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Python and Machine Learning 101

#GAatSXSW

GENERAL ASSEMBLY

Welcome to General Assembly!

We empower people to pursue work they love through education in business, coding, data, and design.

Gregory Godreau (he/his)

Data Science Immersive Instructor

Freelance Developer

Worked at:

Gregory Godreau

Freelance Developer

- M.E. scorned
- Mom got internets in 2013
- That 30 y/o boomer who AOL Onlines

Agenda

- Learn what machine learning experts do and the types of problems they solve.
- Walk through the typical workflow and see how the pros identify powerful business predictions.
- Explore key tools and processes to use to analyze, visualize, and model data.

Agenda IRL

- File I/O and basic analytics and charting in Python / Pandas
  - Processing Austin SXSW 2018 EMS incidents
- Overview of traditional and deep learning methods and applications
  - Creating an object classifier in tensorflow

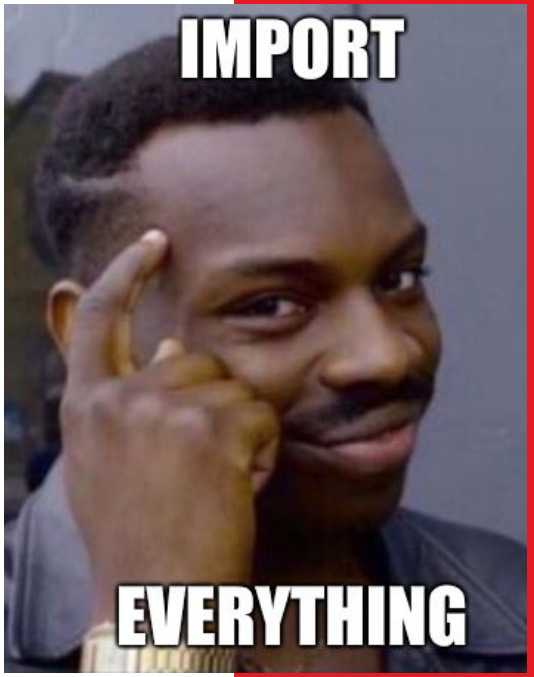
(25m)

Python 101

“You can’t just copy pseudocode and expect it to work.”

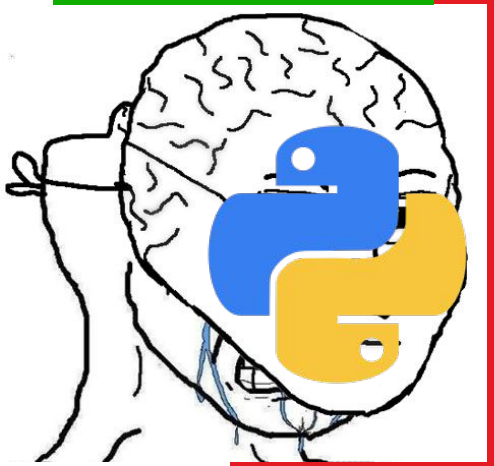
What Python's Good At

- Very readable
- Easy to learn
- Prototyping
- Defacto DS lang for small/mid size
- Wrappers / SDKs for other libs
- Glue code and scripting (shell sellout)
- Simple APIs (Flask)



What Python's Not So Good At

- Embedded deployments
- Hardware / drivers
- Mission-critical code / algos
- Getting you street cred at C++ meetups



