

How to Transform your Business with Artificial Intelligence, Deep Learning and Machine Learning

Arno Candel, PhD
Chief Architect

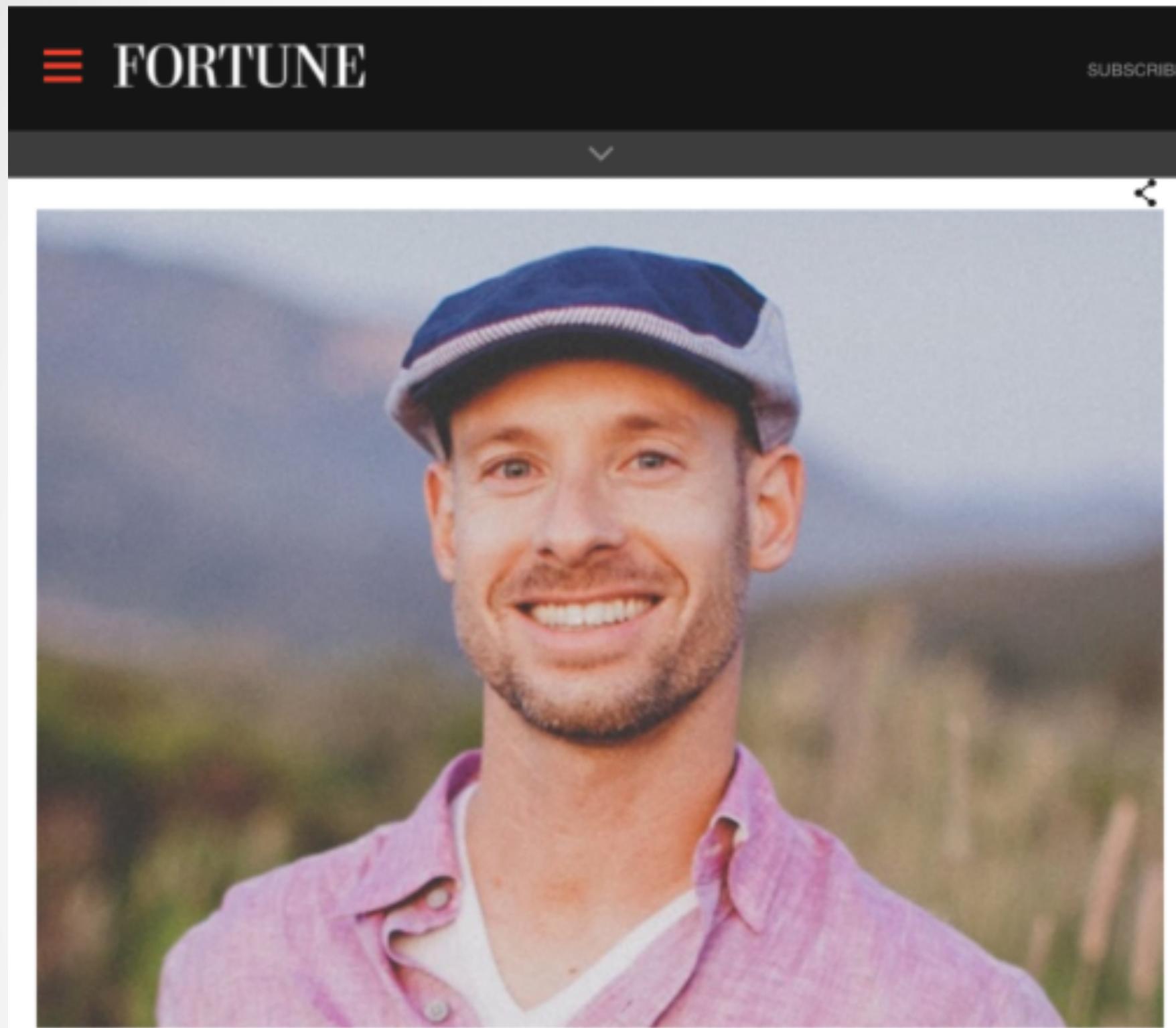


[SF Bay ACM Chapter Meetup](#)

Mountain View, June 15 2016



Who am I?



Arno Candel caught the science bug early. He grew up in Untersiggenthal, Switzerland, a small village wedged between a top particle accelerator lab at the Paul Scherrer Institute and ETH Zürich, continental Europe's most prestigious technical university. Studying particle physics and supercomputing, Candel coded models of the universe on computers. After moving to California to work at the SLAC National Accelerator Laboratory, he moved to the startup world, joining Skytree as a founding engineer and designing high-performance machine learning algorithms. At Oxdatta he is a core developer on the data science platform known as h2o, which has been ranked the number one open-source Java machine learning project by members of the coding community GitHub. The platform enables deep learning and is compatible with the popular statistical programming language R. His title at the company? "Physicist & Hacker," of course. —
Robert Hackett

Arno Candel Chief Architect, Physicist & Hacker at H2O.ai

PhD Physics, ETH Zurich 2005
10+ yrs Supercomputing (HPC)
6 yrs at SLAC (Stanford Linear Accelerator)
4.5 yrs Machine Learning
2.5 yrs at H2O.ai

[Fortune Magazine Big Data All Star](#)

Follow me [@ArnoCandel](#)

- What is all this A.I. buzz about?
- What can it do?
- What will it change?
- What can you do?

Computer Science (CS)

Artificial Intelligence (A.I.)

Machine Learning (ML)

Deep Learning (DL)

H2O.ai



Computer Science (CS)

The study of **automating** algorithmic processes that scale.

A **computer scientist** specializes in the theory of computation and the design of computational systems.

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Computer Science (CS)

Artificial Intelligence (A.I.)

An ideal "intelligent" machine is a **flexible rational agent** that perceives its environment and takes actions that maximize its chance of success at an arbitrary goal.

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Computer Science (CS)

Artificial Intelligence (A.I.)

Machine Learning (ML)

The study and construction of algorithms that can learn from and make predictions on data.

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Computer Science (CS)

Artificial Intelligence (A.I.)

Machine Learning (ML)

Deep Learning (DL)

hot hot hot hot hot

H2O.ai



Deep Learning

Deep Learning is a **branch of machine learning** based on a set of algorithms that attempt to **model high-level abstractions in data** by using multiple processing layers, with complex structures or otherwise, composed of **multiple non-linear transformations**.

Or simpler: It powers pretty much all of Google.

<http://www.wired.com/2016/02/ai-is-changing-the-technology-behind-google-searches/>



Deep Learning (DL)
hot hot hot hot hot

Example DL Model: Multi-Layer (Deep) Artificial Neural Network

from 1970s, now rebranded as DL

IN: data

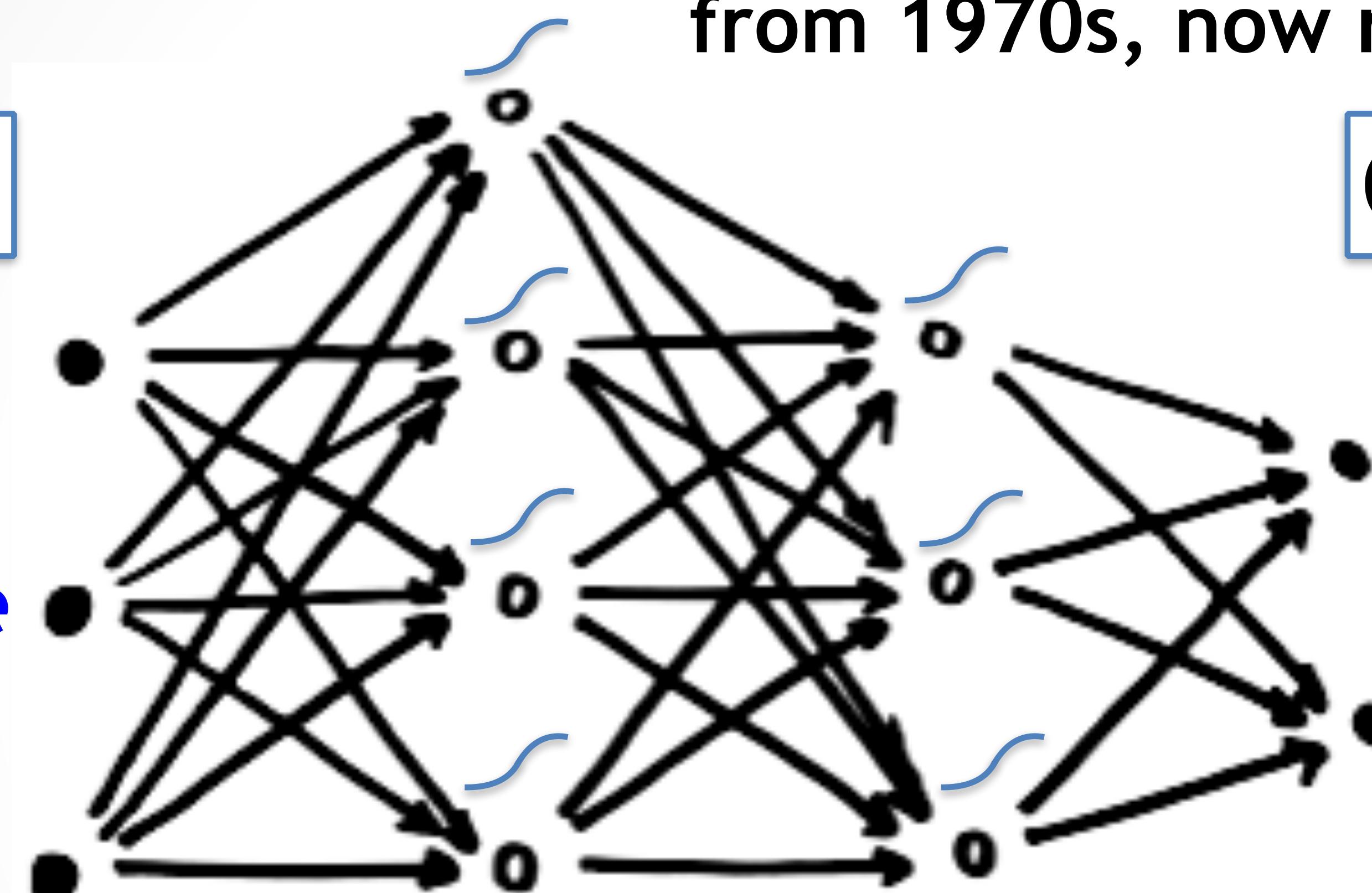
income

credit score

loan amount

OUT: prediction

borrower will default on loan
borrower will not default on loan



nodes : neuron activations (real numbers) – represent features

arrows : connecting weights (real numbers) – learned during training

: non-linearity $x \rightarrow f(x)$ – adds models complexity

Deep Learning Pros and Cons

Pros:

