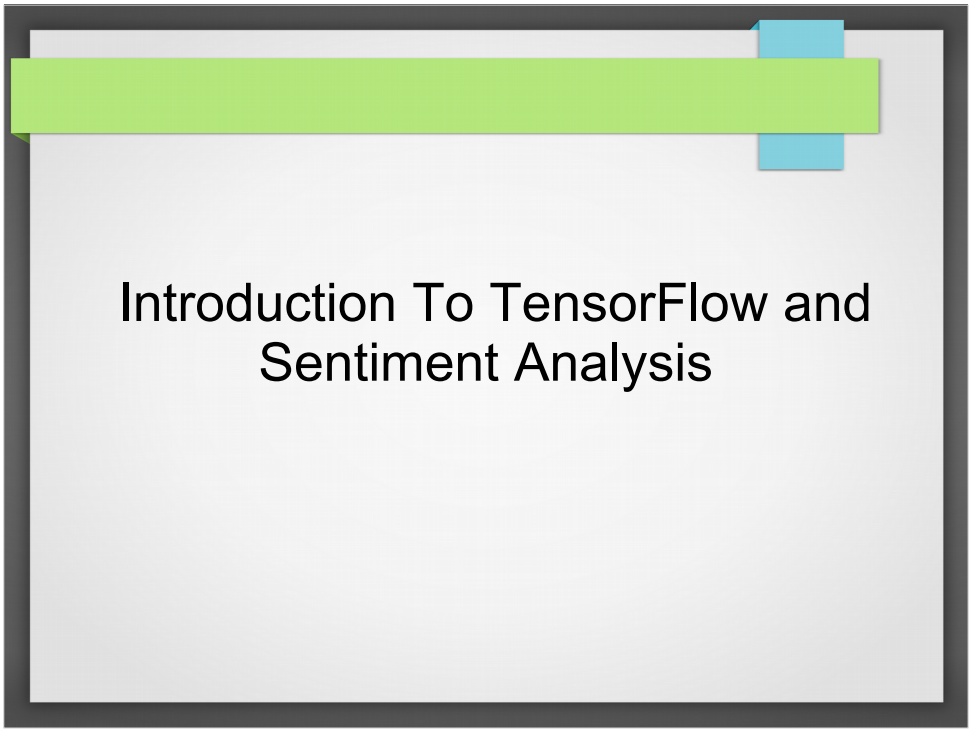

Introduction To TensorFlow and
Sentiment Analysis

References

- The examples used during the introductions were extracted from the following reference:
  - O’Reilly Learning TensorFlow - Tom Hope, Yehezkel S. Ressheff & Itay Lieder -
  - Fundamentals of Machine Learning for Predictive Data Analytics: Algorithms, Worked Examples, and Case Studies (MIT Press) - John D. Kelleher, Mac Namee, Brian, Aoife D'Arcy -
  - Udacity Artificial Intelligence Nanodegree.
  - Deep Learning Ian Goodfellow, Yoshu Bengio and Aaron Courville.