Weapons d'Choix

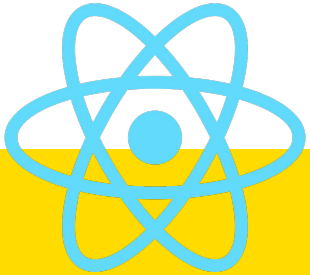
Python

Logic Code / Machine Learning / Do Thangs

Flask

Interface between Python and React

React

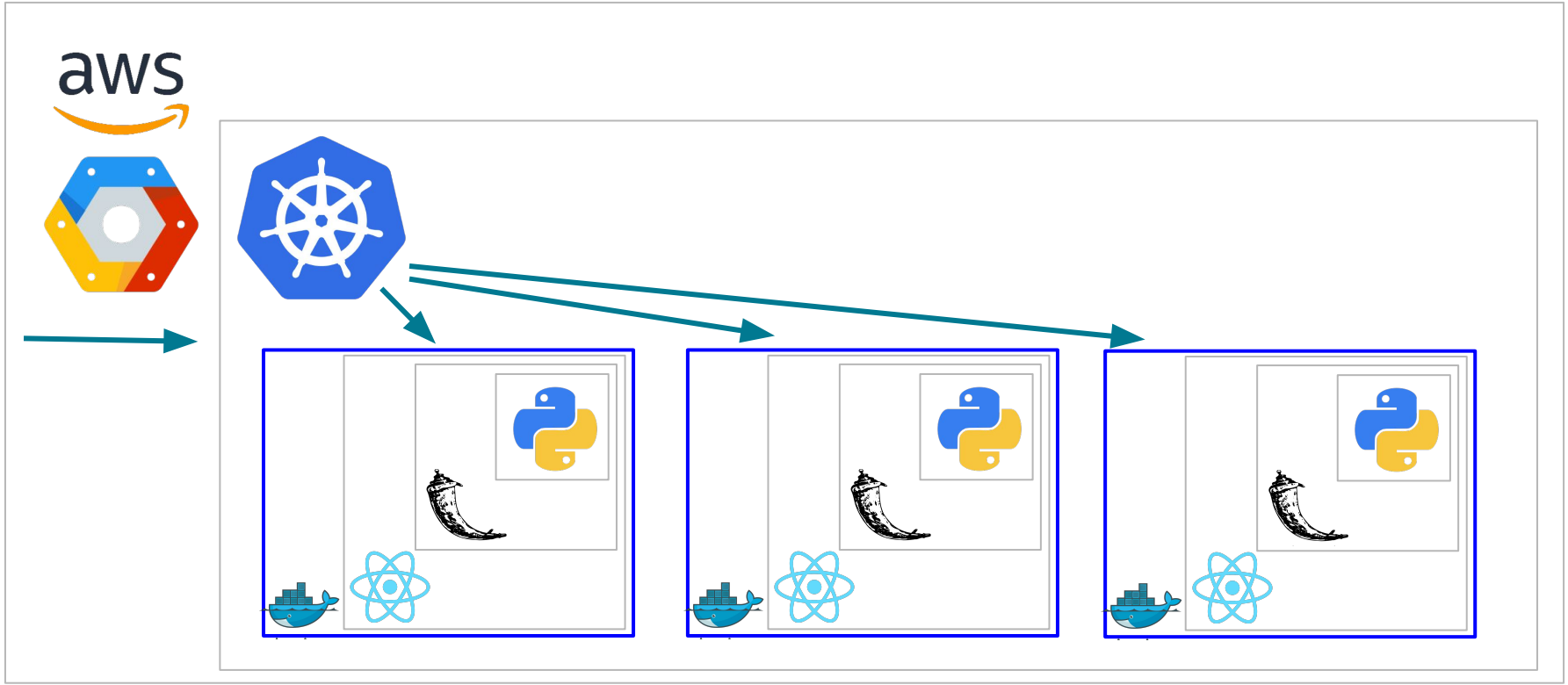


Front end Web Interface (JS)

