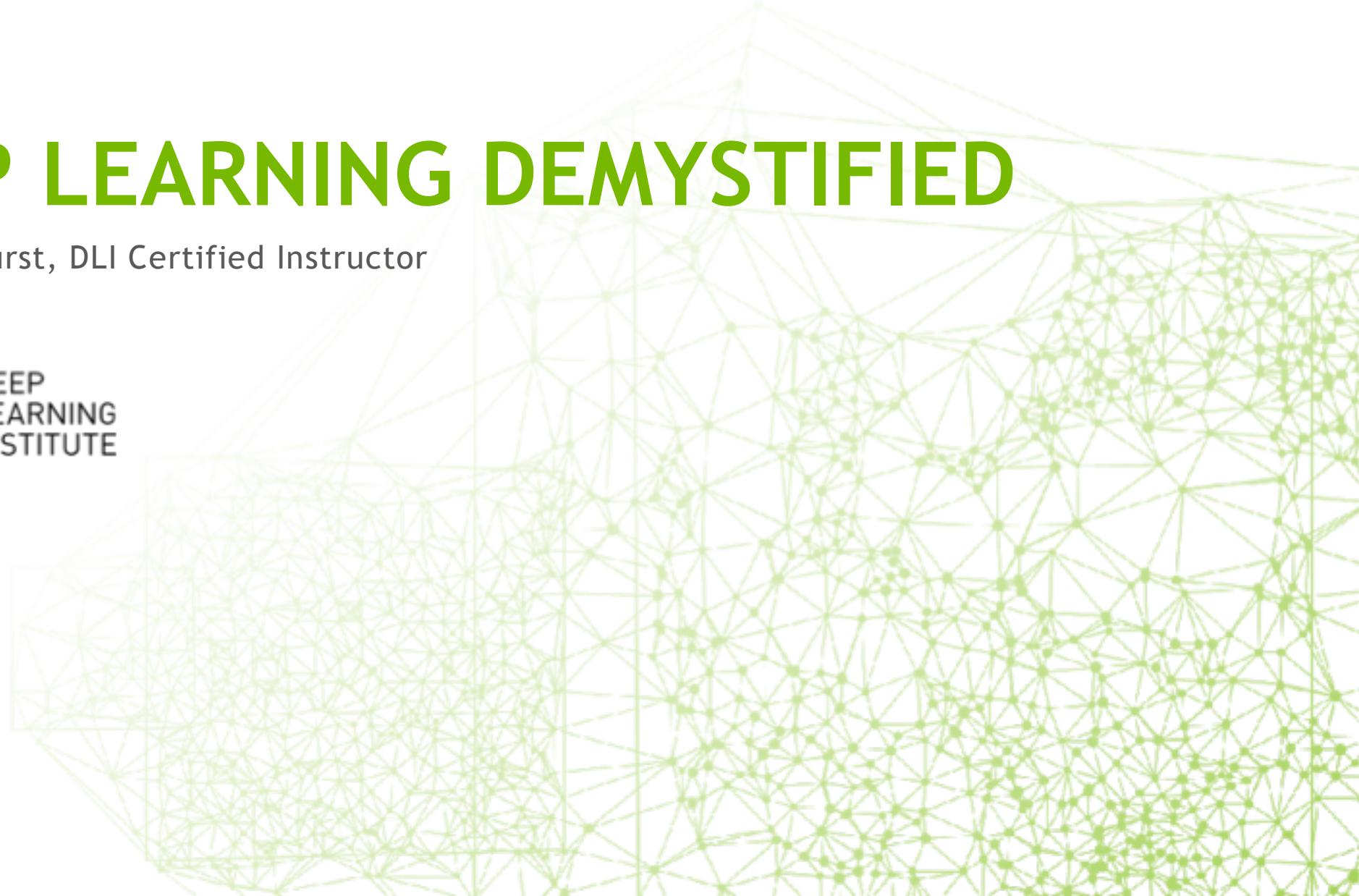


DEEP LEARNING DEMYSTIFIED

Laurence Hurst, DLI Certified Instructor



DEEP
LEARNING
INSTITUTE



DEFINITIONS

ARTIFICIAL INTELLIGENCE

Early artificial intelligence stirs excitement.



MACHINE LEARNING

Machine learning begins to flourish.



DEEP LEARNING

Deep learning breakthroughs drive AI boom.