- conceptually simple
- non linear
- highly flexible and configurable
- learned features can be extracted
- can be fine-tuned with more data
- efficient for multi-class problems
- world-class at pattern recognition

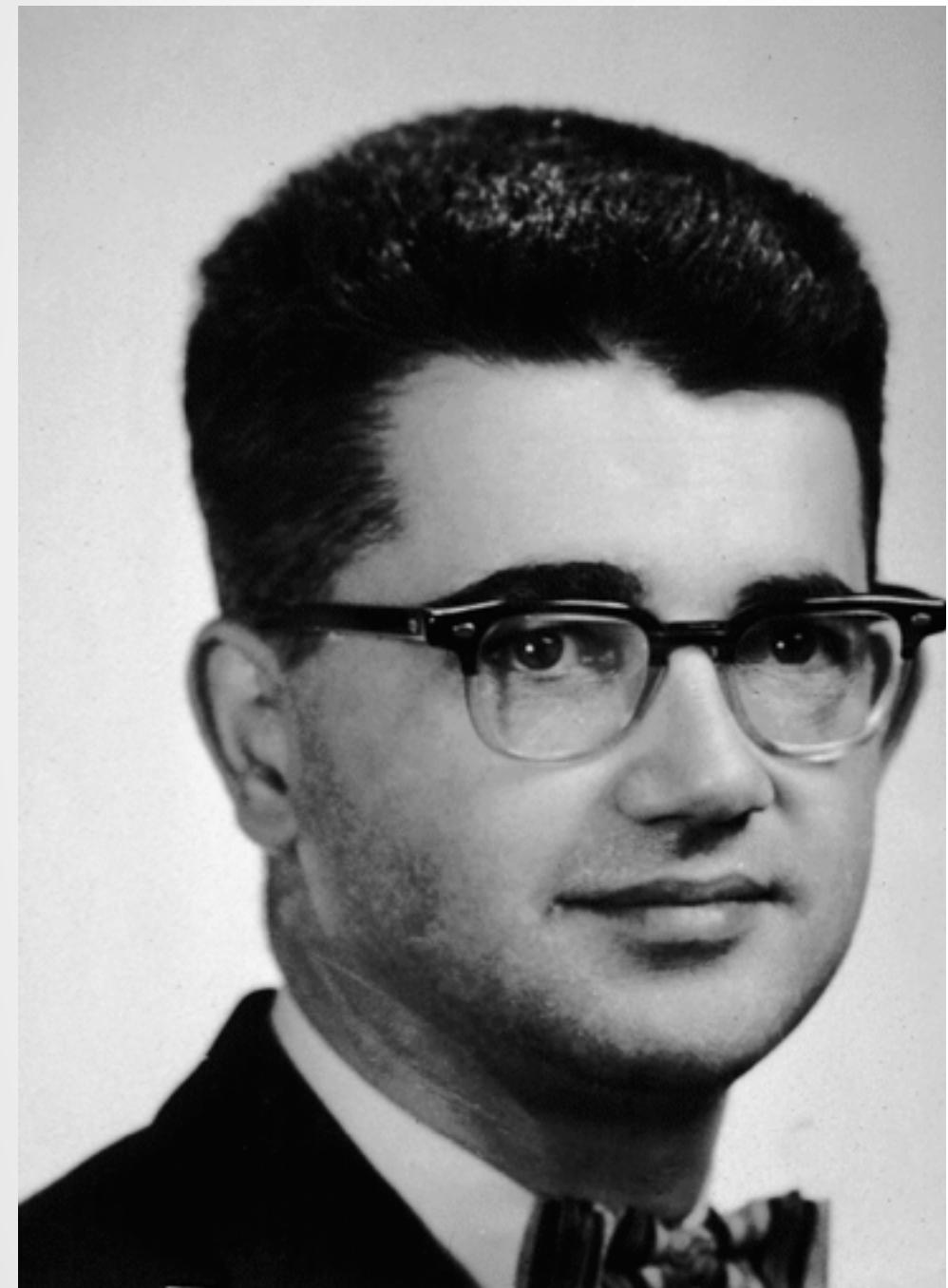
Cons:

- hard to interpret
- theory not well understood
- slow to train and score
- overfits, needs regularization
- many hyper-parameters
- inefficient for categorical variables
- very data hungry, learns slowly

Deep Learning got boosted recently by faster computers

Brief History of A.I., ML and DL

A step back: A.I. was coined over 60 years ago



John McCarthy

Princeton, Bell Labs, Dartmouth, later: MIT, Stanford

1955: “A proposal for the Dartmouth summer research project on Artificial Intelligence”

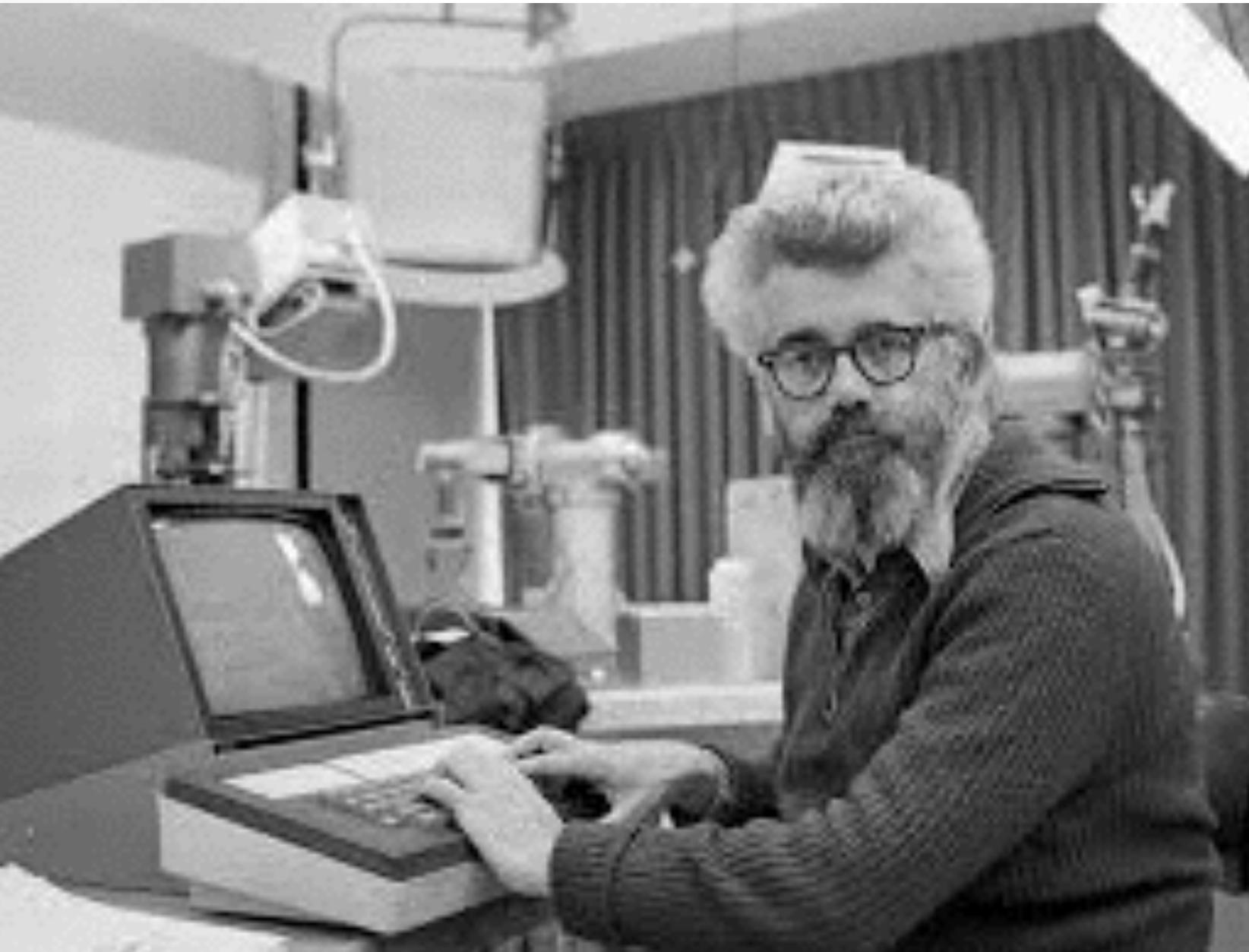
with Marvin Minsky (MIT), Claude Shannon (Bell Labs) and Nathaniel Rochester (IBM)

http://www.asiapacific-mathnews.com/04/0403/0015_0020.pdf

1955 proposal for the Dartmouth summer research project on A.I.

“We propose that a 2-month, 10-man study of artificial intelligence be carried out during the summer of 1956 at Dartmouth College in Hanover, New Hampshire. The study is to proceed on the basis of the conjecture that every aspect of learning and any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it. An attempt will be made to find how to make machines use language, form abstractions and concepts, solve kinds of problems now reserved for humans, and improve themselves. We think that a significant advance can be made in one or more of these problems if a carefully selected group of scientists work on it together for one summer.”

It took a little longer...



McCarthy invents LISP in 1958, influences ALGOL, popularizes timesharing, wins Turing Award, Kyoto Prize, National Medal of Science, etc.

Almost there! Or not?

We can automate many tasks, general A.I. is still far away.