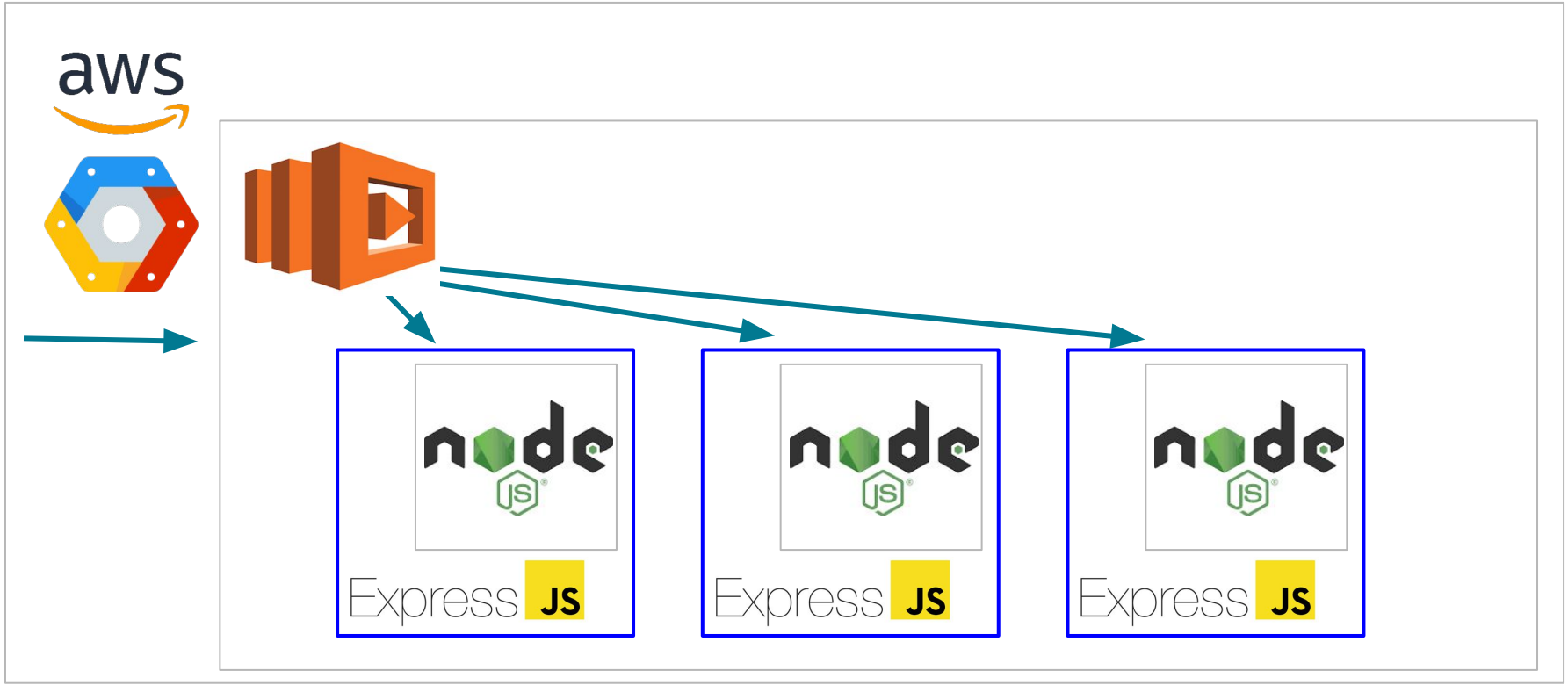
Kubernetes

Scale in the Cloud

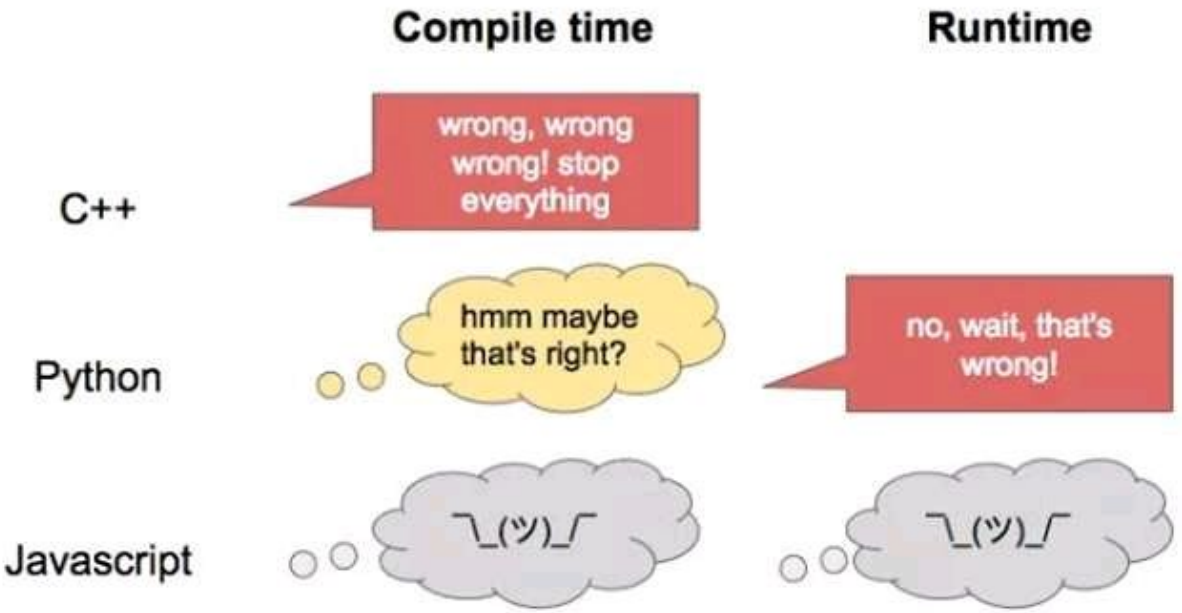
How Deployments Look IRL - “PFRK??” Stack



How Deployments Look IRL - Serverless JS



When you mistype `x = obj.fiedl` instead of `x = obj.field`




JavaScript
FOR
KIDS

Computers Out:

Reading in An Excel File in Pandas

10m

We'll be reading in an excel file using Pandas!

- Automate your excel workflow
- Wrap your work in a library
- Share with others

(25m)

Machine Learning 101

“Computer: I’m a fast learner.”

“Me: What’s 11 x 11?”

“Computer: 65.”

“Me: Not even close. 121.”

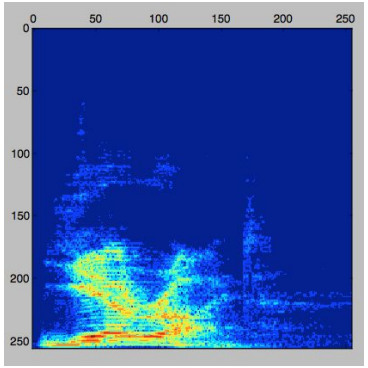
“Computer: 121.”

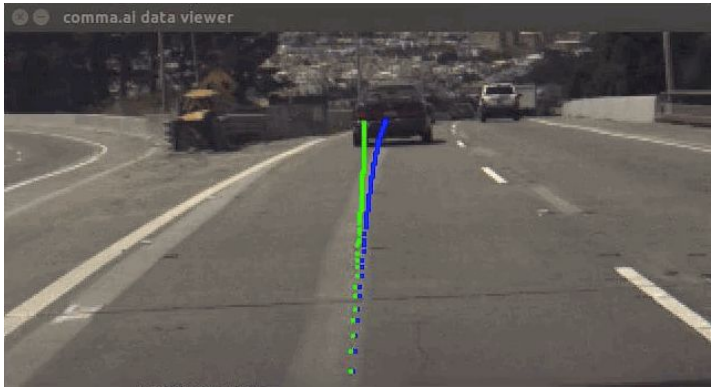
credit: adapted from u/z0ltan_x

A Brief History of Machine Learning:

Year	Milestone
1959	Widrow / Hoff of Stanford - MADALINE
1982	John Hopfield of Caltech - Nat'l Academy of Sciences Resurrection of Neural Nets
1986	Advent of > 2 layer networks using back propagation
1996	IBM Deep Blue beats Garry Kasparov at chess
2006	Geoffrey Everest Hinton - rebrands NNs as Deep Learning
2012	AlexNet (Alex Krizhevsky / Hinton) ImageNet comp; improving top-5 error score by ~11%
2016	Lee Sedol - Alpha Go (13 layers, 200 GPUs, 30m board positions, 160k real-life games, RL)

