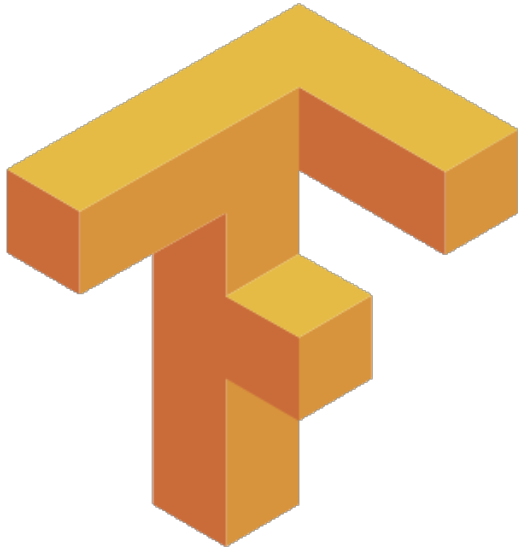
TensorFlow



CS 5665 F16 practicum

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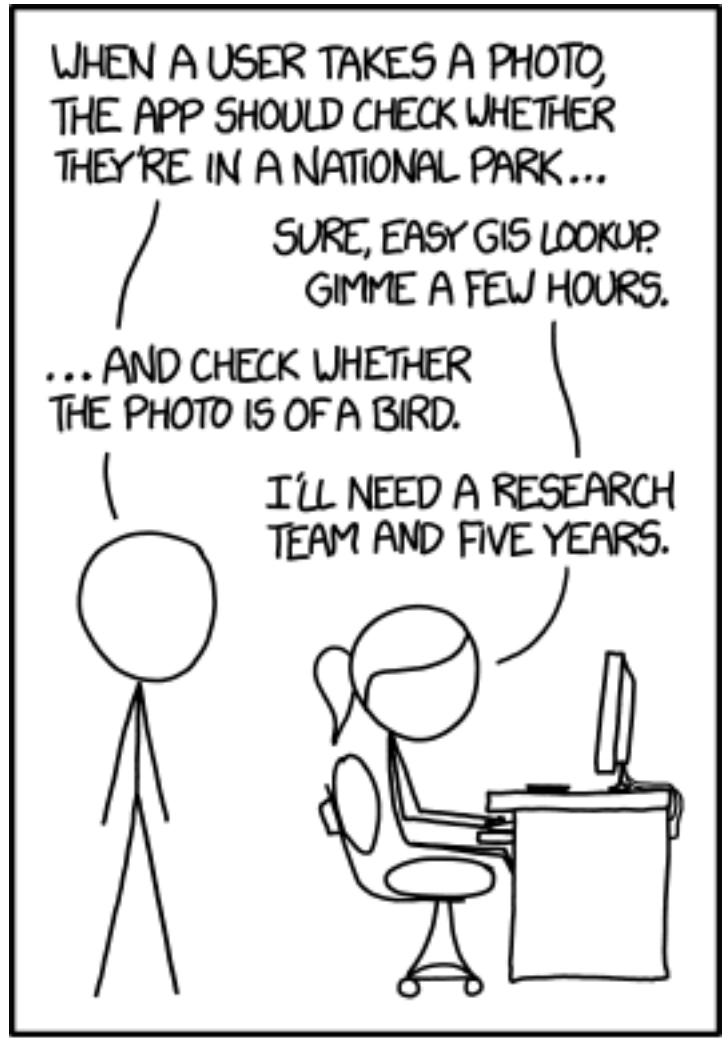


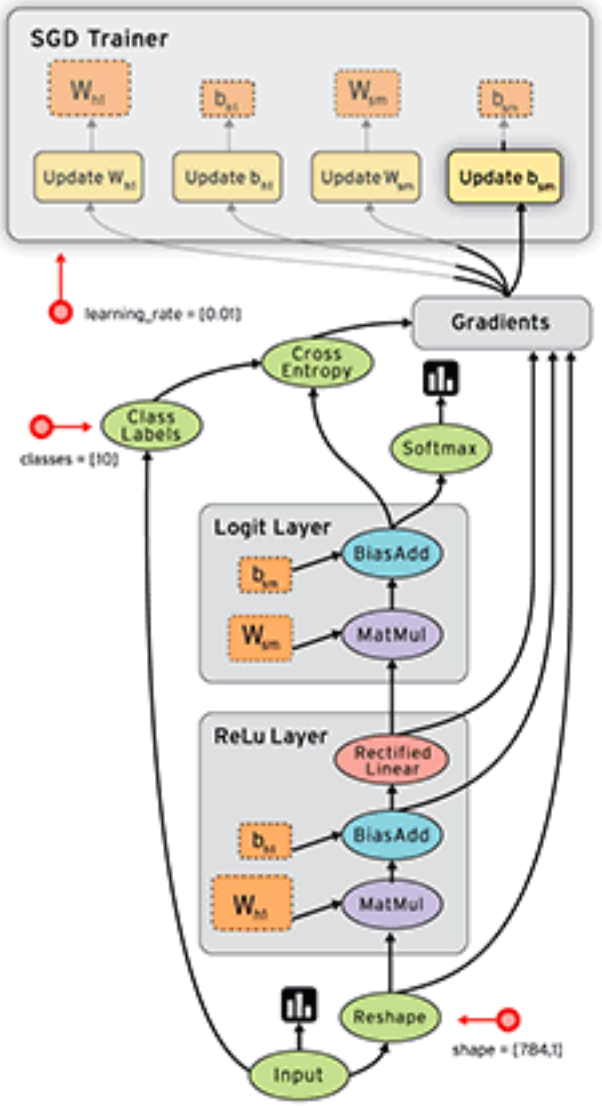
IN CS, IT CAN BE HARD TO EXPLAIN THE DIFFERENCE BETWEEN THE EASY AND THE VIRTUALLY IMPOSSIBLE.

