Deep Water

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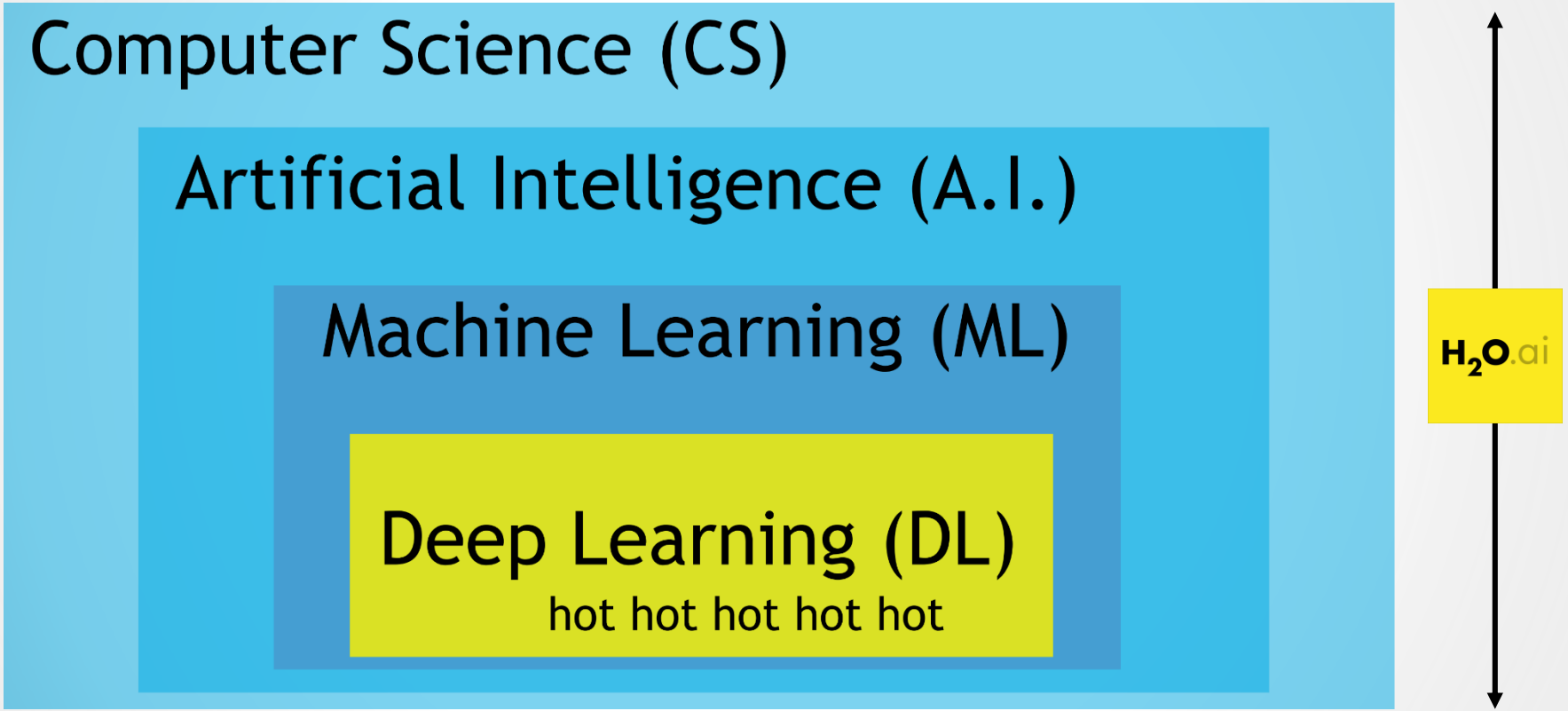
Paris Machine Learning Meetup
Murex
21st September, 2016

Agenda

- This Talk (30 mins)
  - About H2O.ai
  - Demos
    - Web Interface
    - R
  - Why H2O?
  - What's Next?
- **Second Talk (30 mins)**
  - Deep Water
  - Demos
    - H2O + mxnet
    - H2O + TensorFlow
- Third Talk (45 mins)
  - H2O + Spark = Sparkling Water
  - Demos
    - H2O + Spark MLlib