Common Modern UCs





Types of ML Probs

Classification

Predicting a label:
- Binary: Malig / Benign
- Multi: Shirt Size

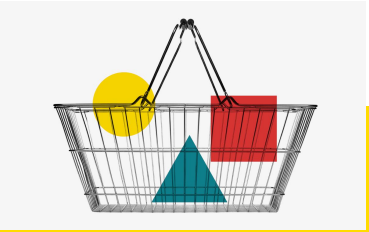
Regression

Predicting a **continuous** value:
- Temperature
- Stock Price

Clustering

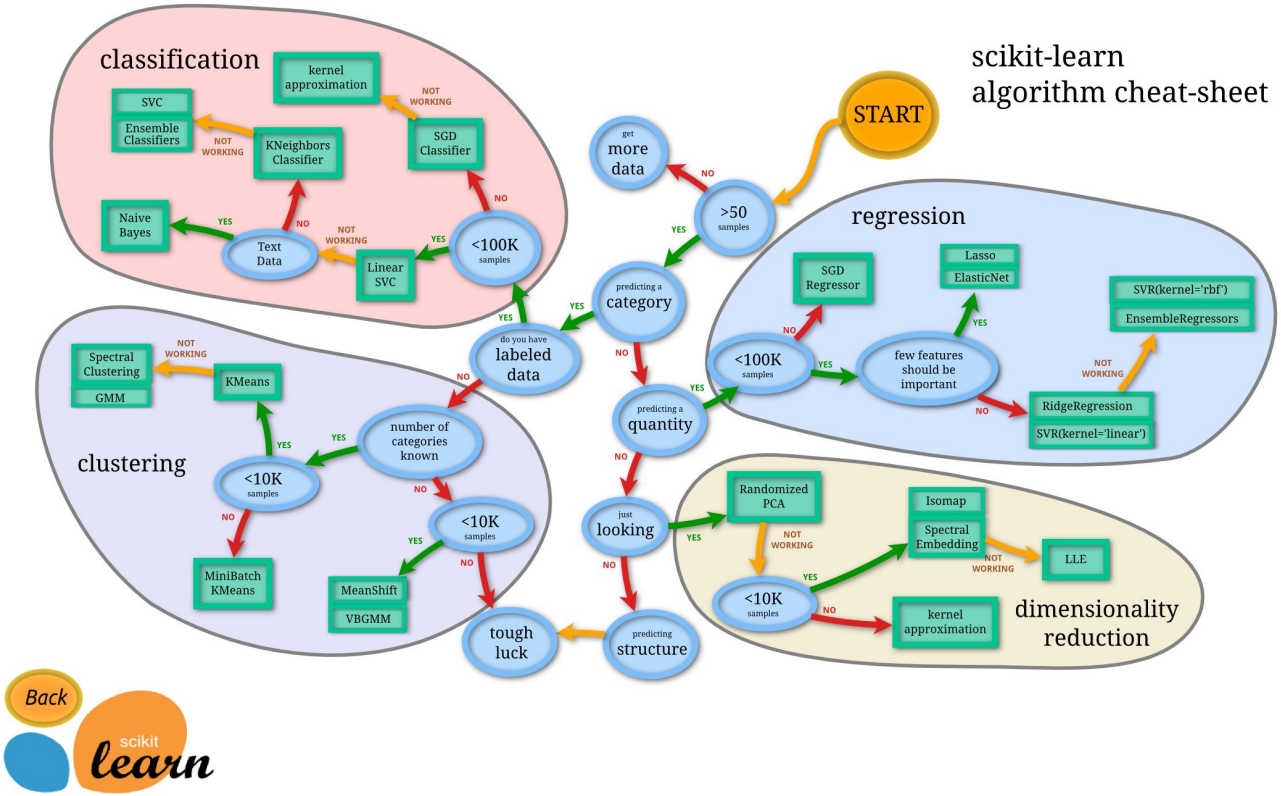
Similarities between **unlabeled data**:
- Recommender systems
- Fraud / anomalies

Dimensionality Reduction

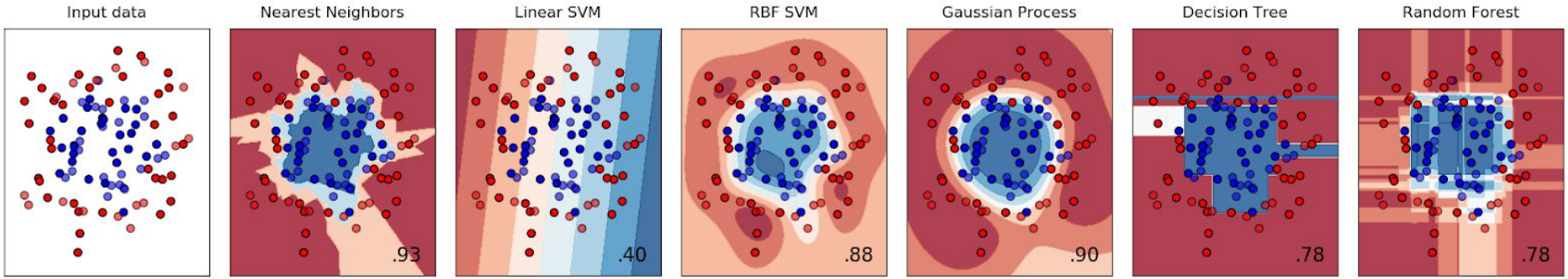


Reducing many features to few features:
- LDA
- PCA

‘Traditional’ ML: Scikit-Learn (Python stack)

