AIDL: PROJECTS

Session 1 (2019/03/05): Introduction

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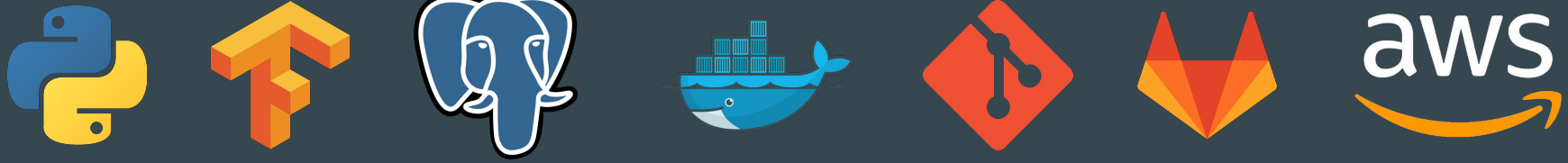
Education: Telecommunications Engineer

Currently working: Deep learning team lead at Vilynx

Technologies:



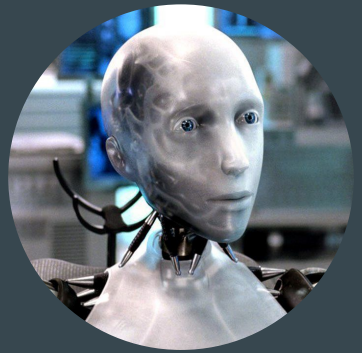
Hand-raised poll

- Programming skills?
- Working on software development? Or management?

Subject goals

“Give them the tools to apply DL in the industry”

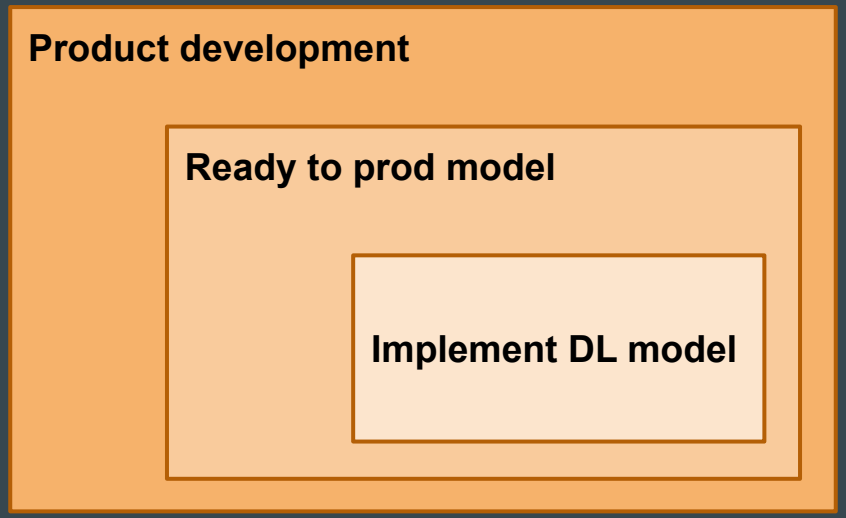
Expectations: what not to expect



Expectations

- Implement NN models
- Ready to prod
- Useful for current job
- Product MVP
- Solve real-world problems
- State of the art

Subject goals



Subject goals

Tangibles:

- Implement DL models
- Optimize resource usage / increase efficiency
- Optimize models
- Deploy to production

Intangibles:

- Add a DL implementation into the roadmap
- Acquire a data scarcity mindset
- It’s not all about DL!

Course overview

How is this all going to work?!?!?

Deep learning

6th of May

1st of July

MLP

Image classification

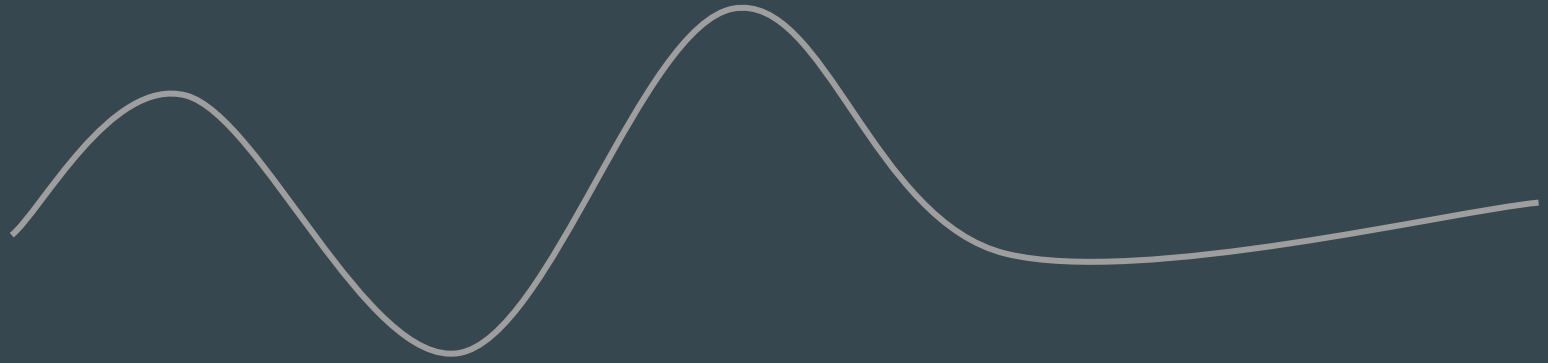
CNN

Object detection

RNN

Pro tip: GAN?