DEEP LEARNING IS SWEEPING ACROSS INDUSTRIES

Internet Services



Medicine



Media & Entertainment



Security & Defense



Autonomous Machines



- > Image/Video classification
- > Speech recognition
- > Natural language processing

- > Cancer cell detection
- > Diabetic grading
- > Drug discovery

- > Video captioning
- > Content based search
- > Real time translation

- > Face recognition
- > Video surveillance
- > Cyber security

- > Pedestrian detection
- > Lane tracking
- > Recognize traffic signs

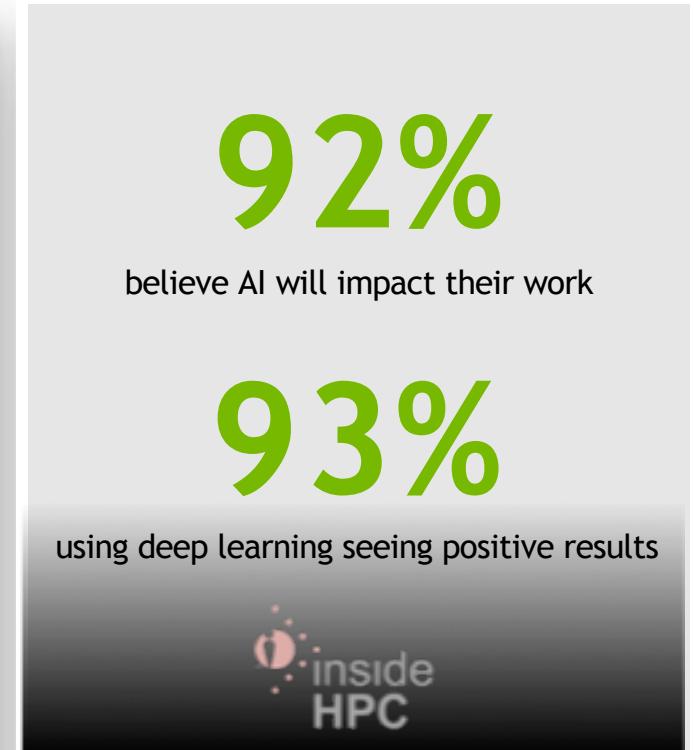
DEEP LEARNING IS TRANSFORMING HPC



“Seeing” Gravity In Real Time



Accelerating Drug Discovery



insideHPC.com Survey
November 2016

AI IS CRITICAL FOR INTERNET APPLICATIONS

Users Expect Intelligence In Services

Growing Use of Deep Learning at Google



Across many products/areas:

Android
Apps
drug discovery
Gmail
Image understanding
Maps
Natural language understanding
Photos
Robotics research
Speech
Translation
YouTube
... many others ...



THE EXPANDING UNIVERSE OF MODERN AI

"THE BIG BANG"

Big Data
GPU
Algorithms

RESEARCH

Berkeley
Carnegie Mellon University
OpenAI
DesPMono
Université de Montréal
MIT
NYU
University of Oxford
University of Toronto

CORE TECHNOLOGY / FRAMEWORKS

facebook. torch
Google TensorFlow
Microsoft CNTK
NVIDIA cuDNN
PyTorch
University of Montreal
Berkeley Caffe
University of Oxford
TensorFlow

AI-as-a-PLATFORM

amazon
web services

IBM Watson

Google

Microsoft Azure

START-UPS

drive.ai

Automotive

computer vision

BLUE RIVER
TECHNOLOGIES

Agriculture

crop yield optimization

clarifai

Tech

computer vision

deep genomics

Genomics

genetic interpretation

1,000+ AI START-UPS

\$5B IN FUNDING

Source: Venture Scanner

INDUSTRY LEADERS

Ford

SIEMEN

Alibaba.com

TARG

AstraZeneca

TESL

gsk

TOYO

Audi

BAI

Baidu

TOYOTA

Bloomberg

UBER

Massachusetts General Hospital

Mercedes-Benz

Charles Schwab

VOLVO

CISCO

MERCK

Pinterest

Walmart

ebay

YAHOO

Schlumberger

Yande

PEPSICO

yelp

A NEW COMPUTING MODEL

Algorithms that Learn from Examples



Traditional Approach

- Requires domain experts
- Time consuming
- Error prone
- Not scalable to new problems