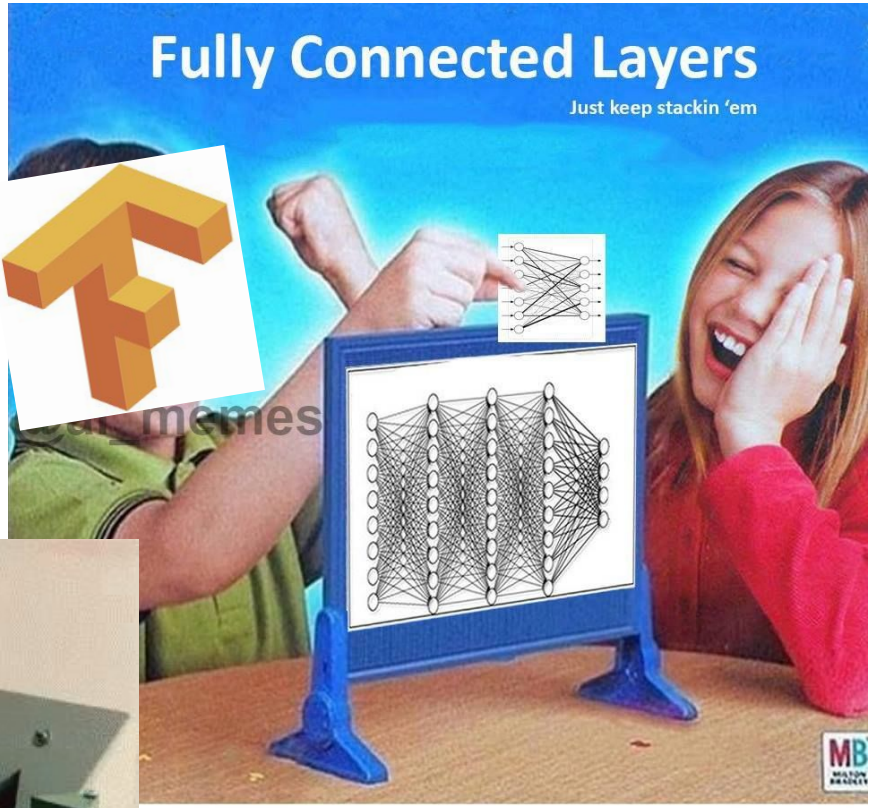


Scikit-Learn Classifier Comparison



https://playground.tensorflow.org

Deap Larnin'


Fully Connected Layers
Just keep stackin 'em


MAKE GIFS AT GIFSOUP.COM

Deap Larnin'