Deep Learning in H2O

H2O Overview



A Simple Neural Network

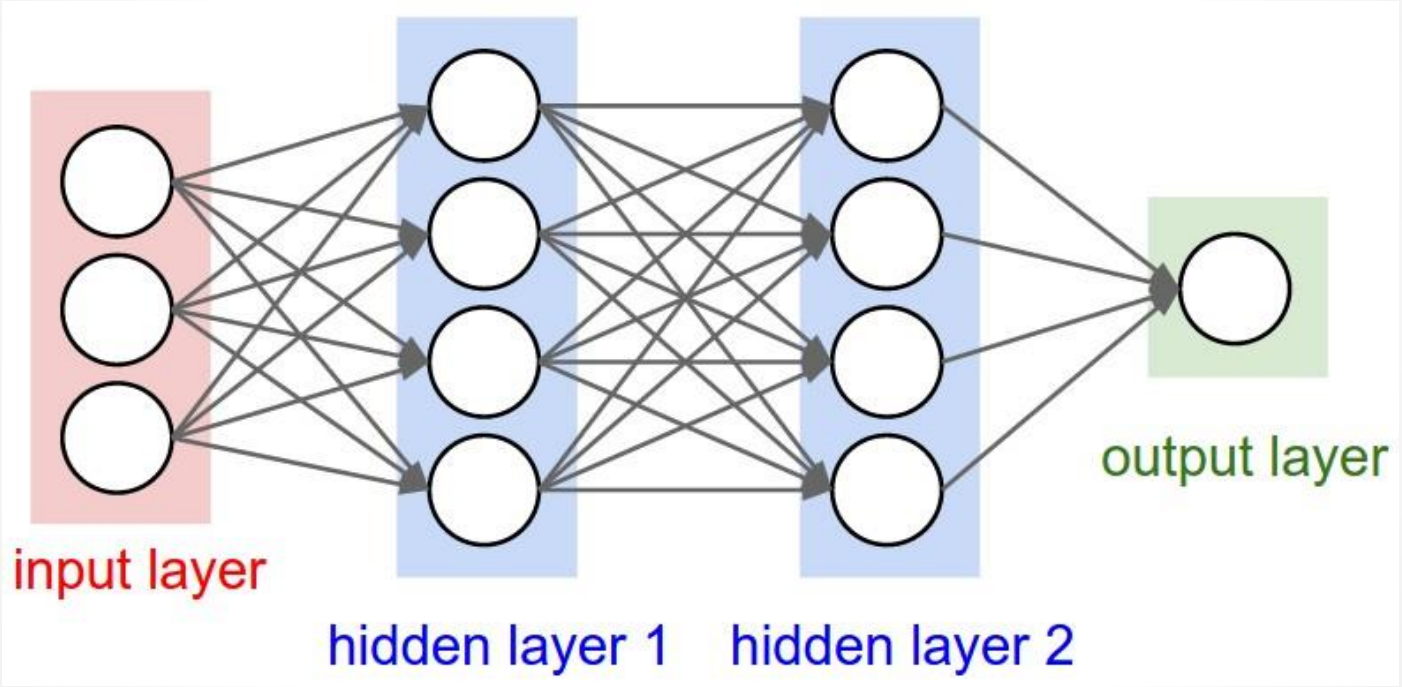


Image credit: http://cs231n.github.io/

H2O Deep Learning in Action

116M rows, 6GB CSV file
800+ predictors (numeric + categorical)

airlines_all_selected_cols.hex

Actions: View Data | Split... | Build Model... | Predict | Download | Export

Rows	Columns	Compressed Size
116695259	12	2GB

Job

Run Time 00:00:36.712
Remaining Time 00:00:17.188
Type Model
Key deeplearning-dd2f42f7-81f7-42e8-9d98-e34437309828
Description DeepLearning
Status RUNNING
Progress 69%