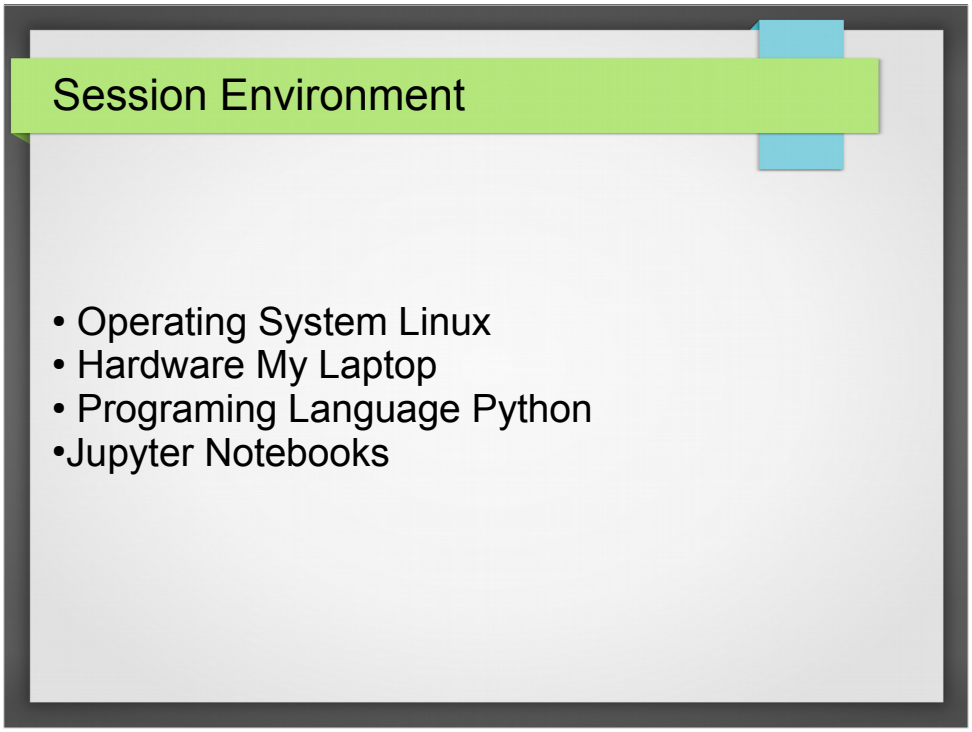
Content

- Introduction to TensorFlow

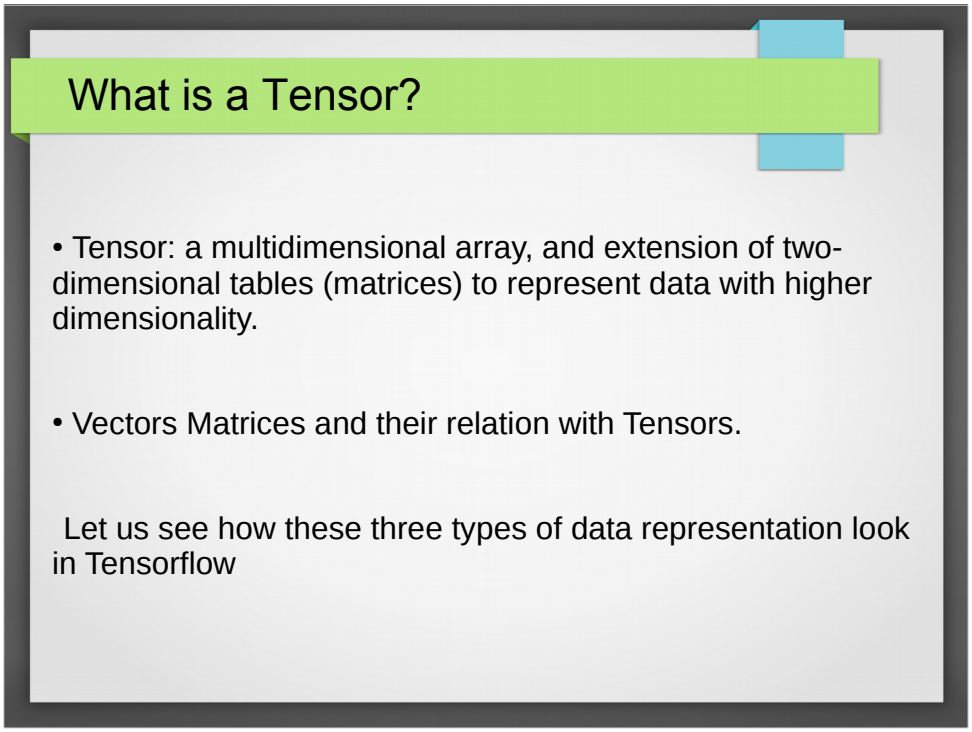
- Natural Language Processing IMDB reviews sentiment analysis

Agenda

- What is a Tensor?
- What is a Graph Theory?
- What is TensorFlow?
- Installing TensorFlow
- TensorFlow and Graph Theory Relation
- TensorFlow Language Objects
- TensorFlow and NN Model Hidden Layers
- Linear regression and Logistic Regression
- Natural Language Processing and Tensorflow



Python was the first client language supported by TensorFlow and currently supports the most features. More and more of that functionality is being moved into the core of TensorFlow (implemented in C++) and exposed via a C API. Client languages should use the language's foreign function interface (FFI) to call into this C API to provide TensorFlow functionality.