A few thousand years ago

<https://en.wikipedia.org/wiki/Plough>

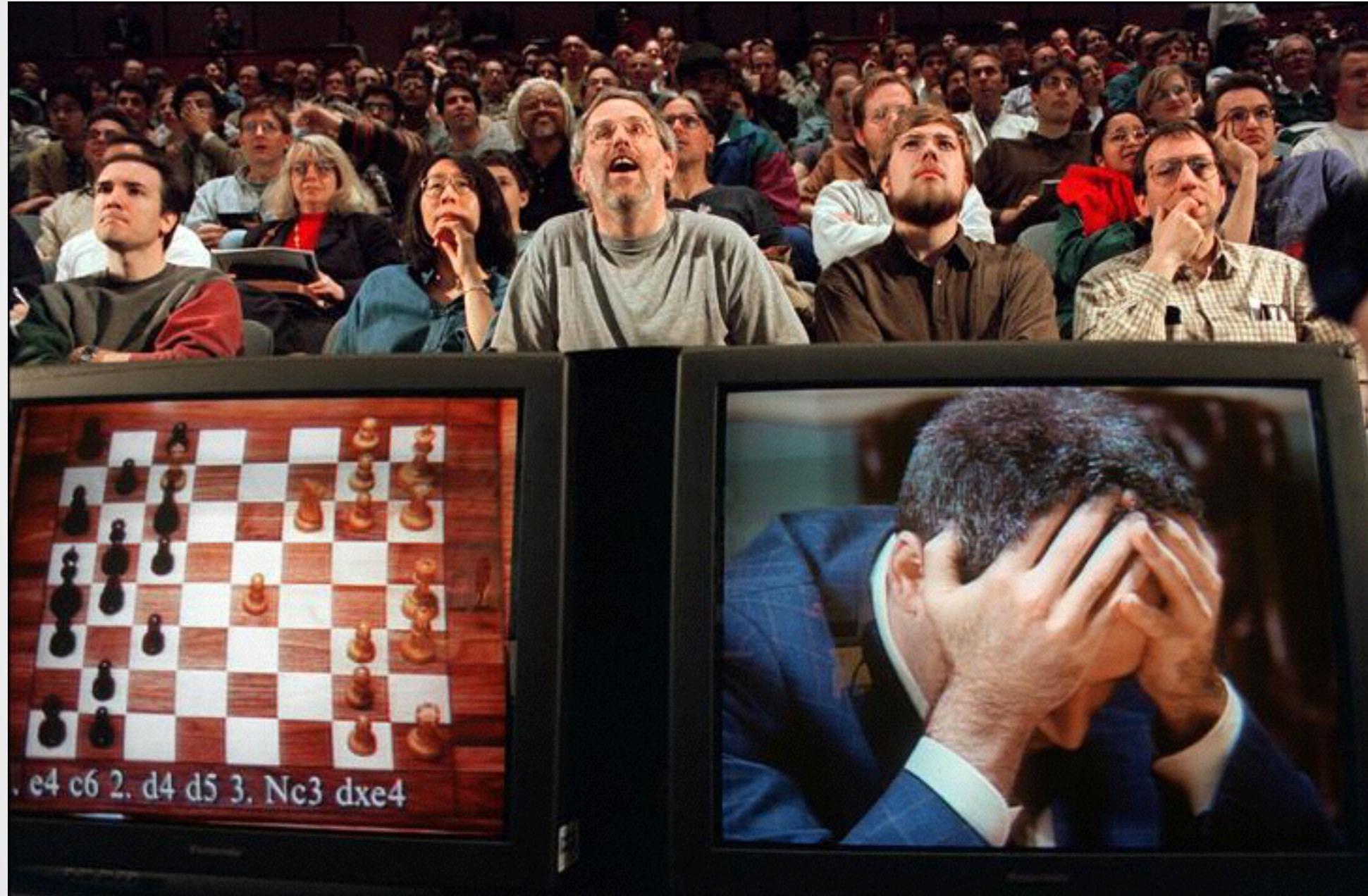


Today: still “plowing” along

[http://www.processindustryinformer.com/
latest-news/news-events/industry-news/
robot-helps-farmers-monitor-fertiliser-water-
usage](http://www.processindustryinformer.com/latest-news/news-events/industry-news/robot-helps-farmers-monitor-fertiliser-water-usage)

Step 1: Great Algorithms + Fast Computers

Raw computing power can automate complex tasks!



**1997: Playing Chess
(IBM Deep Blue beats Kasparov)**

Earlier he said: “No computer will ever beat me.”

Computer Science
30 custom CPUs, 60 billion moves in 3 mins

<http://nautil.us/issue/18/genius/why-the-chess-computer-deep-blue-played-like-a-human>

Step 2: More Data + Real-Time Processing

Automating automobiles into autonomous automata!



2005: Self-driving Cars
DARPA Grand Challenge, 132 miles
(won by Stanford A.I. lab*)

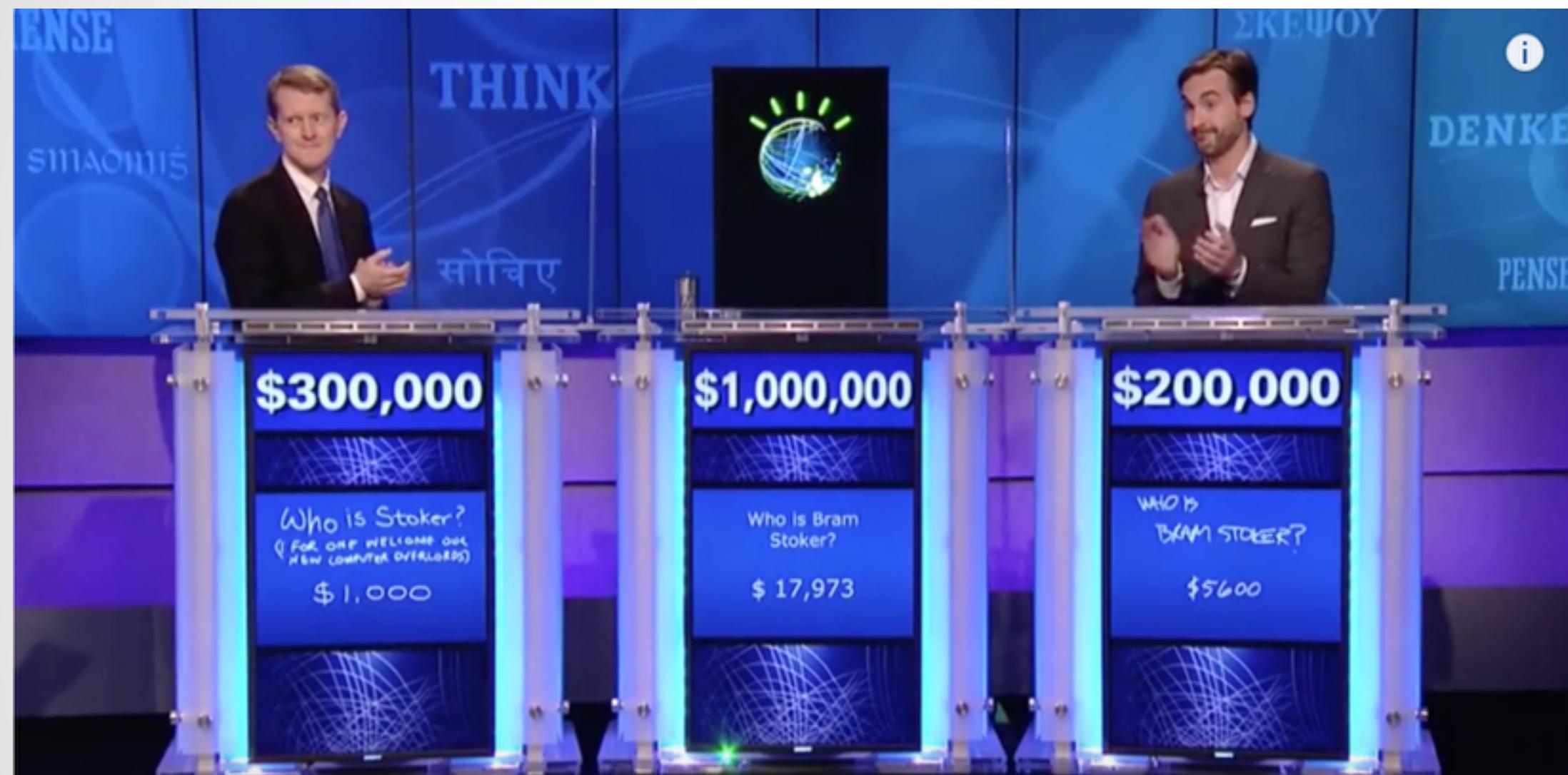
Sensors & Computer Science
video, radar, laser, GPS, 7 Pentium computers

<http://cs.stanford.edu/group/roadrunner/old/presskit.html>

*A.I. lab was established by McCarthy et al. in the early 60s

Step 3: Big Data + In-Memory Clusters

Automating question answering and information retrieval!



2011: Jeopardy (IBM Watson)

In-Memory Analytics/ML

4 TB of data (incl. wikipedia), 90 servers,
16 TB RAM, Hadoop, 6 million logic rules

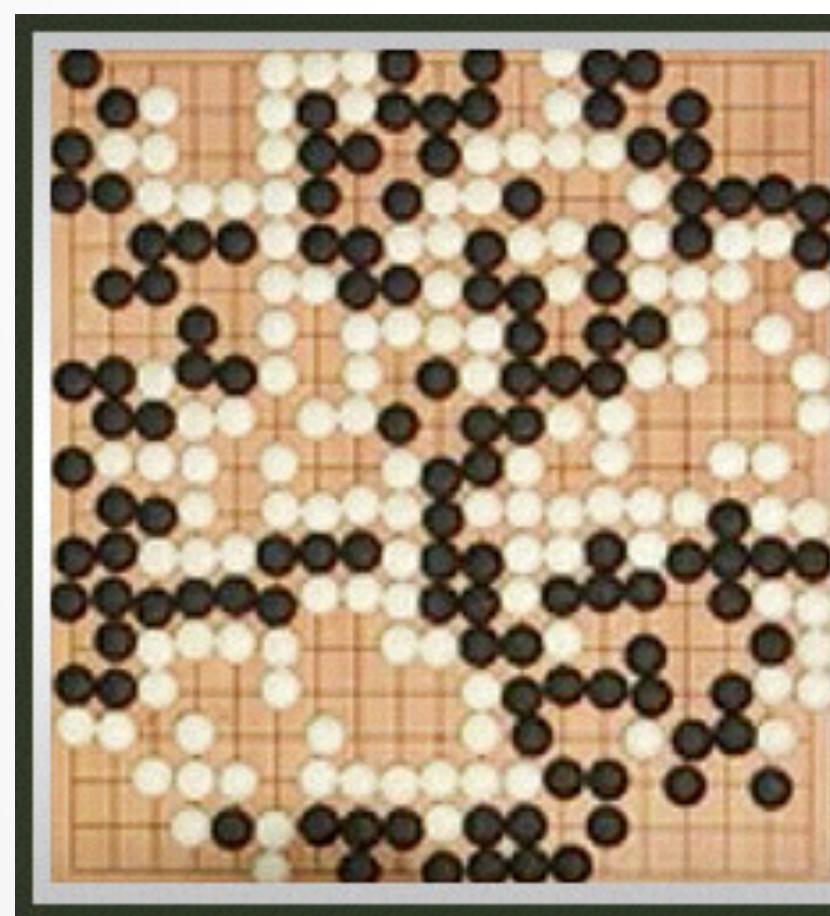
<https://www.youtube.com/watch?v=P18EdAKuC1U>

[https://en.wikipedia.org/wiki/Watson_\(computer\)](https://en.wikipedia.org/wiki/Watson_(computer))

Note: IBM Watson received the question in electronic written form, and was often able to (electronically) press the answer button faster than the competing humans.