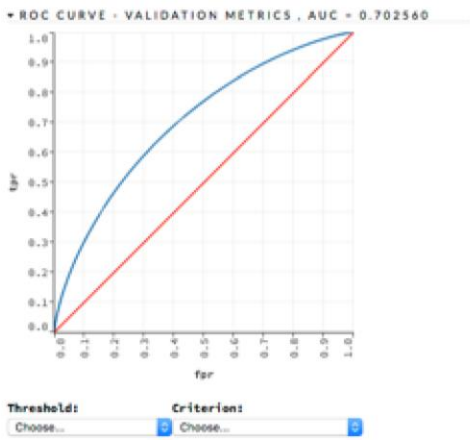
Iterations: 12. Epochs: 0.628821. Speed: 2,243,735 samples/sec. Estimated time left: 21.849 sec

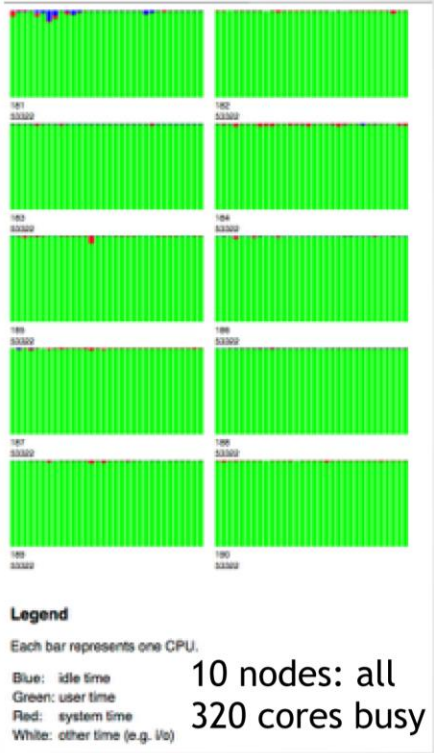
Actions: View | Cancel Job

model trained in <1 min:
2M+ samples/second

▾ OUTPUT - STATUS OF NEURON LAYERS (PREDICTING ISDEPDELAYED, 2-CLASS CLASSIFICATION, BERNOULLI DISTRIBUTION, CROSSENTROPY LOSS, 17,462 WEIGHTS/BIASES, 221.3 KB, 106,585,365 TRAINING SAMPLES, MINI-BATCH SIZE 1)

layer	units	type	dropout	l1	l2	mean_rate	rate_RMS	momentum	mean_weight	weight_RMS	mean_bias	bias_RMS
1	807	Input	0									
2	20	Rectifier	0	0	0	0.0483	0.2020	0	-0.0021	0.2111	-0.9139	1.0036
3	20	Rectifier	0	0	0	0.0197	0.0227	0	-0.1033	0.5362	-1.3908	1.5259
4	20	Rectifier	0	0	0	0.0517	0.0446	0	-0.1575	0.3068	-0.0846	0.6046
5	20	Rectifier	0	0	0	0.0761	0.0844	0	-0.0374	0.2275	-0.2647	0.2481
6	2	Softmax		0	0	0.0161	0.0083	0	0.0741	0.7260	0.4269	0.2056





10 nodes: all
320 cores busy

real-time, interactive
model inspection in Flow

H2O.ai Deep Learning Model

H2O Deep Learning Community Quotes

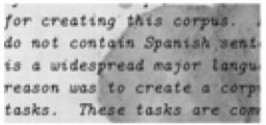
CIFAR-10 Competition Winners: Interviews with Dr. Ben Graham, Phil Culliton, & Zygmunt Zając

Triskelion | 01.02.2015

READ MORE

"I did really like H2O's deep learning implementation in R, though - the interface was great, the back end extremely easy to understand, and it was scalable and flexible. Definitely a tool I'll be going back to."