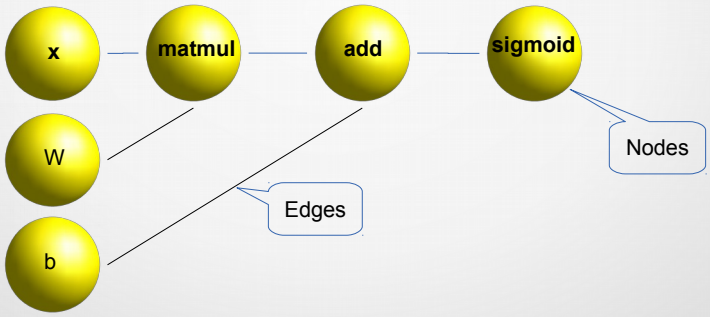
- Activate conda tensorflow environment.
  $>source activare tensorflow

- Run ipython
  $>ipython

Vector
In [22]: import numpy as np
In [23]: vector = np.array([1,2,3,4,5,6])
In [23]: vector.shape
In [25]: vector.reshape(6,1))
Matrix
In [27]: matrix = np.array(([1,2,3],[4,5,6]))
In [29]: matrix.shape
In [28]: matrix
Tensor
import matplotlib.pyplot as plt
import matplotlib.image as mpimg
img = mpimg.imread('image/rpo.png')
imgplot = plt.imshow(img)
plt.show()
img.shape
Just one matric of the three
img[0:,:,0].shape
Tensor 2
np.array(([[[1.1],[1.2],[1.3]],[[2.1],[2.2],[2.3]],[[3.1],[3.2],[3.3]]]))

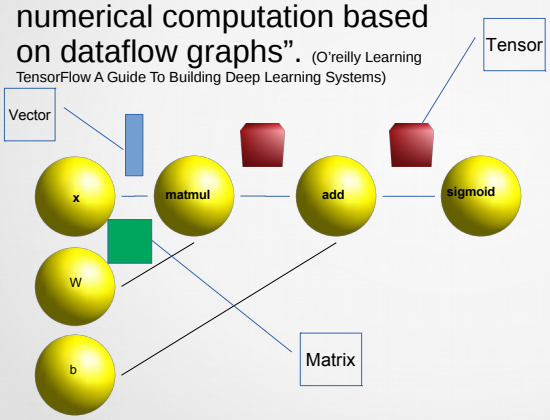
What is a Graph?

"...mathematical structures used to model pairwise relations between objects. A graph in this context is made up of vertices, nodes, or points which are connected by edges, arcs, or lines. A graph may be undirected, meaning that there is no distinction between the two vertices associated with each edge, or its edges may be directed from one vertex to another..." (*https://en.wikipedia.org/wiki/Graph_theory)*

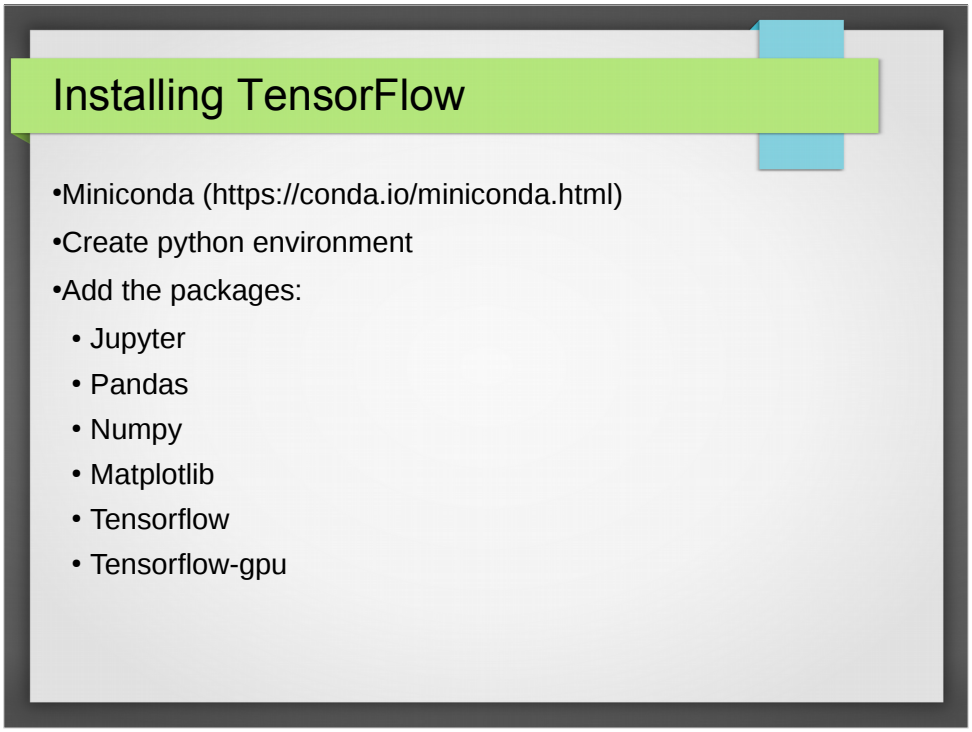


What is TensorFlow?