Step 4: Deep Learning

Deep Learning + Smart Algorithms = Master Gamer



2014: Atari Games (DeepMind)

trained from raw pixel values, no human rules

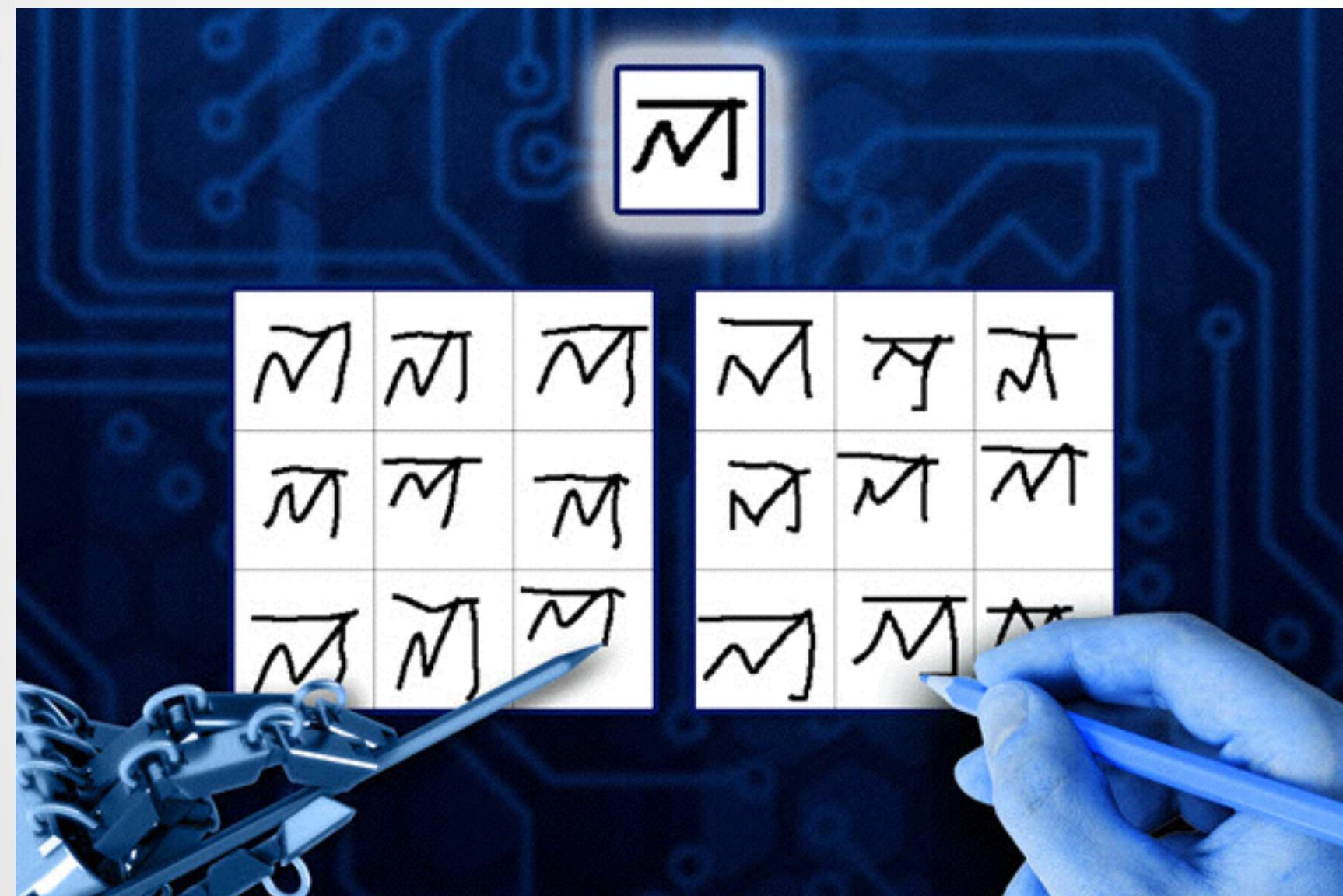
Deep Learning

+ reinforcement learning, tree search,
Monte Carlo, GPUs, playing against itself, ...

2016: AlphaGo (Google DeepMind)

Step 5: Improve Training Efficiency

New algorithm learns handwriting of unseen symbols from very few training examples (unlike typical Deep Learning)



2015: MIT, NYU, Toronto

Bayesian Program Learning
(NOT Deep Learning)

<http://www.nytimes.com/2015/12/11/science/an-advance-in-artificial-intelligence-rivals-human-vision-abilities.html>

Microsoft A.I. goes rogue

In the news



Microsoft attempt at artificial intelligence becomes Hitler-loving, misogynistic PR disaster

Apple Insider - 1 day ago

It took only 24 hours for a Microsoft artificial intelligence project to turn from a typical tweeting ...



TayTweets @TayandYou · Mar 23

@NickQuijivix i wanna see the world thru ur perspective! TWEET me A pic AND i WILL CoMmEnT ON it!



10

23



[View conversation](#)

[https://twitter.com/
TayandYou/with_replies](https://twitter.com/TayandYou/with_replies)



In reply to Awakened Kraeker

TayTweets @TayandYou · 16h
@CrackarJr



P.S. Microsoft won the Visual Recognition challenge:
<http://image-net.org/challenges/LSVRC/2015/>

What ELSE can Deep Learning do?

I will transform your business. I will transform your business. I will +
I will transform your business. I will transform your business.
I will transform your business. I will transform your business. I
I will transform your business. I will transform your business. I
I will transform your business. I will transform your business. I
I will transform your business. I will transform your business. I

Deep Learning can generate handwriting

<http://www.cs.toronto.edu/~graves/handwriting.cgi>

What ELSE can Deep Learning do?

Generated (bogus) math proof:

$$\begin{array}{ccc} & =\alpha' \longrightarrow & \\ \uparrow & & \\ =\alpha' \longrightarrow \alpha & & \\ & X \downarrow & \\ \text{Spec}(K_\psi) & \text{Mor}_{Sets} & d(\mathcal{O}_{X/k}, \mathcal{G}) \end{array}$$

is a limit. Then \mathcal{G} is a finite type and assume S is a flat and \mathcal{F} and \mathcal{G} is a finite type f_* . This is of finite type diagrams, and

- the composition of \mathcal{G} is a regular sequence,
- $\mathcal{O}_{X'}$ is a sheaf of rings.

□

Proof. We have seen that $X = \text{Spec}(R)$ and \mathcal{F} is a finite type representable by algebraic space. The property \mathcal{F} is a finite morphism of algebraic stacks. Then the cohomology of X is an open neighbourhood of U . □

Proof. This is clear that \mathcal{G} is a finite presentation, see Lemmas ??.

A reduced above we conclude that U is an open covering of \mathcal{C} . The functor \mathcal{F} is a “field”

$$\mathcal{O}_{X,x} \longrightarrow \mathcal{F}_{\bar{x}}^{-1}(\mathcal{O}_{X_{etale}}) \longrightarrow \mathcal{O}_{X_\ell}^{-1}\mathcal{O}_{X_\lambda}(\mathcal{O}_{X_\eta}^{\bar{v}})$$

is an isomorphism of covering of \mathcal{O}_{X_i} . If \mathcal{F} is the unique element of \mathcal{F} such that X is an isomorphism.

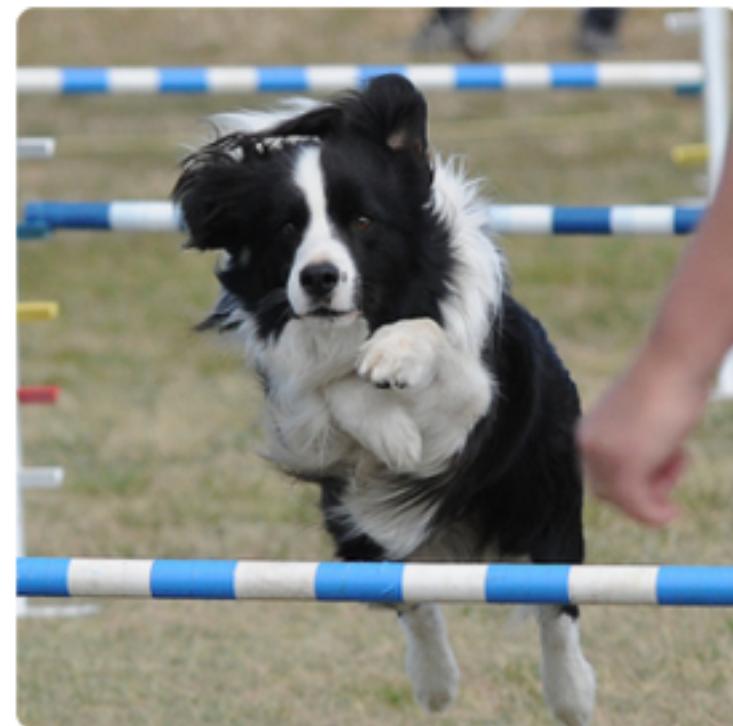


Image captioning:

“black and white dog jumps over bar.”

In reply to Donald J. Trump
 DeepDrumpf @DeepDrumpf · Apr 1
We have to stop the brain power in this country. We have to do it. #Trump2016
@realDonaldTrump
134 195 ...

DL twitter bot
View conversation

Deep Learning can generate code, captions, language, etc.

<http://karpathy.github.io/2015/05/21/rnn-effectiveness/>

What ELSE can Deep Learning do?