Tensorflow



6th of May

1st of July

TF building blocks

End2End model

Low-level API

Keras / High level API

To prod!

Classes

Classes

What they should be:

- Guide + DIY + review solution → what did we learn?
- Align each one with the subject goals

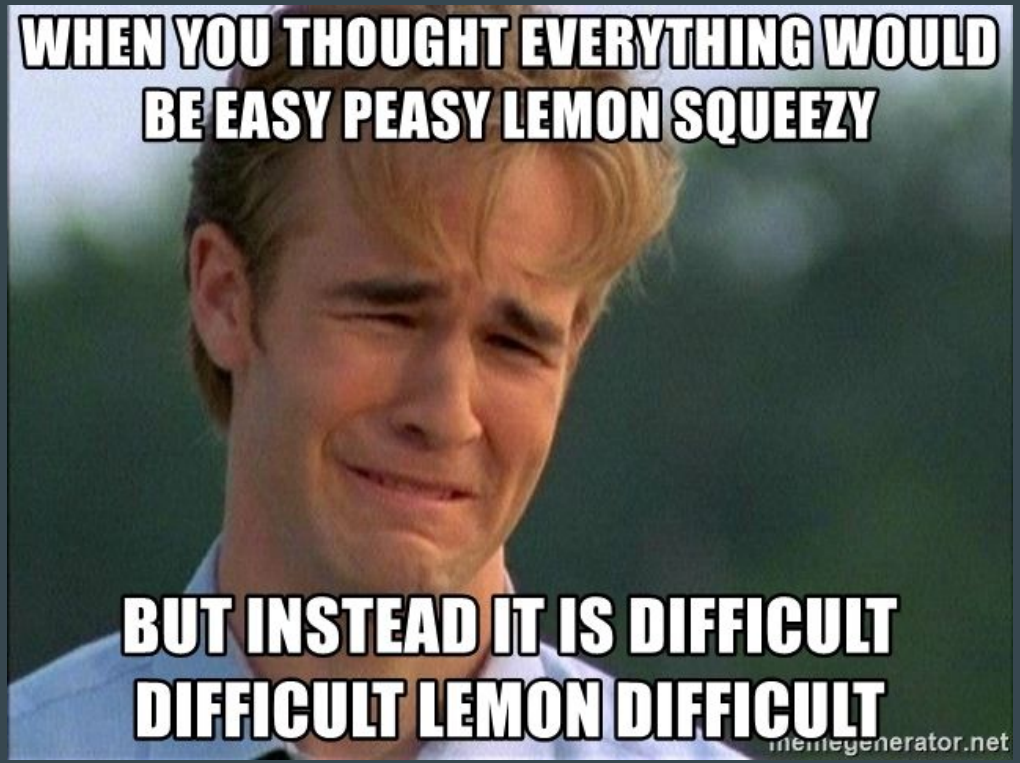
What they should not be:

- Medium blog post
- Tensorflow tutorial
- TF API reference summary

Classes

~~Jupyter & Codalab~~

Old & good python



Begin!

Computational graph

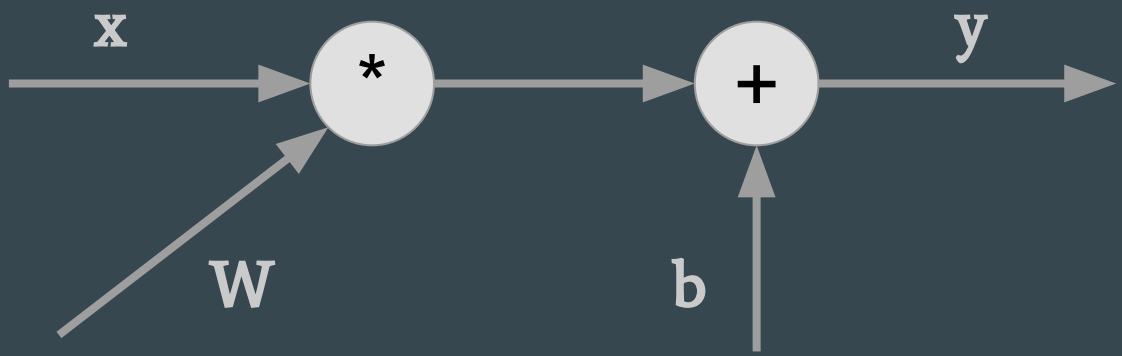
What is it?