"Is a software framework for numerical computation based on dataflow graphs". (O'reilly Learning TensorFlow A Guide To Building Deep Learning Systems)



- Graph
- Operations:
  - Source
  - Mathematic
- Namespaces
- Sessions

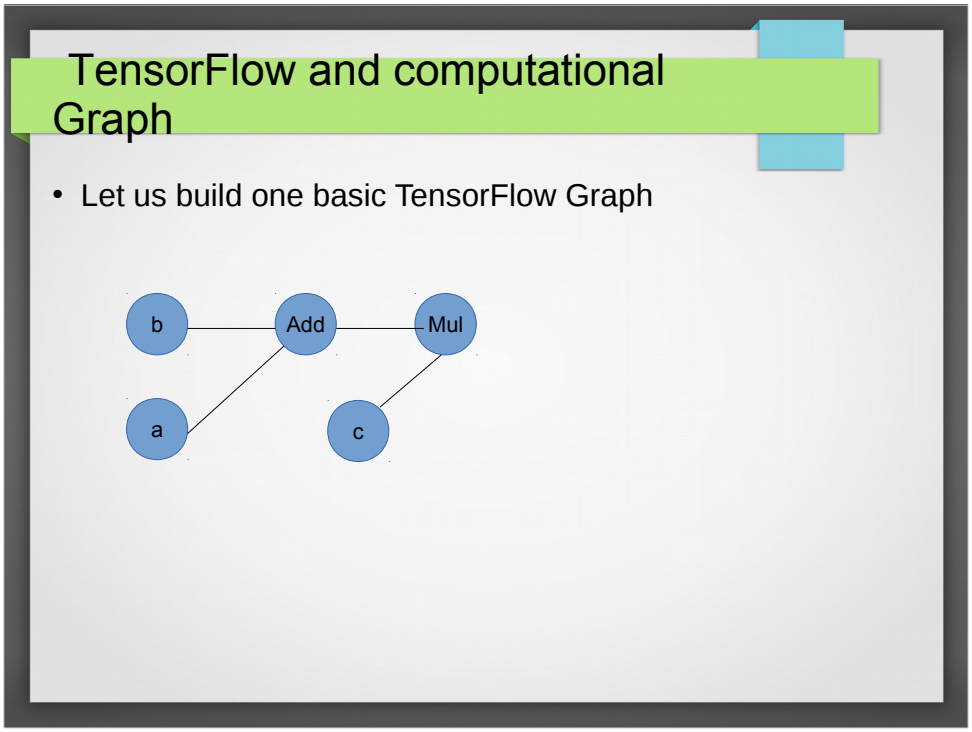


1) Create container:
   $>sudo docker run --rm -v /home/gaure/Google_Drive/Tensorflow_Course/conda/:/conda -it centos:latest /bin/bash
2)After creating the container and before installing Miniconda install bzip2
   $>yum -y install bzip2
3) Reload the bash profile
   $>. ./.bashrc
4) Create environment:
   $>conda create -n tensorflow python=3.6
5)Install all the packages listed in the slide running the following command:
   $> conda install <package_name>
   Example:
   $>conda install tensorflow

TensorFlow objects

- As any programming framework TensorFlow has objects and operations.

Math Operations	Source Operations	Tensor Objects
tf.add() tf.multiply() tf.subtract() tf.divide() tf.matmul()	tf.constant() tf.fill() tf.random_normal() tf.zeros() tf.truncated_normal()	tf.placeholder tf.variables