What is TensorFlow?

- Open source software library from Google (Brain Team) for machine learning
- Especially good for training and implementing deep neural networks
- Example applications include image recognition, automated translation. Think Google Photos, Translate
- Used in production at Uber, SnapChat, Google (obv.), others

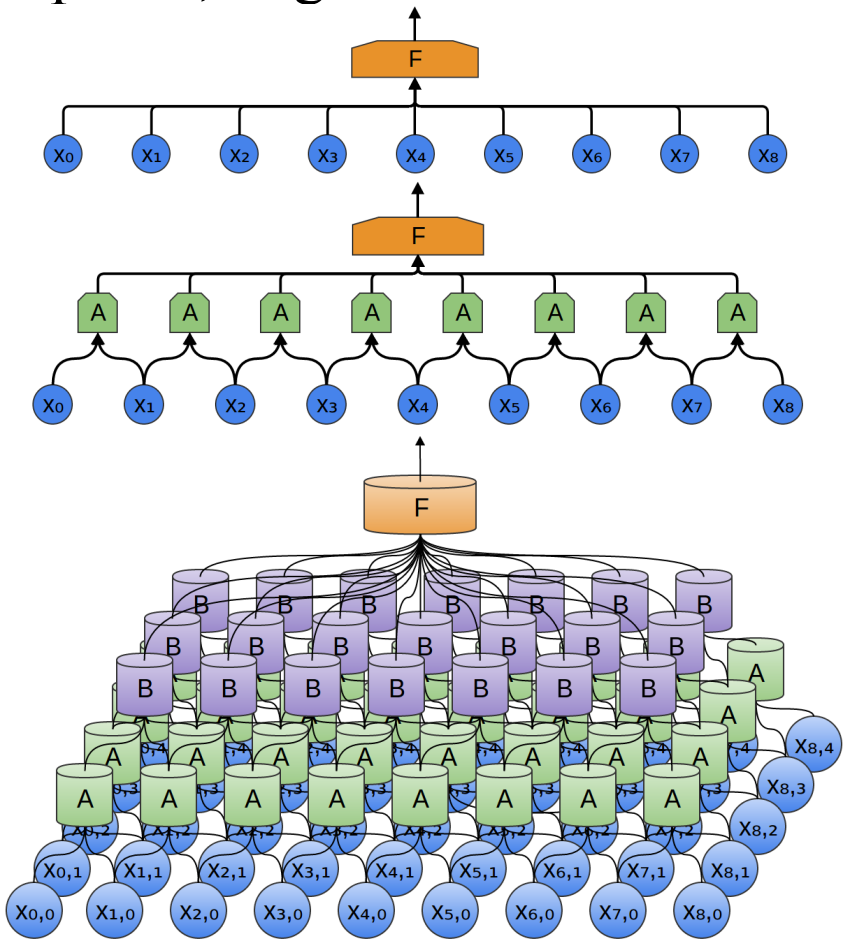
How does it work?

- Uses data flow graphs to represent a learning model
  - Comprise of nodes and edges
  - Nodes represent mathematical operations
  - Edges represent multi-dimensional data arrays (tensors)
  - “TensorFlow”
- C based with Python and C++ APIs



Deep neural networks?

- Fancy name for neural networks algorithm with more than one layer
- Now possible with cheap HW, huge data sets and better techniques



How is it different scikit-learn or other tools in R?

- Scikit-learn - model already built; “off-the-shelf”’; Fit/ predict style
- TensorFlow - has to build model up from; should be able to describe your model in the form of a datagraph with functions like gradient descent, add, max, etc.

What are its advantages?

- Cross platform: Android, Linux, etc.
- Quick turn around to production
- Efficient computation utilizing CPUs, GPUs

Demo on Raspberry Pi!

- Transfer learning - use a model already trained on images. Deep learning from scratch will take days
- Model - Inception v3 network
- Training set - ImageNet images with 1000 classes

Demo on Raspberry Pi!

- Process of building a makefile in Raspberry Pi
- Quick run through of C code
- Option to change last layer to be specific to your classes and retrain the model

Takeaways

- Looking for a fit/ predict style, existing algorithms type library? Use Scikit-learn
- Looking to learn and quickly implement ML? Use Scikit-learn
- Looking to build your own algorithms with custom functions, of deep learning type, across platforms? Use Tensor Flow!

References

- Source code - https://www.tensorflow.org/
- Convolution neural networks - http://colah.github.io/posts/2014-07-Conv-Nets-Modular/
- Pattern recognition and ML reading - https://github.com/rasbt/pattern_classification, https://github.com/rasbt/python-machine-learning-book
- Retraining last layer of model - https://codelabs.developers.google.com/codelabs/tensorflow-for-poets/#0