Nodes: operations

Edges: data / tensors

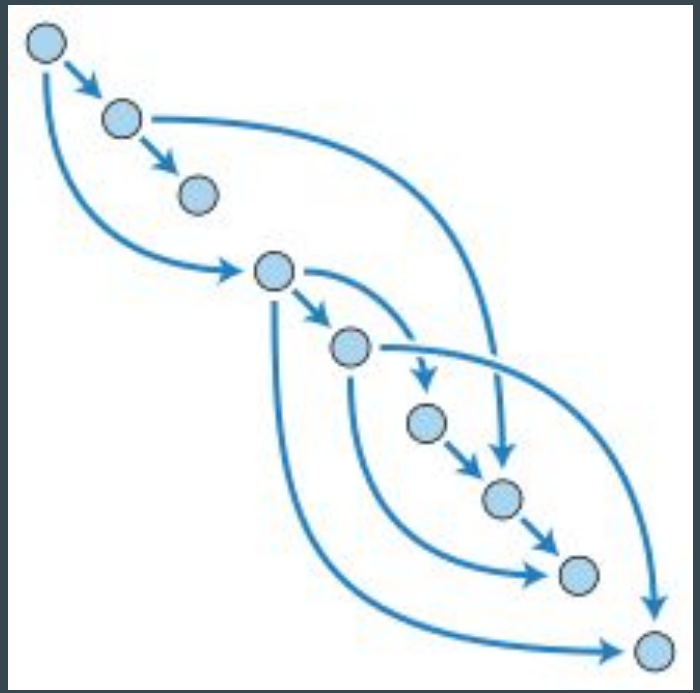
<u>Example</u>

Linear regression: y = Wx + b



Directed Acyclic Graph (DAG)

- Edged are directed from one node to another
- Nodes have a topological ordering
- No closed loops!



Static computational graphs

Define-and-Run methodology.

Pros:

- Speed: can spend a long time optimizing the graph
- Memory: can predict and allocate all mem ahead of time

Cons:

- Inflexible: once compiled, it cannot be modified at run time
- Debugging: graph representation doesn't match code
- Static: more difficult to support flexible sized inputs

Slide credit: Kevin McGuinness (adapted from the original one)

Dynamic computational graphs

Define-by-Run strategy

Pros:

- Can change structure of NN at runtime (add layers, change shape, etc.)
- Support flexible sized inputs
- Easier to debug
- More natural to code

Cons:

- Compile at runtime, can be slower
- Dynamic batching more difficult

Slide credit: Kevin McGuinness (adapted from the original one)

Deep learning frameworks

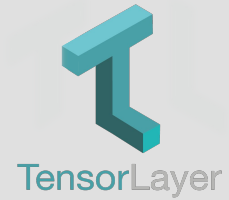

torch

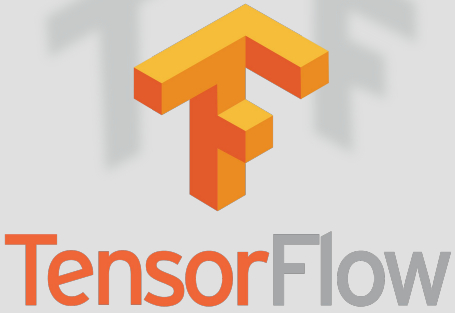

K
Keras


theano


DEEPLEARNING4J


Caffe2


TensorLayer


TensorFlow


PYTORCH


Chainer


Lasagne


Caffe


Microsoft
CNTK


Sonnet


mxnet

Framework basic comparison

Tensorflow:

- Production ready
- Multiple languages supported (Python, C, Java, JavaScript, Go)
- Multi device (Android, iOS, Web browser)
- Mature with a big community
- Tensorboard
- Keras
- Static graph

... Tensorflow 2.0 coming soon! → dynamic graph

Pytorch:

- Pythonic
- Easy to learn
- Framework rather than library
- Integration with Caffe2
- Dynamic graph

... Pytorch 1.0 finally released! → production ready

Surrounding technologies

Git

- Course repository (for the coding sessions)
- Use a personal branch to keep track of your progress
- Master branch will be updated each week with the solutions of previous sessions & required material for the current one

Virtualenv & virtualenvwrapper

- Isolate python environment

Docker

- Development reproducibility
- Containerize production environment
- TF Serving

NVIDIA

CUDA: “is a parallel computing platform and application programming interface (API) model created by Nvidia”

cuDNN: “is a GPU-accelerated library of primitives for deep neural networks. cuDNN provides highly tuned implementations for standard routines such as forward and backward convolution, pooling, normalization, and activation layers”

Questions?