simulations.
- Best of all, TensorFlow supports production prediction at scale, with the same models used for training.

# TensorFlow versus Competition

- **PyTorch**, in addition to being built with Python, and has many other similarities to TensorFlow: hardware-accelerated components under the hood, a highly interactive development model that allows for design-as-you-go work, and many useful components already included. PyTorch is generally a better choice for fast development of projects that need to be up and running in a short time, but TensorFlow wins out for larger projects and more complex workflows.
- **CNTK**, the Microsoft Cognitive Toolkit, like TensorFlow uses a graph structure to describe dataflow, but focuses most on creating deep learning neural networks. CNTK handles many neural network jobs faster, and has a broader set of APIs (Python, C++, C#, Java). But CNTK isn't currently as easy to learn or deploy as TensorFlow.
- **Apache MXNet**, adopted by Amazon as the premier deep learning framework on AWS, can scale almost linearly across multiple GPUs and multiple machines. It also supports a broad range of language APIs—Python, C++, Scala, R, JavaScript, Julia, Perl, Go—although its native APIs aren't as pleasant to work with as TensorFlow's.

# Kera Adoption

- Education and experimentation
- Prototyping
- Production systems that don't have highly specialised requirements  
e.g. system that serves 1 million users per hour

# Keras Sample Use Case

- Built-in Image Recognition Models



Image File



Pre-Trained  
Model



"seashore"