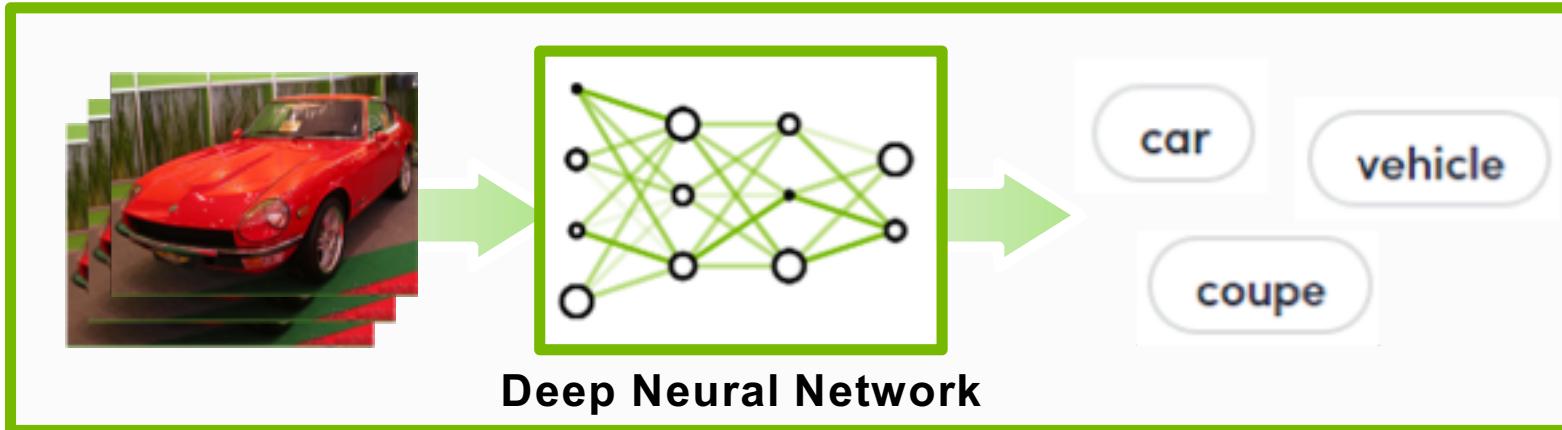
A NEW COMPUTING MODEL

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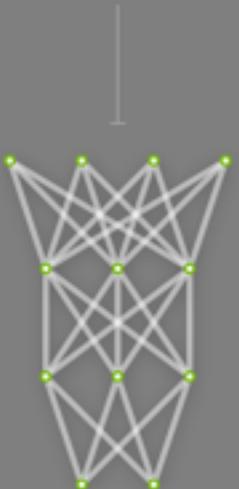