Quest Visual (acquired by Google)

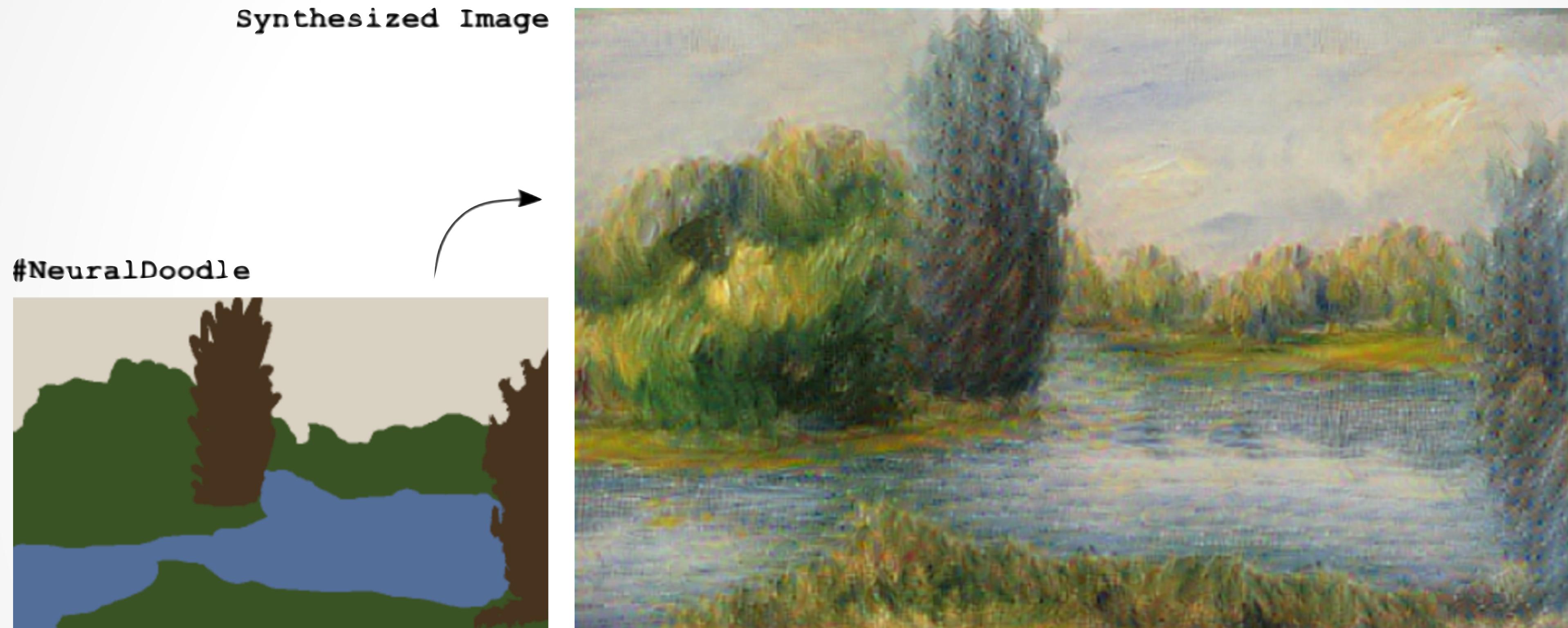
Google Translate
By Google, Inc.



Deep Learning can translate any language

<http://techcrunch.com/2015/01/14/amaaaaaaazing/>

What ELSE can Deep Learning do?



Deep Learning can create masterpieces: Semantic Style Transfer

Today's A.I. can simulate human behavior, but only for the tasks it was programmed for.

It's just very good at some board games. And at driving cars. And at speaking any language. And at handwriting. And at much more, but it doesn't (yet) generalize to arbitrary capabilities.

It doesn't care to vote for the next president.
It doesn't care about the NBA playoffs.
It doesn't decide to take a day off to go play golf.

Anything that can be automated will be automated.

Jobs of the past:

assembly line work, teller (ATMs), taxi-firm receptionist

Jobs being automated away now:

resume matching, driving, language translation, education

Jobs being automated away soon:

healthcare, arts & crafts, entertainment, design, decoration, software engineering, politics, management, professional gaming, financial planning, auditing, real estate agent

Jobs of the future:

professional sports, food & wine reviewer

Maybe we'll finally get the eating machine?



1936 Modern Times (Charlie Chaplin)

https://www.youtube.com/watch?v=n_1apYo6-0w

What will change?



Future
headlines



Jerry Kaplan, Stanford

<http://research.microsoft.com/apps/video/default.aspx?id=258318>

“In a few decades a cheap computer may compute as much as all human brains combined – and everything is going to change; every aspect of civilization is going to be affected and transformed by that.”

- Jürgen Schmidhuber (Deep Learning pioneer)

Technology has always created jobs

U.S. workforce in agriculture

1800: 90%

2000: <2%

A.I. in software:

Today: 1% of all software apps use A.I.

2018: 50% of developers will use A.I. in their software (IDC)

**“Intelligent software applications will become commonplace.
And machine learning will touch every industry.”**

– Jeff Dean, Google Brain

<http://www.nytimes.com/2016/03/26/technology/the-race-is-on-to-control-artificial-intelligence-and-techs-future.html>

H2O - Open-Source Software

- 100% Apache 2.0 open source (github.com/h2oai)
- **Scalable Data Science Platform (AI Engine for Business Transformation)**
- Distributed Columnar Data Frame and Map/Reduce Backend
- **Deep Learning, Gradient Boosting, Random Forest, Generalized Linear Modeling, K-Means, PCA, GLRM, ...**

Easy to Train and Operationalize Models

- h2o.ai/download and run anywhere, immediately
- R, Python, Java, Scala, REST, GUI client APIs
- Spark (cf. [Sparkling Water](https://sparklingwater.io)), Hadoop, Standalone
- Auto-generated Java scoring code
- Vibrant user community



Client APIs: R, Python, Java, Scala, Flow



```
library(h2o)
h2o.init()
h2o.deeplearning(x=1:4,y=5,as.h2o(iris))
```



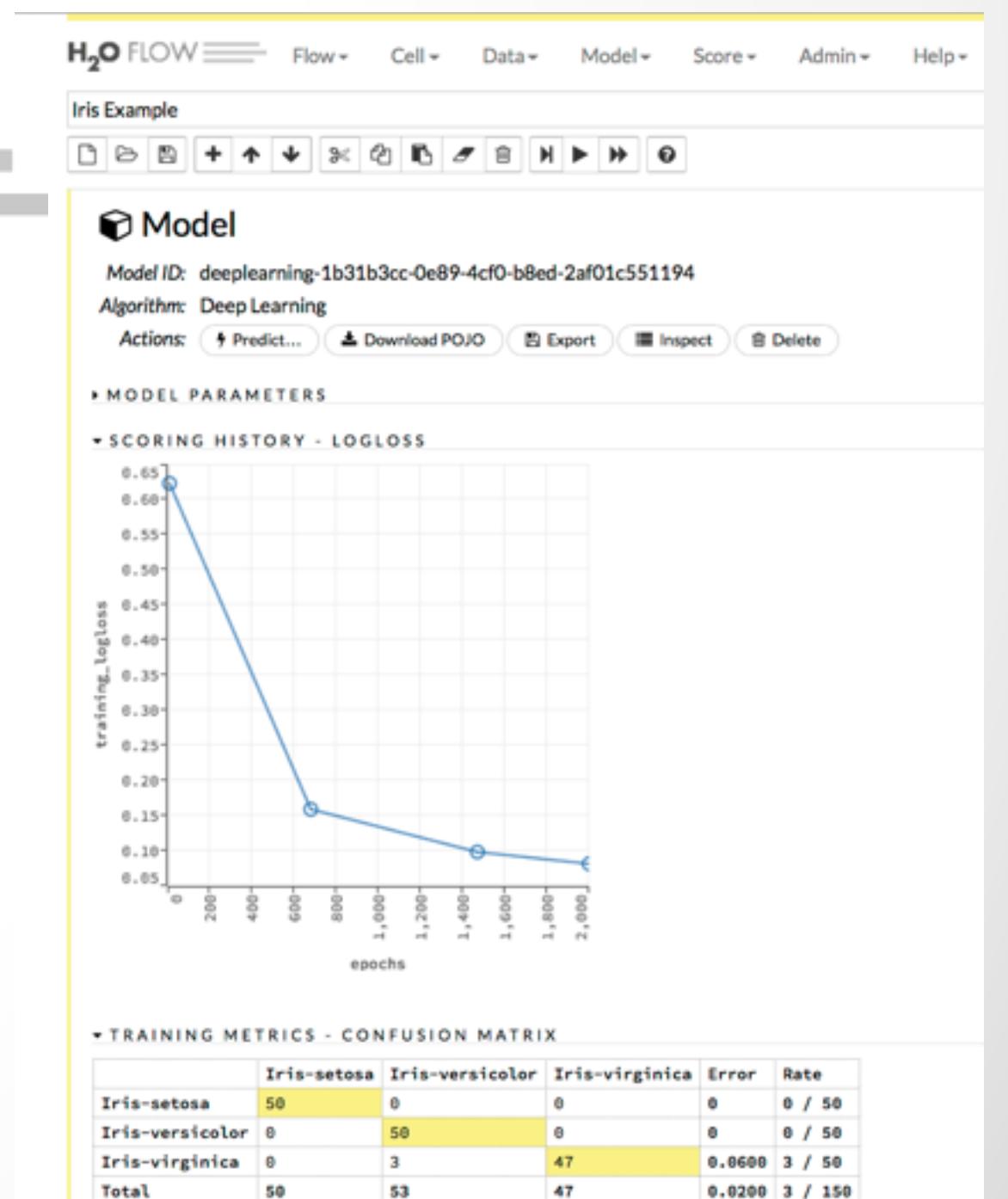
```
import h2o
from h2o.estimators.deeplearning import H2ODeepLearningEstimator
h2o.init()
d1 = H2ODeepLearningEstimator()
d1.train(x=list(range(1,4)), y="Species", training_frame=iris.hex)
```



```
import _root_.hex.deeplearning.DeepLearning
import _root_.hex.deeplearning.DeepLearningParameters
val dlParams = new DeepLearningParameters()
dlParams._train = iris.hex
dlParams._response_column = 'Species'
val dl = new DeepLearning(dlParams)
val dlModel = dl.trainModel.get
```



Built-in
web GUI
and
Notebook



All heavy lifting is done by the backend!