Kaggle challenge 2nd place winner Colin Priest



Completed • Knowledge • 161 teams

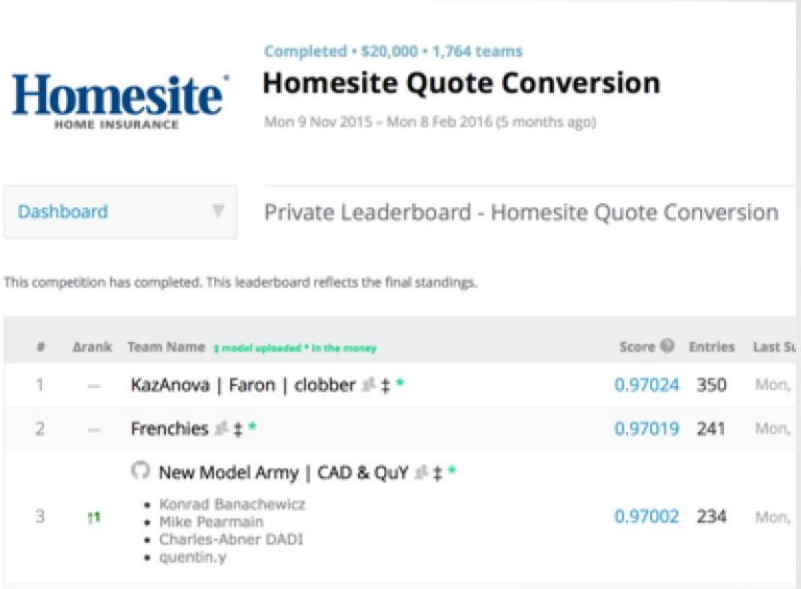
Denoising Dirty Documents

Mon 1 Jun 2015 – Mon 5 Oct 2015 (3 months ago)

READ MORE

"For my final competition submission I used an ensemble of models, including 3 deep learning models built with R and h2o."

H2O Deep Learning Community Quotes



H2O.ai

Why Deep Water?

What is Deep Water?

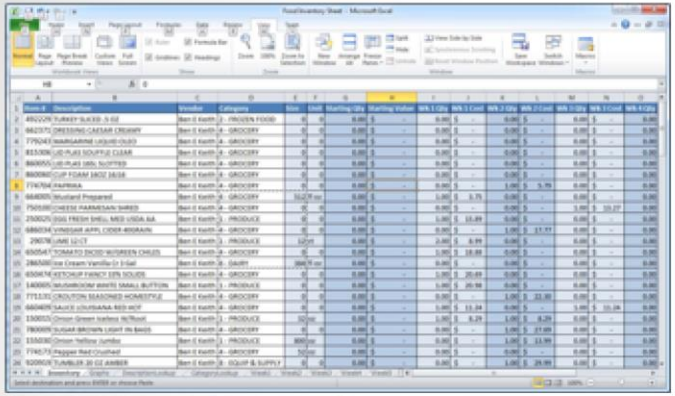
Photo credit: en.wikipedia.org/wiki/Deepwater_Horizon_explosion

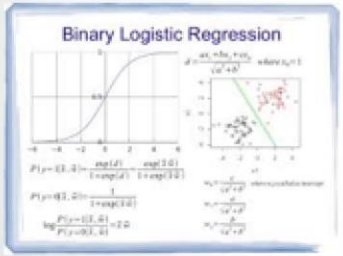
Deep Water: Best Open-Source Deep Learning

Enterprise Deep Learning for Business Transformation

Deep Water = THE Deep Learning Platform	H2O integrates the top open-source DL tools 
Native GPU support	 is up to 100x faster than 
Enterprise Ready	Easy to train and deploy, interactive, scalable, etc. Flow, R, Python, Spark/Scala, Java, REST, POJO, **Steam**
New Big Data Use Cases (previously impossible or difficult in H2O)	**Image** - social media, manufacturing, healthcare, … **Video** - UX/UI, security, automotive, social media, … **Sound** - automotive, security, call centers, healthcare, … **Text** - NLP, sentiment, security, finance, fraud, … **Time Series** - security, IoT, finance, e-commerce, …