DL4J

Keras

Microsoft CNTK

theano

Caffe2

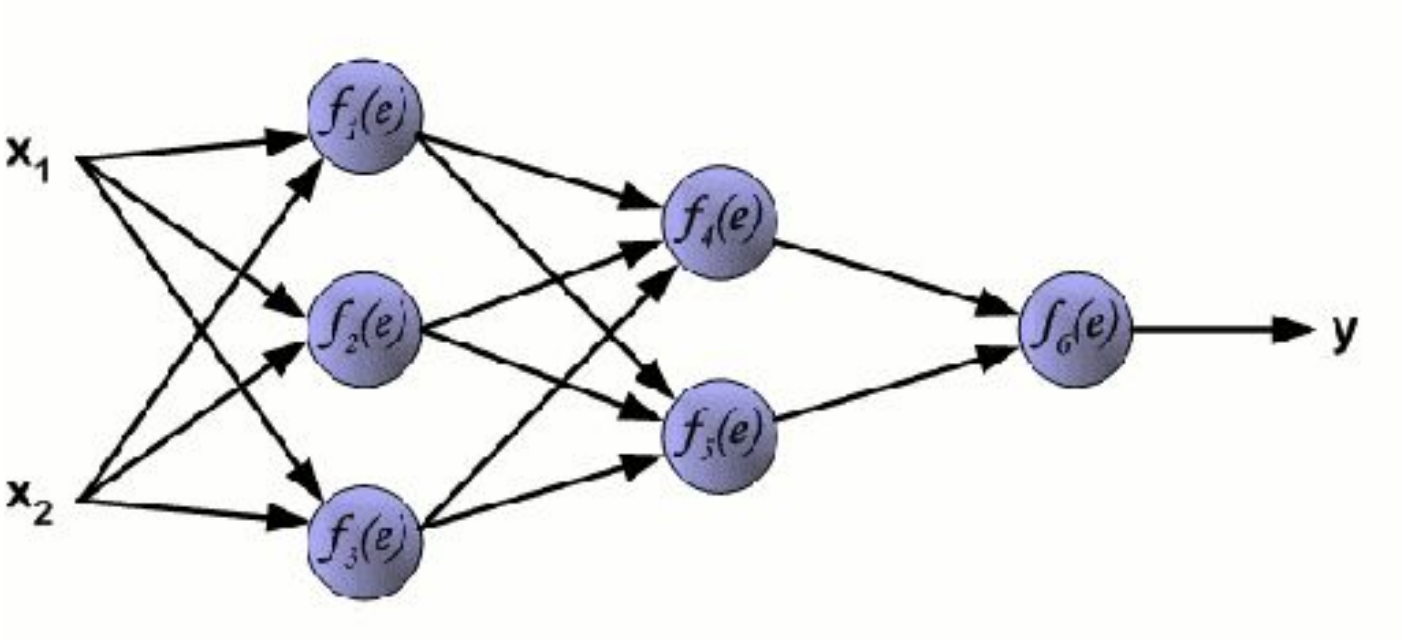
PyTorch

mxnet

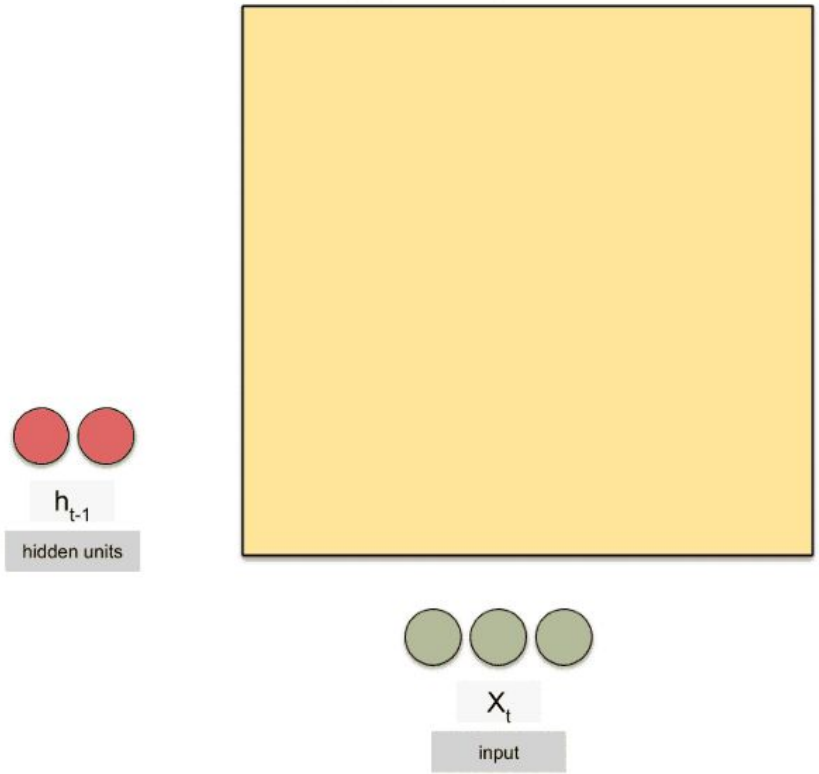
DL/NN Model Types

Name	General UCs
FFNN	Feed Forward NN: Simple and fast modeling of linearish systems
CNN	Convolutional NN: Sliding window NN, very common for image processing
RNN	Recurrent NN: Short-term memory, next-event prediction based on few prior events
LSTM	Long short term memory NN: RNN with a longer term memory
GRUs	Gated recurrent unit: Similar to LSTM with fewer matrix mult operations