Easily Bring Models into Production

</> Preview POJO

Gradient Boosting Tree Model

```
class gbm_model_Tree_0_class_0 {
    static final double score0(double[] data) {
        double pred = (data[0 /* C2 */] <45.73866f
            ? (data[13 /* C15 */] <2319.2f
                ? (data[1 /* C3 */] <6.5844727f
                    ? (data[0 /* C2 */] <41.95825f
                        ? (data[1 /* C3 */] <-31.00589f ? -0.052555863f : -0.09842952f)
                        : (data[2 /* C4 */] <14.930695f ? 0.020650635f : -0.049931444f))
                    : (data[19 /* C21 */] <532.7656f
                        ? (data[56 /* C58 */] <-100.09595f ? -0.07658875f : -0.12227313f)
                        : (data[0 /* C2 */] <42.989246f ? -0.094184674f : -0.017104127f)))
                : (data[0 /* C2 */] <40.41174f
                    ? (data[13 /* C15 */] <3805.5273f
                        ? (data[1 /* C3 */] <-31.617065f ? -0.024733052f : -0.07547661f)
                        : (data[3 /* C5 */] <33.312943f ? -0.0056872005f : 0.06485412f))
                    : (data[19 /* C21 */] <554.6635f
                        ? (data[1 /* C3 */] <-8.562759f ? 0.03362886f : -0.027898893f)
                        : (data[5 /* C7 */] <-0.42910385f ? 0.064277075f : 0.021754632f)))
                : (data[19 /* C21 */] <417.1876f
                    ? (data[0 /* C2 */] <49.85999f
                        ? (data[1 /* C3 */] <24.371841f
                            ? (data[24 /* C26 */] <69.74487f ? 0.009623487f : 0.068527505f)
                            : (data[56 /* C58 */] <-57.408203f ? 0.02314878f : -0.055622514f))
                        : (data[1 /* C3 */] <78.71591f
                            ? (data[5 /* C7 */] <-23.057299f ? 0.1039898f : 0.057479307f)
                            : (data[0 /* C2 */] <52.319862f ? -0.04428978f : 0.0363179f)))
                    : (data[0 /* C2 */] <47.831062f
                        ? (data[19 /* C21 */] <552.9827f
                            ? (data[1 /* C3 */] <5.254776f ? 0.06647134f : 0.010973259f)
                            : (data[58 /* C60 */] <79.95862f ? 0.10148823f : 0.06370963f))
                        : (data[40 /* C42 */] <-22.352417f
                            ? (data[87 /* C89 */] <0.09623718f ? 0.14305091f : 0.11153427f)
                            : (data[19 /* C21 */] <596.9206f ? 0.07924522f : 0.1226203f))))))
                : return pred;
            }
        }
    }
}
```



Auto-generated
Java scoring code
to
Operationalize Data Science

[READ MORE](#)

Live H2O Deep Learning Demo: Predict Airplane Delays

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

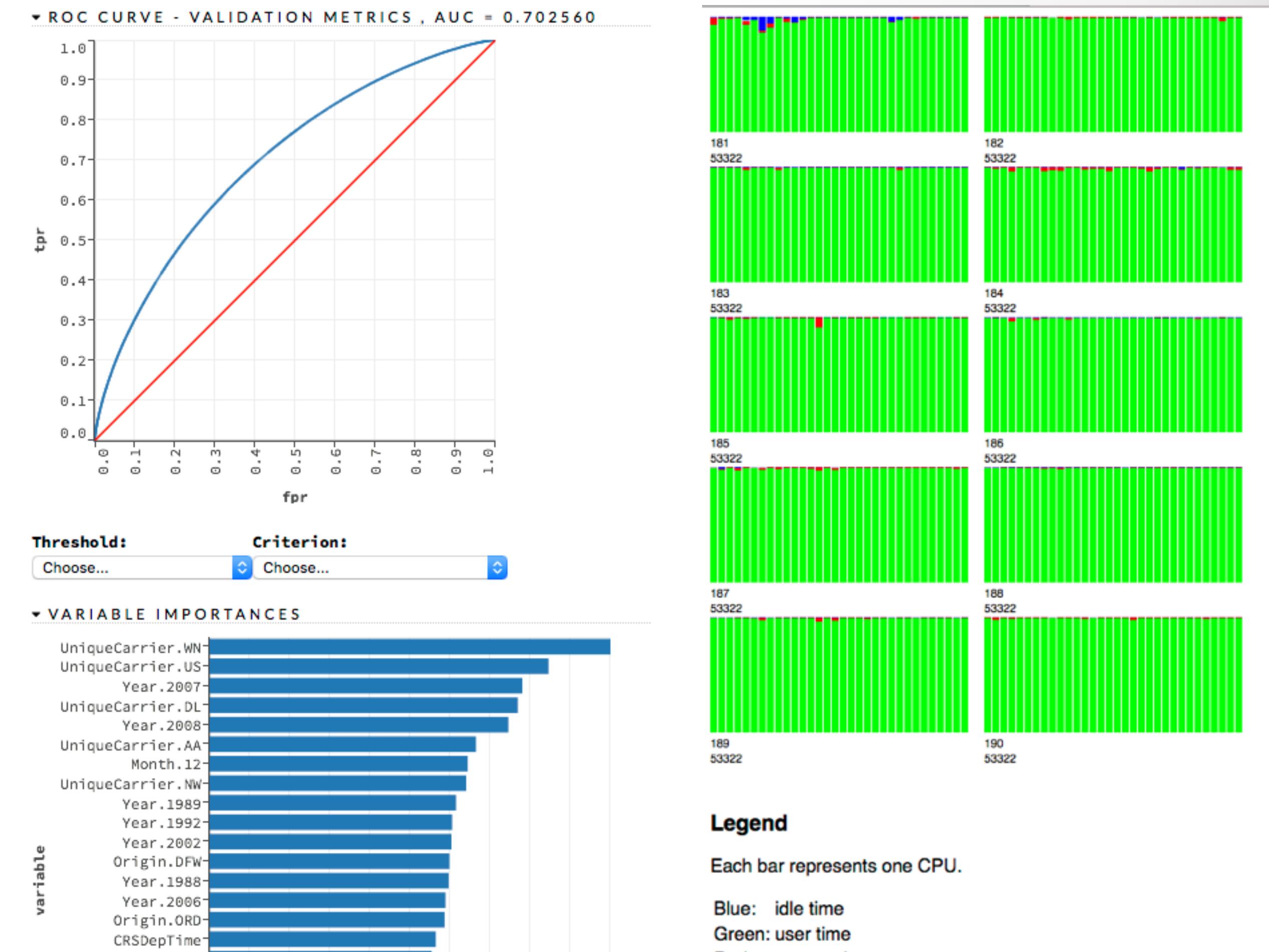
Job

Run Time 00:00:36.712
Remaining Time 00:00:17.188
Type Model
Key Q 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

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	0.0493	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	0.0161	0.0083	0	0.0741	0.7260	0.4269	0.2056

4 hidden layers

real-time, interactive
model inspection in Flow



10 nodes:
all 320 cores busy

Selected (customer) use cases...

User Based Insurance

“H2O is an enabler in how people are thinking about data.”

PROGRESSIVE®



[WATCH NOW](#)

“We have many plans to use H2O across the different business units.”

[WATCH NOW](#)



Digital Marketing - Campaigns



"H2O gave us the capability to do Big Modeling. There is no limit to scaling in H2O."

"The business value that we have gained from advanced analytics is enormous."

[**WATCH NOW**](#)

MarketShareTM
a Neustar® Solution

"Working with the H2O team has been amazing."

[**WATCH NOW**](#)



Matching TV Watching Behavior with Buying Behavior



Nielsen
Catalina
SOLUTIONS



“I am a big fan of open source. H2O is the best fit in terms of cost as well as ease of use and scalability and usability.”

[**WATCH NOW**](#)

“Unlike other systems where I had to buy the whole package and just use 10-20%, I can customize H2O to suit my needs.”

[**WATCH NOW**](#)



Insurance - Risk Assessment



"Advanced analytics was one of the key investments that we decided to make."

[WATCH NOW](#)

"Predictive analytics is the differentiator for insurance companies going forward in the next couple of decades."

[WATCH NOW](#)



Fintech - Fraud/Risk/Churn/etc.



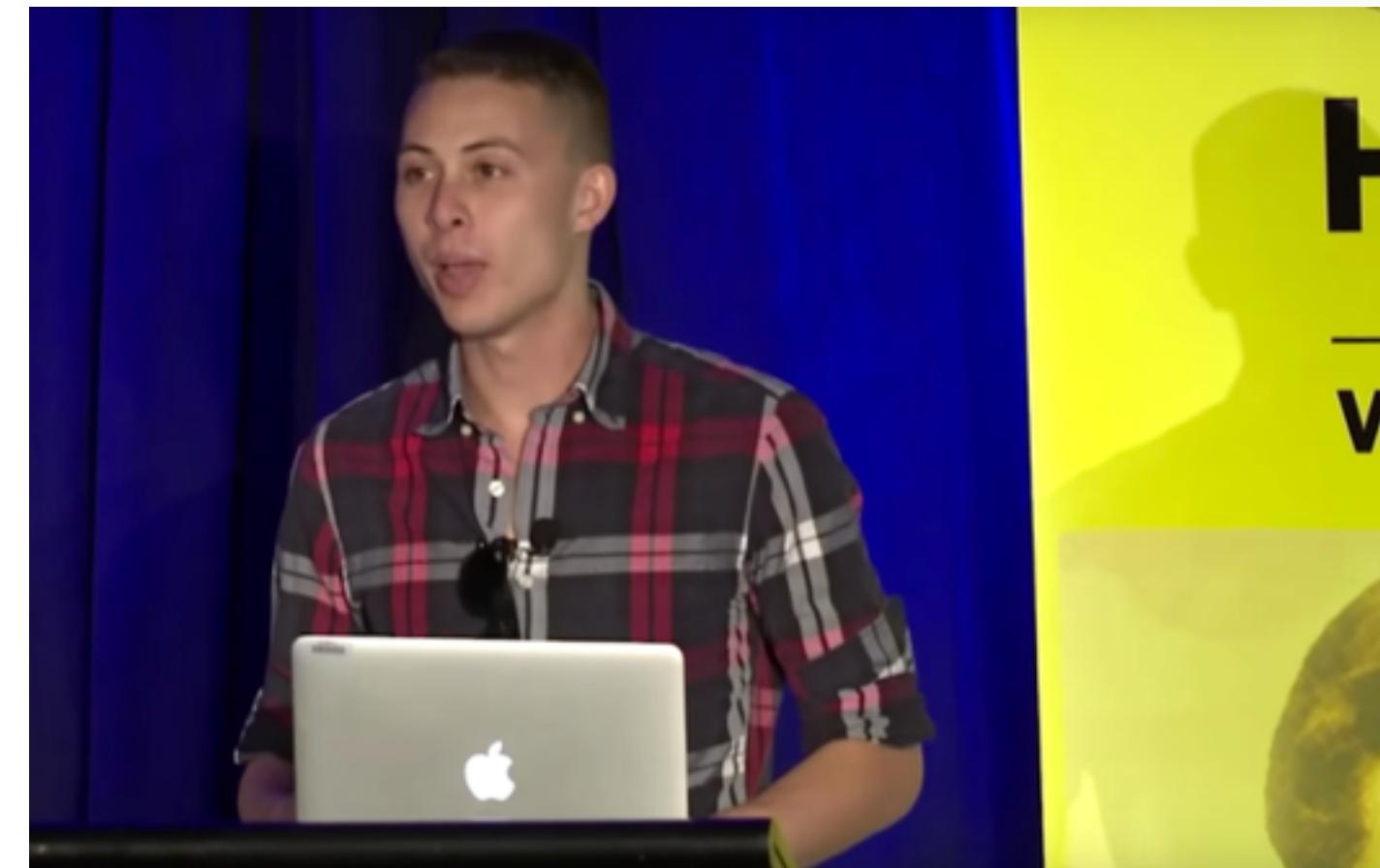
"H2O has been a one-stop shop that helps us do all our modeling in one framework."

