Stony Brook University

CSE-538

TensorFlow 2.0

Nikita Soni

Fall, 2020

FAR BEYOND

Credits

- TF Guide

  (Official TF guide)

- TF 2.0 Slides

  (Slides by Josh Gordon)

- Calculus on Computational Graphs: Backpropagation

  (Colah's blog on Backpropagation)

- Stack Overflow

Overview

- TensorFlow
- TensorFlow Basics:
  - Tensor or NumPy Array?
  - Constants, Variables
  - Data Flow Graphs
- Keras
- Model Building (3 styles)
- End to End Modeling
- Demo

What is TensorFlow?

- Google's open source library that can be used for Deep Learning.
- Python-friendly.
- Numerical computations using data-flow graphs.
- CPU, GPUs.
- TF 2.0:

  Eager Execution (Imperative by default).

  Keras integrated.

Tensors, Constants, Variables

- Tensors - Fancy word for an array (similar to NumPy arrays).
- Can convert Tensor to NumPy array and vice-versa.
- Scalar or multi-dimensional.
- As their names say:

  Constants - Tensors whose values cannot be changed.

  Variables - Tensors whose values can be changed.

  [Trainable and non-trainable variables]

Computational Graphs

- e = (a + b) * (b + 1)

tf.Operation object
tf.Tensor object

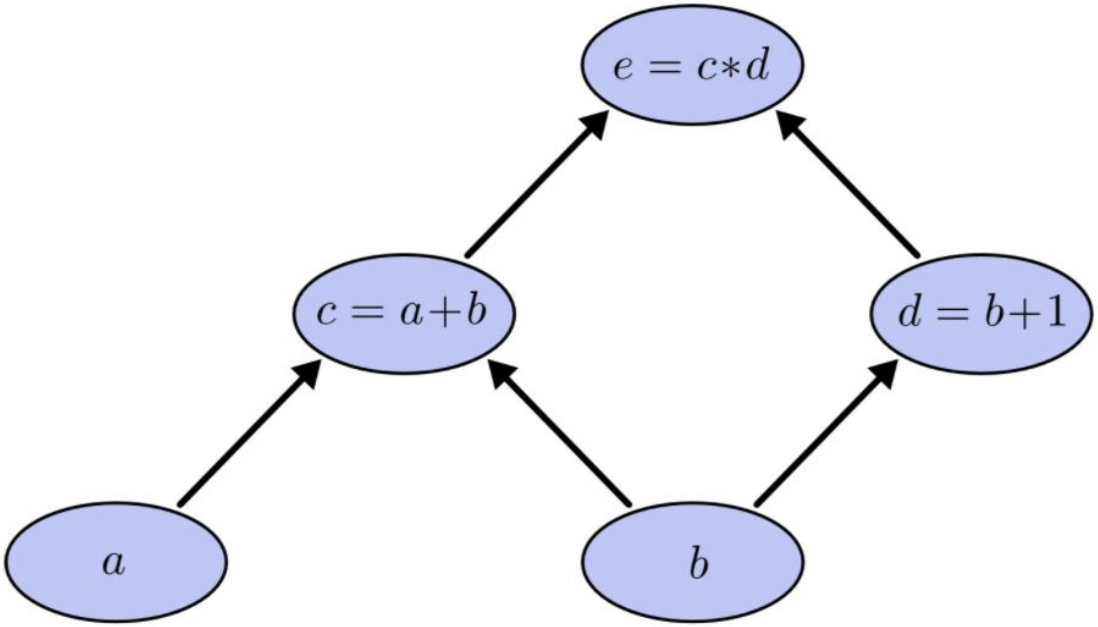

Image Source: https://colah.github.io/posts/2015-08-Backprop/

Keras

- Keras is a separate Deep Learning library. (Keras.io)
- Different ways of defining deep neural networks.
- Sequential - a stack of layers.
- Functional - building a graph.
- Everything at Keras.io works in TF2 (Keras built-in in TF2).

Model Building

- Sequential
- Functional (more flexible)
- Sub-Classed (Used in Assignments!)
- Examples in Notebook.

End to End Modeling

- Data processing
- Define the Model.
- Define the Loss function.
- Define a training loop:

  Run a batch of inputs through the model (Forward pass).

  Calculate loss on generated outputs comparing with labels.

  Gradient calculation. (Backprop; Backward pass)

  Optimizing model parameters with calculated gradients. (Backward pass)
- Repeat the training loop till stop criteria met.

Jupyter Notebook

- Concept examples.
- Logistic Regression Model walkthrough.
- https://colab.research.google.com/drive/14qGEz8WdxtlVSmq1FHHPZdA-wKaGAQf2?usp=sharing

THANK YOU !

QUESTIONS ?

Helper Slides