More Data is Better! — Images, Video, Text, Logs, Streams, …





Example:
Fraud
Prediction

Today → **Tomorrow**

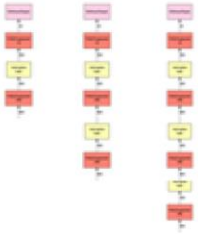
Better Data — Better Models — Better Results

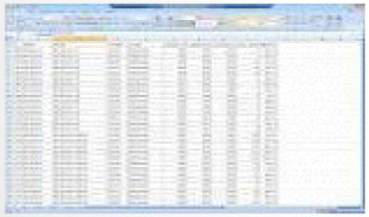
H$_2$O.ai

Deep Water opens the Floodgates for state-of-the-art Deep Learning

H2O Deep Learning:
simple multi-layer neural networks

1-5 layers
MBs/GBs of data



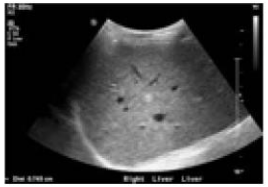


AMD
intel

Limited to business analytics,
statistical models (CSV data)

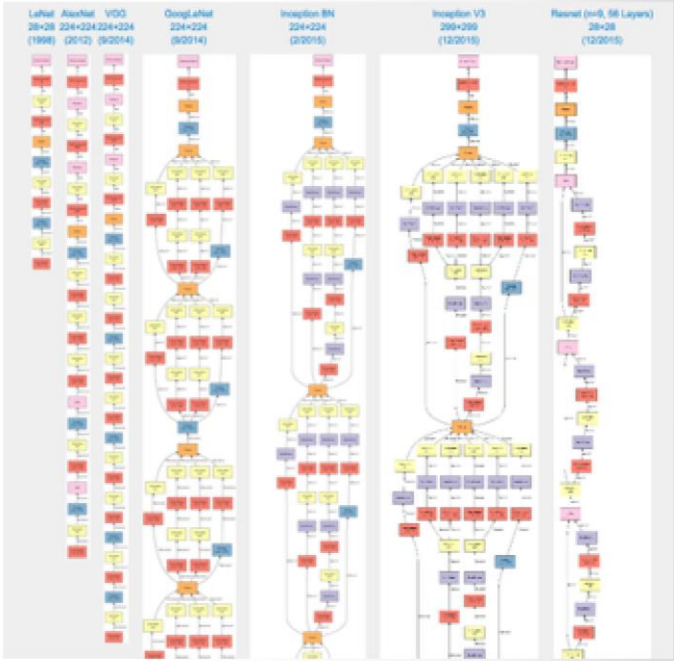
Deep Water: deep complex networks

5-1000 layers
GBs/TBs of data



AMD
intel

NVIDIA
CUDA



Large networks for big data
(e.g. image 1000x1000x3 -> 3m inputs)

H2O.ai

Current Contributors (more H2O.ai folks joining soon)

Fabrizio Milo

Cyprien Noel

Qiang Kou

Arno Candel

TensorFlow

Caffe

mxnet

H2O.ai

This repository Search

h2oai / deepwater

Deep Water Demos

Deep Water Demos

- **H2O + mxnet**
  - Dataset:
    - Cat / Dog / Mouse
  - H2O Python interface
  - mxnet GPU backend
  - Train a LeNet (CNN) model
  - Explore model in Flow
- **H2O + TensorFlow**
  - Dataset:
    - MNIST hand-written digits
  - Sparkling Water + Jupyter Notebook
  - Convert TensorFlow model into H2O
  - Explore models in Flow

For Online Audience

- **H2O + mxnet**
  - bit.ly/h2o_paris_1
  - **demo_03_mxnet**
- **H2O + TensorFlow**
  - bit.ly/h2o_paris_1
  - **demo_04_tensorflow**

H2O + mxnet

H2O + TensorFlow

Merci Beaucoup!

- Jiqiong (Ji) Qiu
- Franck Bardol
- Igor Carron

- Slides & Code
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  - github.com/woobe