DEEP LEARNING DEMYSTIFIED

APPG AI

NVIDIA
ABOUT ME
Adam Grzywaczewski - adamg@nvidia.com

- Deep Learning Solution Architect @ NVIDIA - Supporting delivery of AI / Deep Learning solutions
- 10 years experience delivering Machine Learning of all scale (from embedded, mobile to Big Data)
- My past experience:
  - Capgemini: https://goo.gl/MzgGbq
  - Jaguar Land Rover Research: https://goo.gl/ar7LuU
NEURAL NETWORKS
NEURAL NETWORKS ARE NOT NEW
And are disappointingly simple as an algorithm
NEURAL NETWORKS ARE NOT NEW
And have historically never worked
WHY NOW?
LIFE AFTER MOORE’S LAW
40 Years of Microprocessor Trend Data

Transistors (thousands)

Single-threaded perf

GPU-Computing perf
1.5X per year

1.1X per year

By 2025
NEURAL NETWORK ARE GREEDY

For both compute and data

- 2015 - Microsoft ResNet
  Superhuman Image Recognition
  7 ExaFLOPS
  60 Million Parameters

- 2016 - Baidu Deep Speech 2
  Superhuman Voice Recognition
  20 ExaFLOPS
  300 Million Parameters

- 2017 - Google Neural Machine Translation
  Near Human Language Translation
  100 ExaFLOPS
  8700 Million Parameters
100 EXFLOPS = 2 YEARS ON A DUAL SOCKET CPU SERVER
ONCE A FAILED MACHINE LEARNING EXPERIMENT
WHAT IS POSSIBLE TODAY?
Overwhelming majority of our day to day activities

“If a typical person can do a mental task with less than one second of thought, we can probably automate it using AI either now or in the near future.”

Andrew Ng, Founder of Google Brain
EMPIRICAL EVIDENCE
MAKING IMPOSSIBLE PROBLEMS EXPENSIVE

With enough data we can find an approximation of every problem

- Translation
- Language Models
- Character Language Models
- Image Classification
- Attention Speech Models

MORE THAN JUSTIFIABLE EXCITEMENT
FUNDAMENTAL CHANGE TO THE ECONOMY

Impact

China’s Got a Huge Artificial Intelligence Plan

Bloomberg News
July 21, 2017, 4:04 AM GMT+1 Updated on July 21, 2017, 8:12 AM GMT+1

- Priorities are intelligent robotics, vehicles, virtual reality
- AI seen contributing up to $15.7 trillion worldwide by 2030

Microsoft just officially listed AI as one of its top priorities, replacing mobile

- Satya Nadella’s “mobile-first and cloud-first world” line is out.
- The change comes after Microsoft formed the Artificial Intelligence and Research group.

Jordan Novet | @jordannovet
Published 5:48 PM ET Wed, 2 Aug 2017 | Updated 7:00 PM ET Fri, 4 Aug 2017
AI IS THE NEW ELECTRICITY
Affecting every aspect of our lives

“Just as electricity transformed almost everything 100 years ago, today I actually have a hard time thinking of an industry that I don’t think AI will transform in the next several years, ...”

Andrew Ng, Founder of Google Brain
CALL TO ACTION
ENSURE VISIBILITY
Entire UK Government needs to understand the technology

It will affect all aspects of our lives so all departments
(they need skills to make unbiased decisions)
SUPPORT EDUCATION
At all levels

It is possible to teach logic, software development, AI and robotics in primary schools

(more important than ever)
SUPPORT RESEARCH
Need to compete with large US and Chinese organisation

Just a single research department of a large internet company has 10x more research infrastructure than the largest UK AI cluster.

There is no escaping from large datasets and as a consequence large compute.
LAB OVERVIEW
DEEP LEARNING INSTITUTE

DLI Mission

Helping people solve challenging problems using AI and deep learning.

• Developers, data scientists and engineers
• Self-driving cars, healthcare and robotics
• Training, optimizing, and deploying deep neural networks
DEEP LEARNING
DEEP LEARNING

TRAINING
Learning a new capability from existing data

Untrained Neural Network Model

Deep Learning Framework

TRAINING DATASET

dog  cat

X  ✓
DEEP LEARNING

TRAINING
Learning a new capability from existing data

Untrained Neural Network Model

Deep Learning Framework

TRAINING DATASET

Trained Model New Capability

"dog" "cat"

"cat"
DEEP LEARNING

TRAINING
Learning a new capability from existing data

INFEERENCE
Applying this capability to new data

Untrained Neural Network Model

Deep Learning Framework

TRAINING

DATASET

Trained Model
New Capability

NEW DATA

App or Service
Featuring Capability

Trained Model
Optimized for Performance
LAUNCHING THE LAB
NAVIGATING TO QWIKLABS

1. Navigate to: https://nvlabs.qwiklab.com

1. Login or create a new account
3. Select the event specific In-Session Class in the upper left

3. Click the “Image Classification with DIGITS” Class from the list
LAUNCHING THE LAB ENVIRONMENT

5. Click on the Select button to launch the lab environment

- After a short wait, lab Connection information will be shown
- Please ask Lab Assistants for help!
LAUNCHING THE LAB ENVIRONMENT

6. Click on the Start Lab button
You should see that the lab environment is “launching” towards the upper-right corner.
7. Click on “here” to access your lab environment / Jupyter notebook
CONNECTING TO THE LAB ENVIRONMENT

You should see your “Image Classification with DIGITS” Jupyter notebook.
JUPYTER NOTEBOOK

1. Place your cursor in the code

2. Click the “run cell” button

2. Confirm you receive the same result
Instruction in Jupyter notebook will link you to DIGITS
ACCESSING DIGITS

- Will be prompted to enter a username to access DIGITS
  - Can enter any username
  - Use lower case letters