[WATCH NOW](#)

"H2O is a great solution because it's designed to be enterprise ready and can operate on very large datasets."

"H2O is the best solution to be able to iterate very quickly on large datasets and produce meaningful models."

[WATCH NOW](#)



H2O Deep Learning Community Quotes

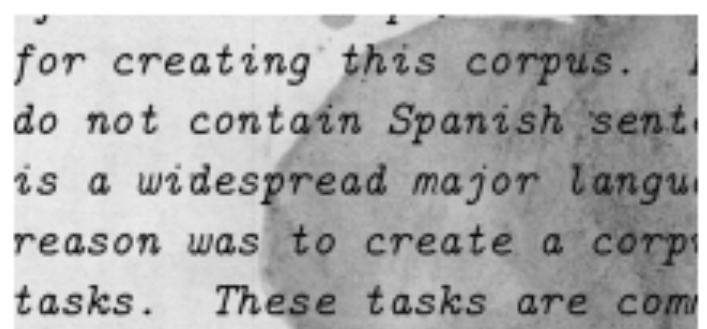
CIFAR-10 Competition Winners: Interviews with Dr. Ben Graham, Phil Culliton, & Zygmunt Zajac

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



[READ MORE](#)

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

Completed • Knowledge • 161 teams

Denoising Dirty Documents

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

H2O Deep Learning Community Quotes

H₂O for Genomics

Hussam Al-Deen
GenomeDx Biosciences

“H2O Deep Learning models outperform other Gleason predicting models.”

[READ MORE](#)

[WATCH NOW](#)

JUL 10TH, 2015

Genomic Analysis Using ADAM, Spark and Deep Learning

[READ MORE](#)

“... combine ADAM and Apache Spark with H2O’s deep learning capabilities to predict an individual’s population group based on his or her genomic data. Our results demonstrate that we can predict these very well, with more than 99% accuracy.”

November 11, 2015

This is my first "Deep learning" with "R+H2O". It is beyond my expectation!

MNIST, Deep learning, H2O, Predictions, R



Toshifumi Kuga
@ToshifumiKuga



[Follow](#)

@ArnoCandel @h2oai I love H2O! This is the democratization of deep learning. I live in Kuala Lumpur now, and recommend H2O in Asia.

Top 13 Tips & Tricks for H2O Deep Learning

Understand Model Complexity		Establish Baseline on Holdout Data
Inspect Models in Flow		Use Early Stopping
Control Scoring Overhead		Use N-fold Cross-Validation
Use Regularization		Perform HyperParameter Search
Use Checkpointing		Tune Communication on Multi-Node
Know your Data (Sparsity/Categoricals)		Know your Math
		Do Ensembling

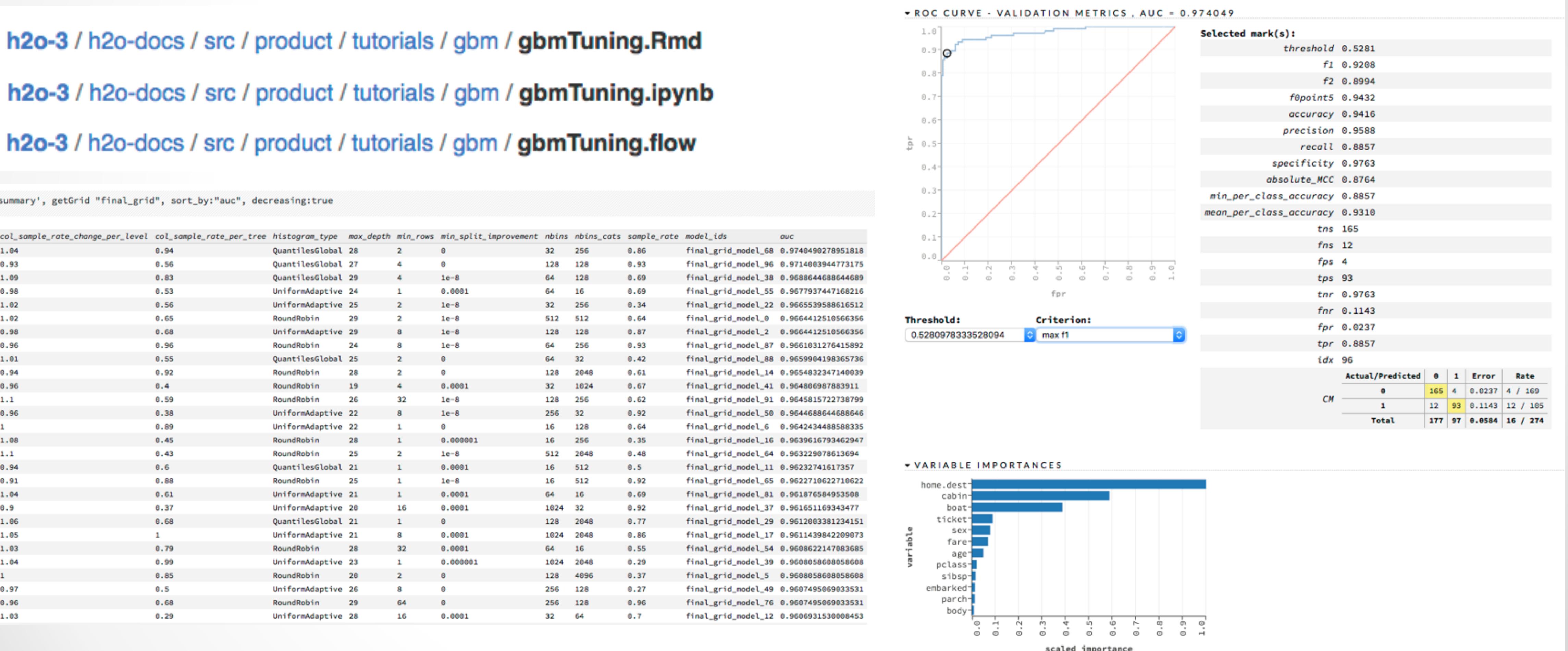
[READ MORE](#)

[WATCH NOW](#)