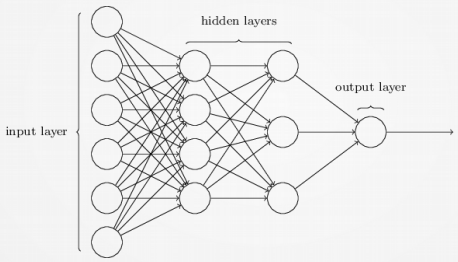


1) Define your graph

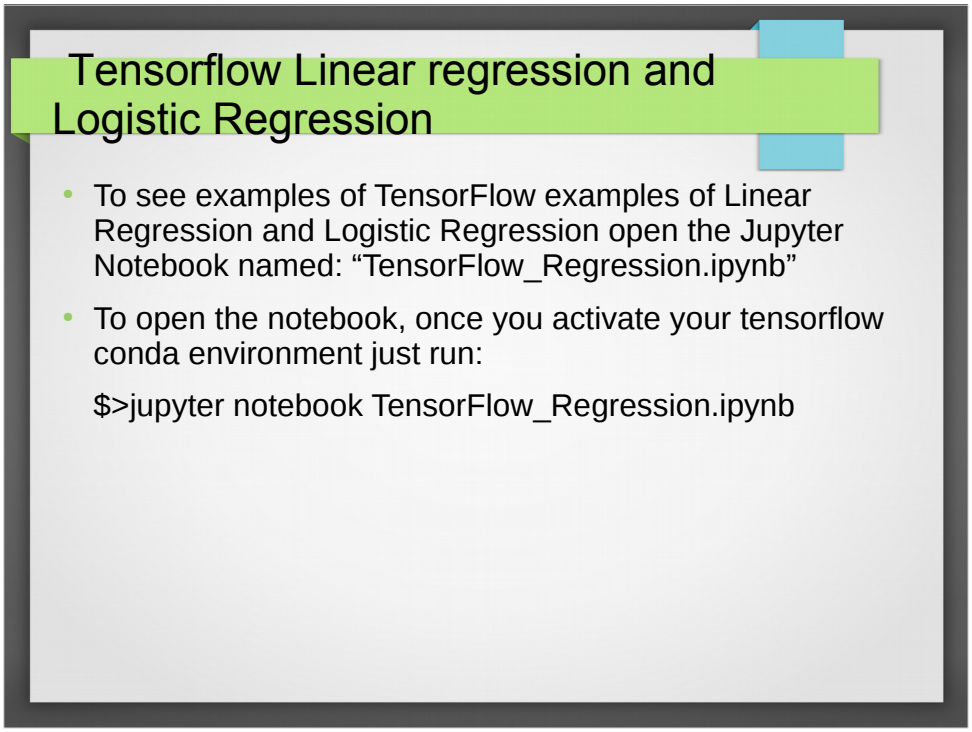
```
In [22]: with g.as_default():
    ...:     with tf.name_scope('add'):
    ...:         a = tf.constant(4, dtype=tf.float32, name='a')
    ...:         b = tf.constant(5, dtype=tf.float32, name='b')
    ...:     with tf.name_scope('multiply'):
    ...:         c = tf.constant(10, dtype=tf.float32, name='c')
    ...:     print("Namespace add constants names: {} {}".format(
    ...:         a.name, b.name))
    ...:     print("Namespace multiply constant name {}".format(
    ...:         c.name))
    ...:     s = a + b
    ...:     m = s * c
    ...:     with tf.Session() as sess:
    ...:         out = sess.run(m)
    ...:         print("Result: ",out)
```

Tensorflow and hidden layers

- TensorFlow has higher level objects that can be used to built complex neural network Graph representations.



- Some of this higher level objects can be used to build different types of hidden layers: tf.contrib.rnn, tf.conv2d, tf.nn.maxpool, tf.nn.dropout, etc.



Linear Regression: Is a way to model the linear relation between a depending variable and one or more independent variables.

Logistic Regression:
Logistic regression is a statistical method for analyzing a dataset in which there are one or more independent variables that determine an outcome. The outcome is measured with a dichotomous variable (in which there are only two possible outcomes)

Tensorlow Natural Language Processing and Tensorflow

- Using TensorFlow and RNN LSTM we will predict the sentiment of the IMDB reviews.
- We will use an embedding layer to learn a mapping representation of each movie review, them we will feed the LSTM neural network from the embedding output.
- NLP problems steps:
  - Collect Data (feature – words – , labels – boolean –)
  - Normalization & Tokenized
  - Padding
  - Extract features (embedding)
  - Modeling (neural network)

- Once in your tensorflow conda environment open the Jupyter notebook called “Sentiment_RNN.ipynb”. You can do this running: “$> jupyter notebook Sentiment_RNN.ipynb”
- In the next slide we will see an LSTM cell internal gates representation.

Tensorlow Natural Language Processing and Tensorflow