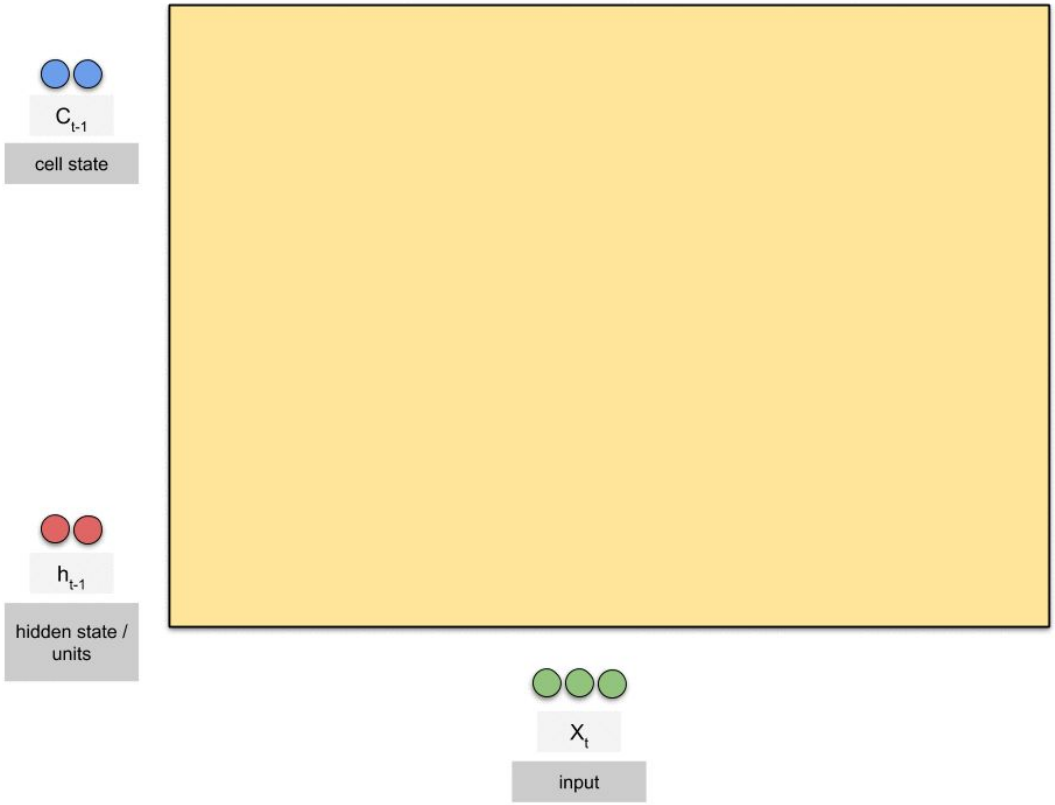
‘Simple’ FFNN



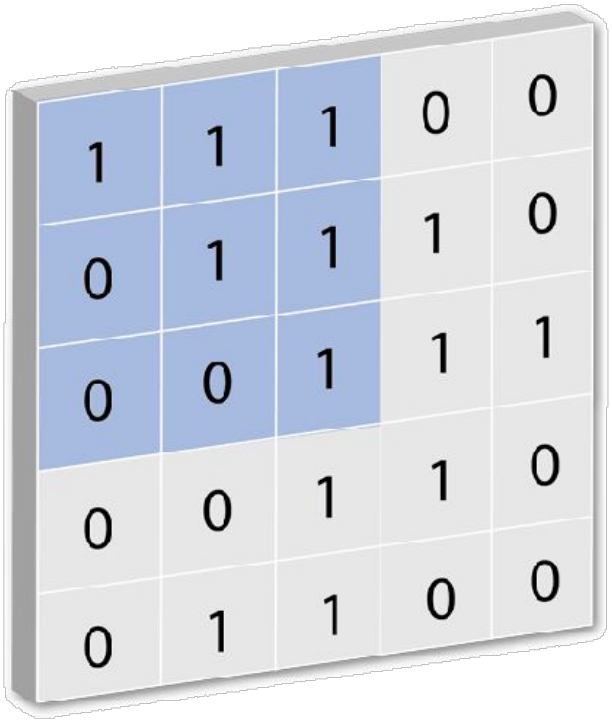
RNN

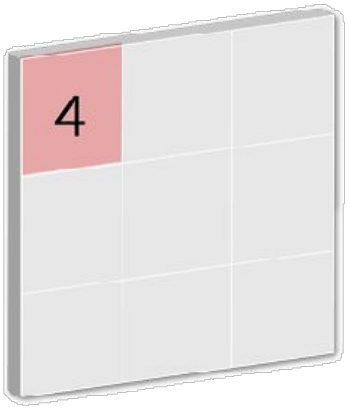


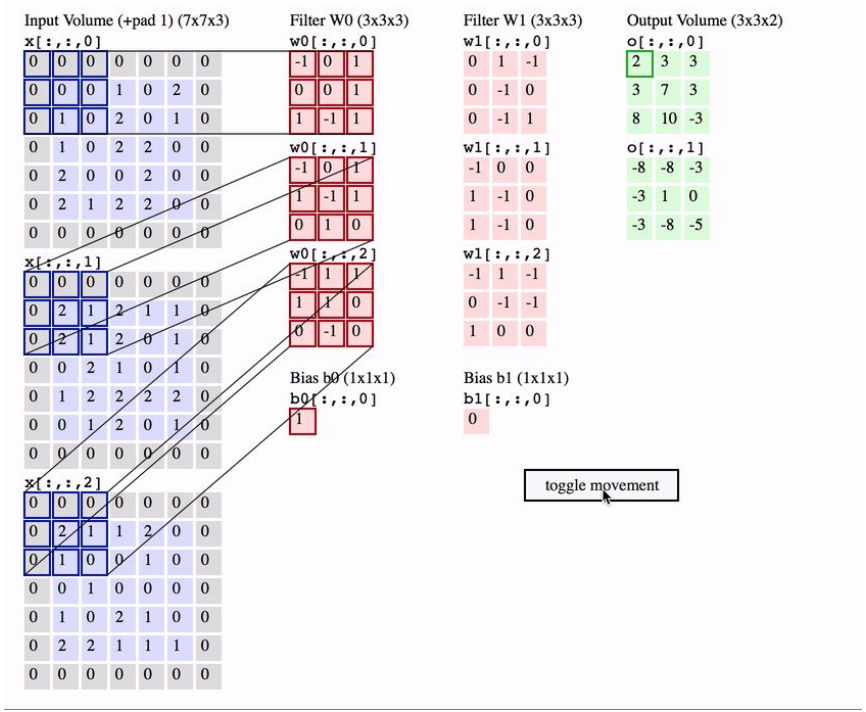
LSTM



Convolutional Neural Net



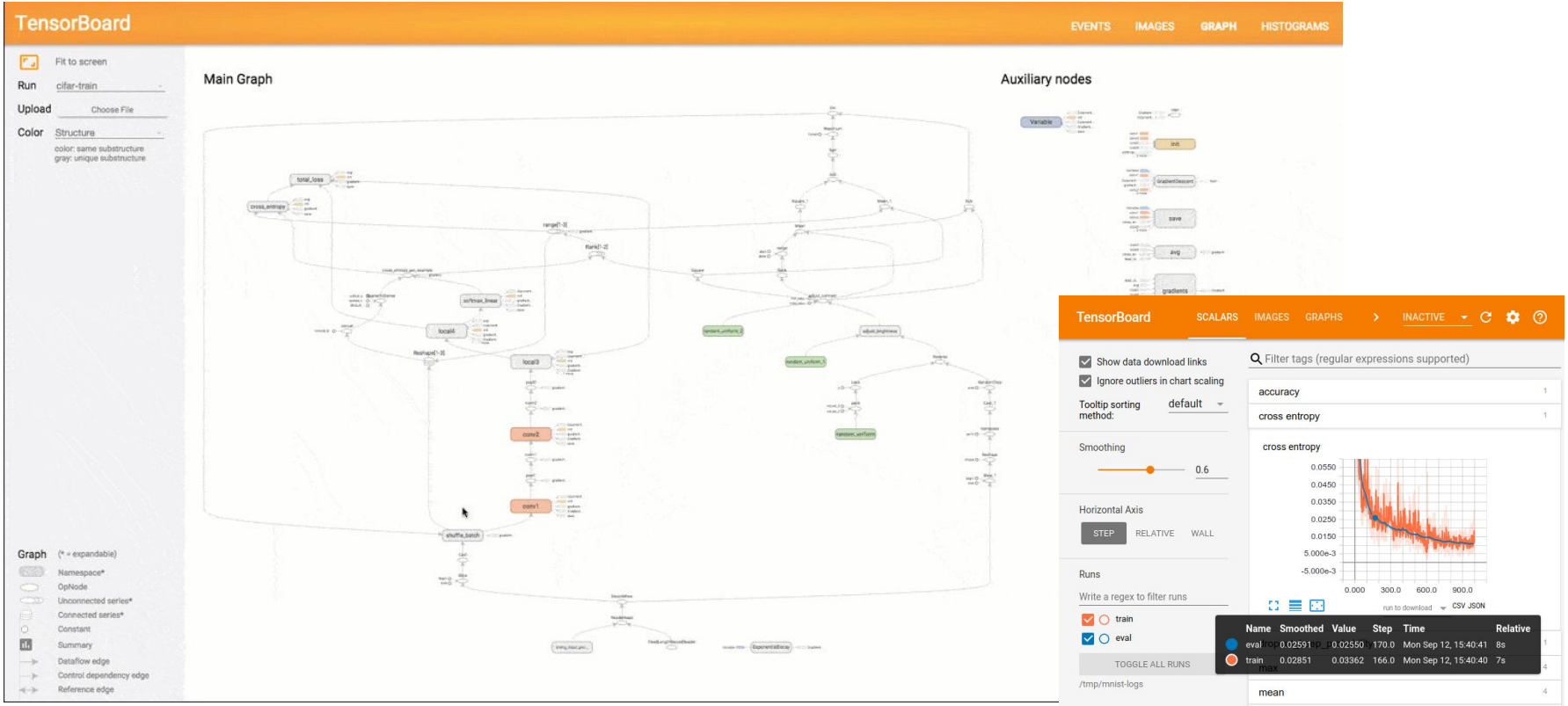




TF Components

- Tensorflow
- TF Hub - model reuse
- Tensorflow Serving - inference
- Tensorboard - training and vis
- Tensorflow Lite - mobile
- Tensorflow.js - in-browser

Tensorboard

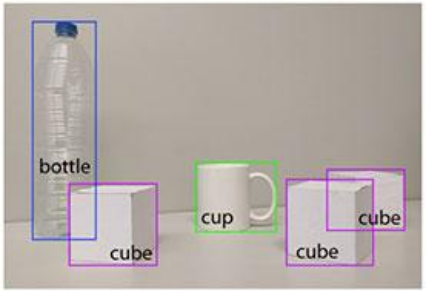



MY STOMACH WAS MAKING
THE RUMBLIES

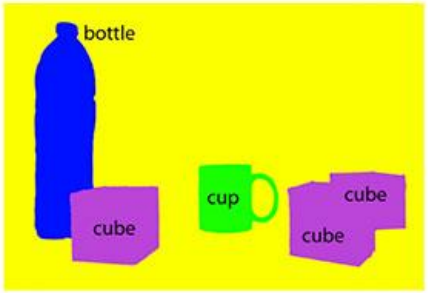
Guided Walk-Through:

TF Demo - Object classification

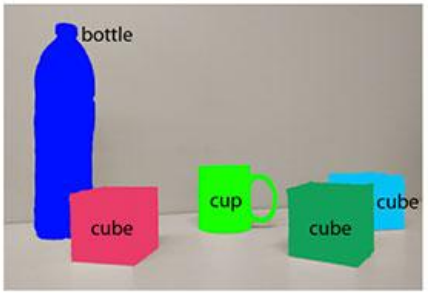