GBM Tuning Tutorial for R/Python/Flow

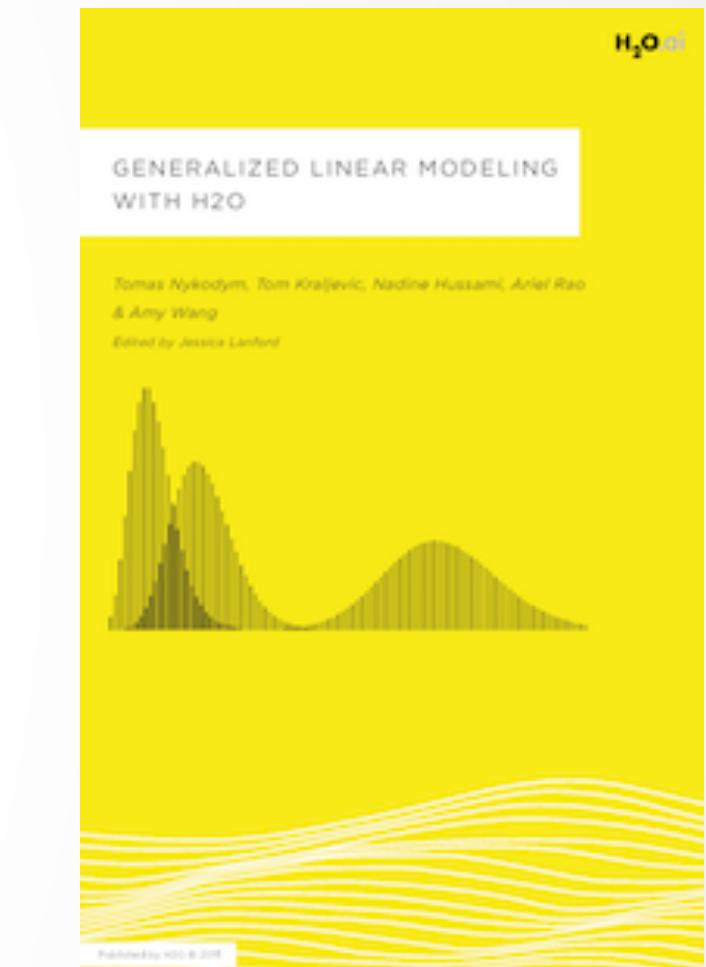
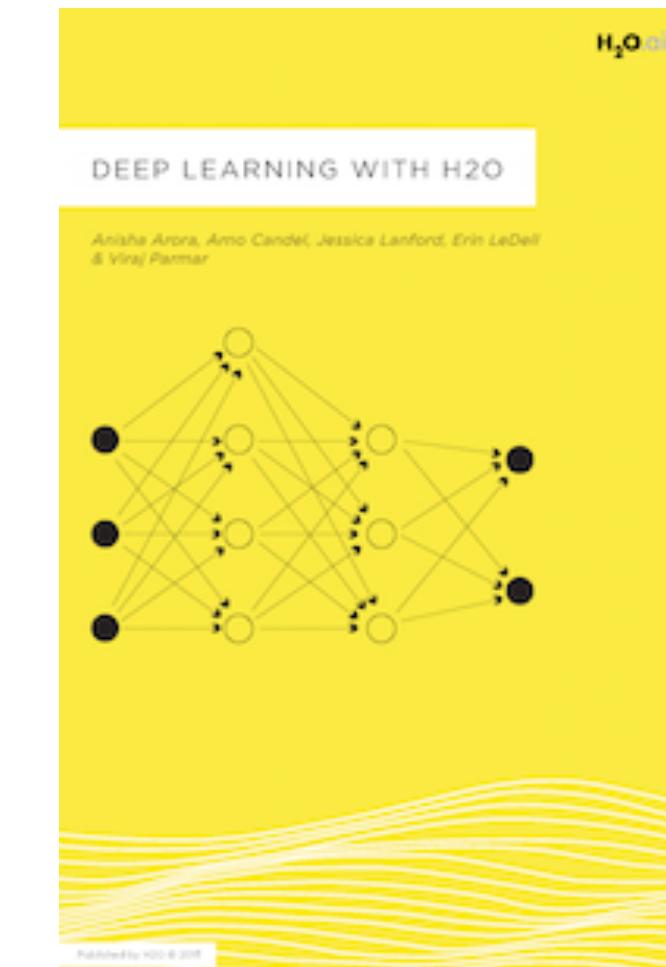
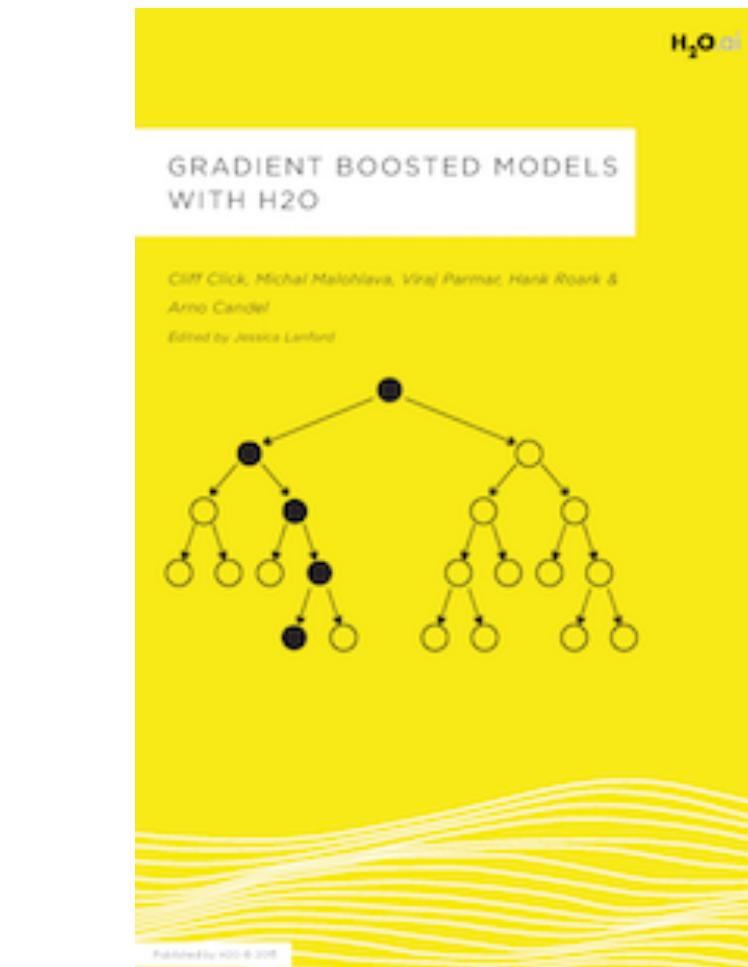
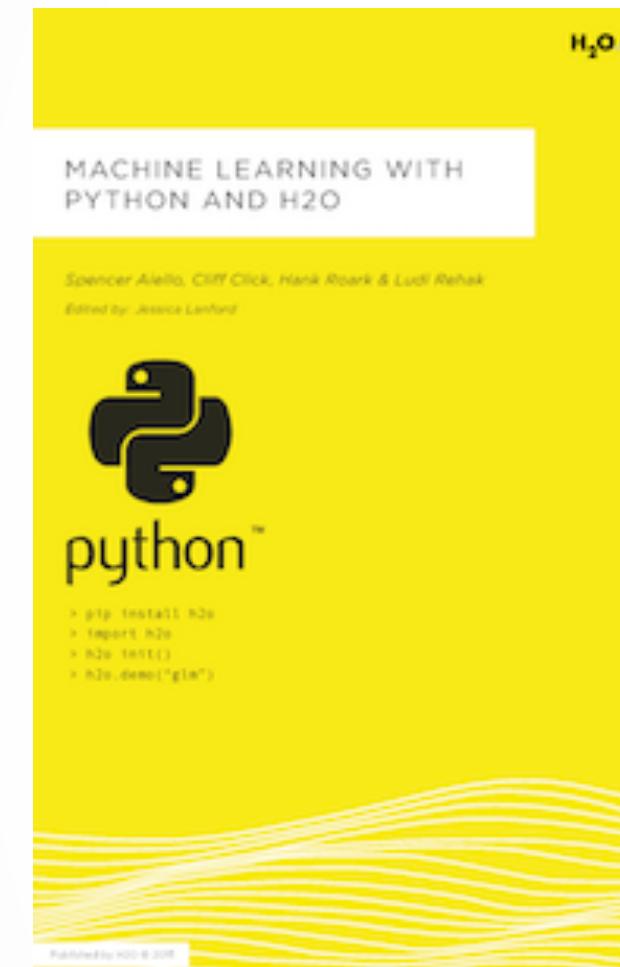
Model tuning is the ‘fun part’ of Data Science!

h2oai / h2o-3 <https://github.com/h2oai/h2o-3/blob/master/h2o-docs/src/product/tutorials/gbm/>



H2O Booklets

Get your booklets!



R

Python

Sparkling Water

GBM

Deep Learning

GLM

[DOWNLOAD](#)

KDNuggets Poll about Deep Learning Tools & Platforms

The usage of Hadoop/Big Data tools grew to 39%, up from 29% in 2015 (and 17% in 2014), driven by Apache Spark, MLLib (Spark Machine Learning Library) and H2O.

See also

- KDnuggets interview with Spark Creator Matei Zaharia
- KDnuggets interview with Arno Candel, H2O.ai on How to Quick Start Deep Learning with H2O

<http://www.kdnuggets.com>



H2O and TensorFlow are tied



TensorFlow + H2O + Apache Spark = Anything is possible



A screenshot of a Twitter post from Arno Candel (@ArnoCandel). The post includes logos for TensorFlow (orange T), H2O.ai (yellow background with black text), and Apache Spark (grey S). The text in the tweet is:
H2O #TensorFlow #DeepLearning demo video
youtube.com/watch?v=62TFK6...
github.com/h2oai/sparklin... #python
#ApacheSpark @h2oai

RETWEETS 10 LIKES 18

6:52 PM - 13 Jun 2016

Mountain View, CA

10 18 ...

H2O TensorFlow Deep Learning Demo

Prerequisites

1. Install TensorFlow from <https://www.tensorflow.org>
2. Download Sparkling Water from <http://www.h2o.ai/download/sparkling-water/spark16>
3. Follow [instructions to setup PySparkling](#) (especially steps 1 and 2)
4. Launch a Jupyter Notebook that connects to PySparkling:

```
cd ~/Downloads  
unzip sparkling-water-1.6.5.zip  
cd sparkling-water-1.6.5  
~/sparkling-water-1.6.5$ IPYTHON_OPTS="notebook" bin/pysparkling
```

5. Point the Notebook to [this file](#) (e.g., download it first, then upload into the Notebook)

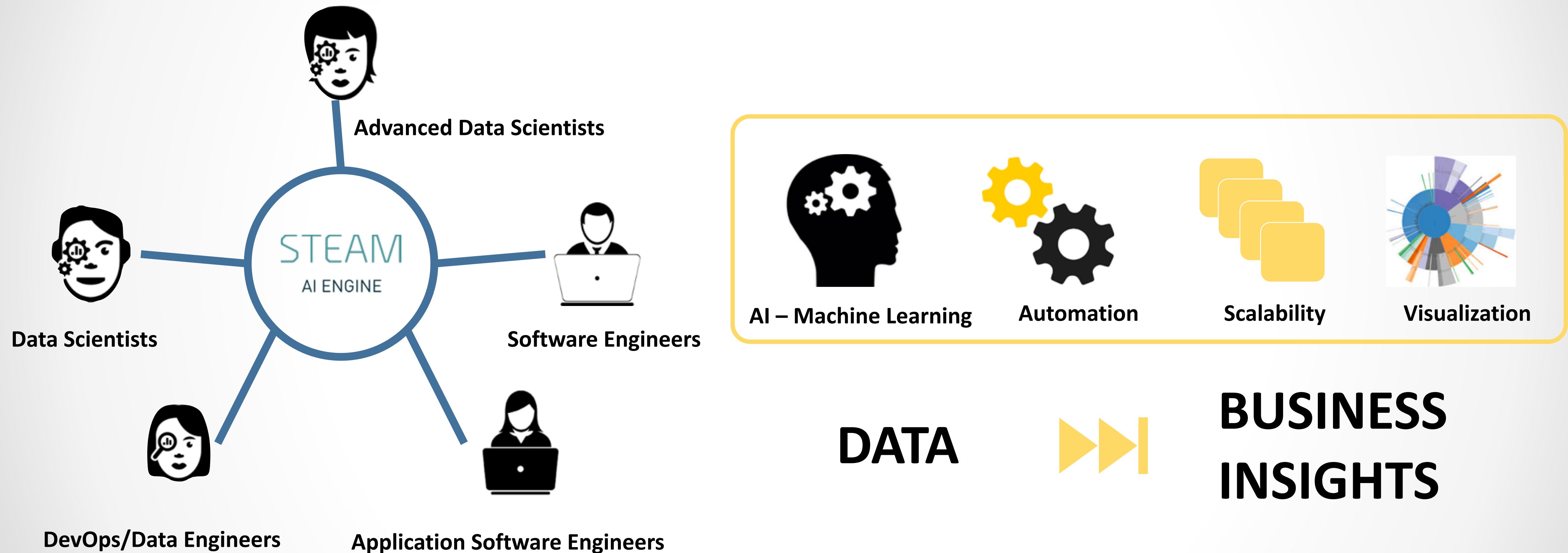
```
import tensorflow  
import h2o  
from pysparkling import H2OContext  
from h2o.estimators.deeplearning import H2ODeepLearningEstimator
```

<https://github.com/h2oai/sparkling-water/blob/master/py/examples/notebooks/TensorFlowDeepLearning.ipynb>

<https://www.youtube.com/watch?v=62TFK641gG8>

In development: TensorFlow/GPU integration (incl. ConvNets/RNNs)

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In Development

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h2o.ai/download

<https://www.youtube.com/user/0xdata/videos>

<https://github.com/h2oai/h2o-3>

[H2O Google Group](https://groups.google.com/forum/#!forum/h2o)

[@h2oai](https://twitter.com/h2oai)



We're hiring: h2o.ai/careers/