(a) Image classification



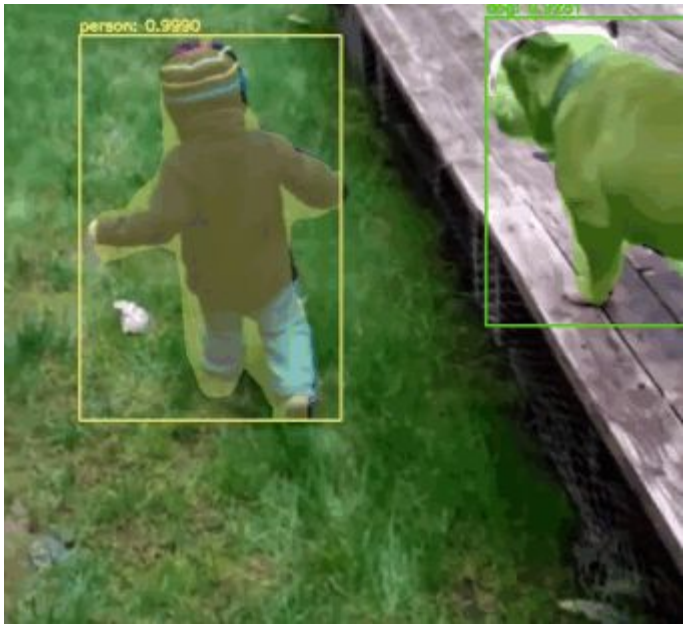
(b) Object localization



(c) Semantic segmentation



(d) Instance segmentation



Q&A

Upcoming at GA ATX Campus:

- 3/30 – Python Fundamentals Bootcamp
- 5/18 + 5/19 – Python & Machine Learning Weekend Bootcamp
    - Day 1: Python Fundamentals Bootcamp
      Day 2: Intro to Data Science & Machine Learning
- Free, 2-hour intro classes in data science, data analytics, coding, product management, digital marketing, UX design and Python held regularly on campus and online!

Want More?

Checkout upcoming workshops at your local GA campus
ga.co/education

Thank You!

github.com/ggodreau/sxsw2019

godreau.xyz