Deep Learning Approach

- ✓ Learn from data
- ✓ Easily to extend
- ✓ Speedup with GPUs

DEEP LEARNING

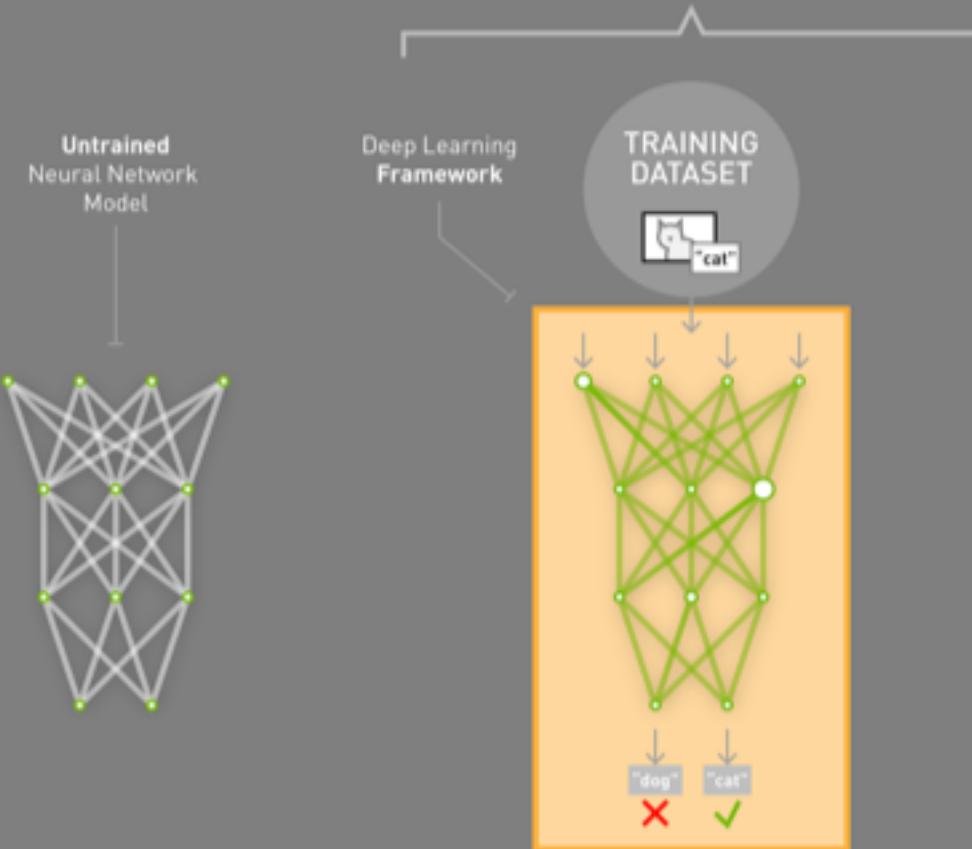
Untrained
Neural Network
Model



DEEP LEARNING

TRAINING

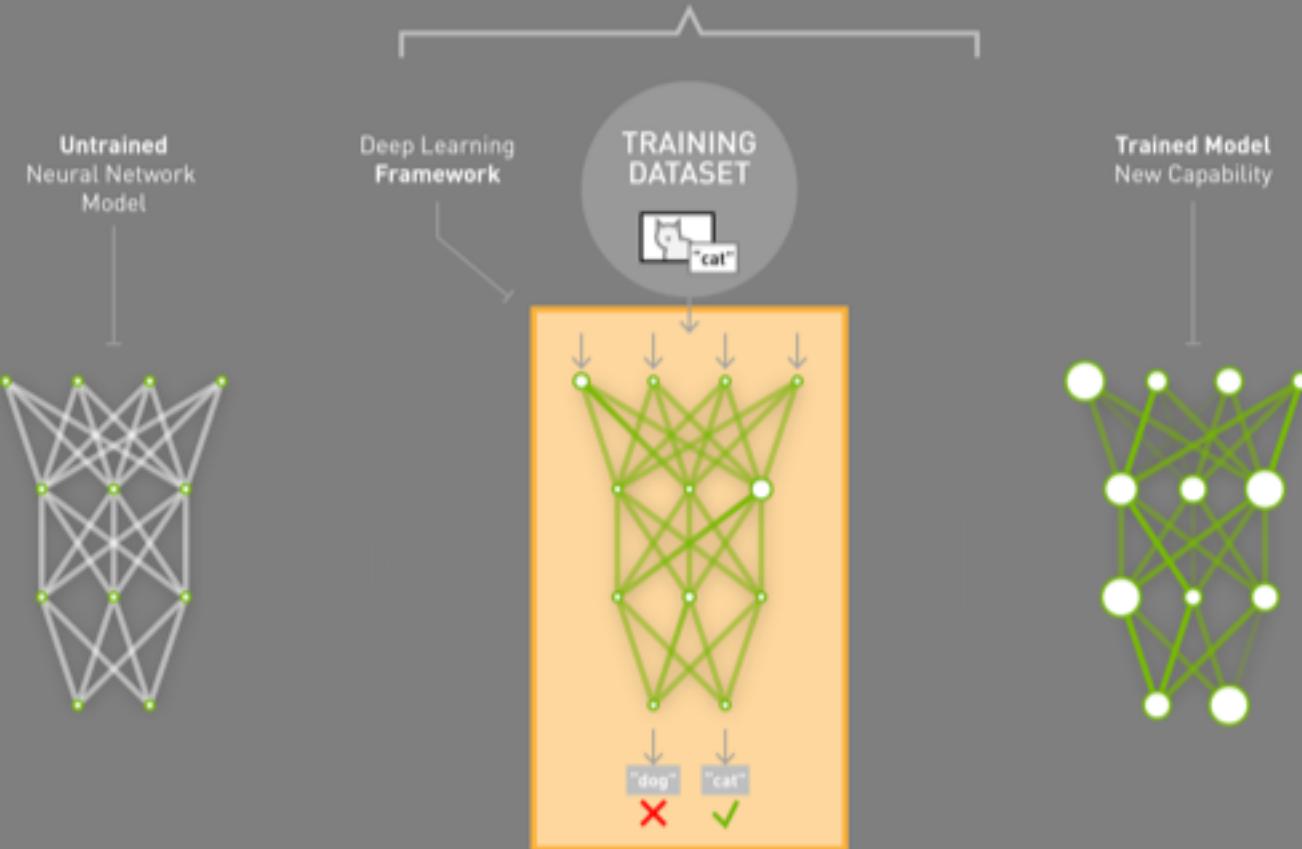
Learning a new capability
from existing data



DEEP LEARNING

TRAINING

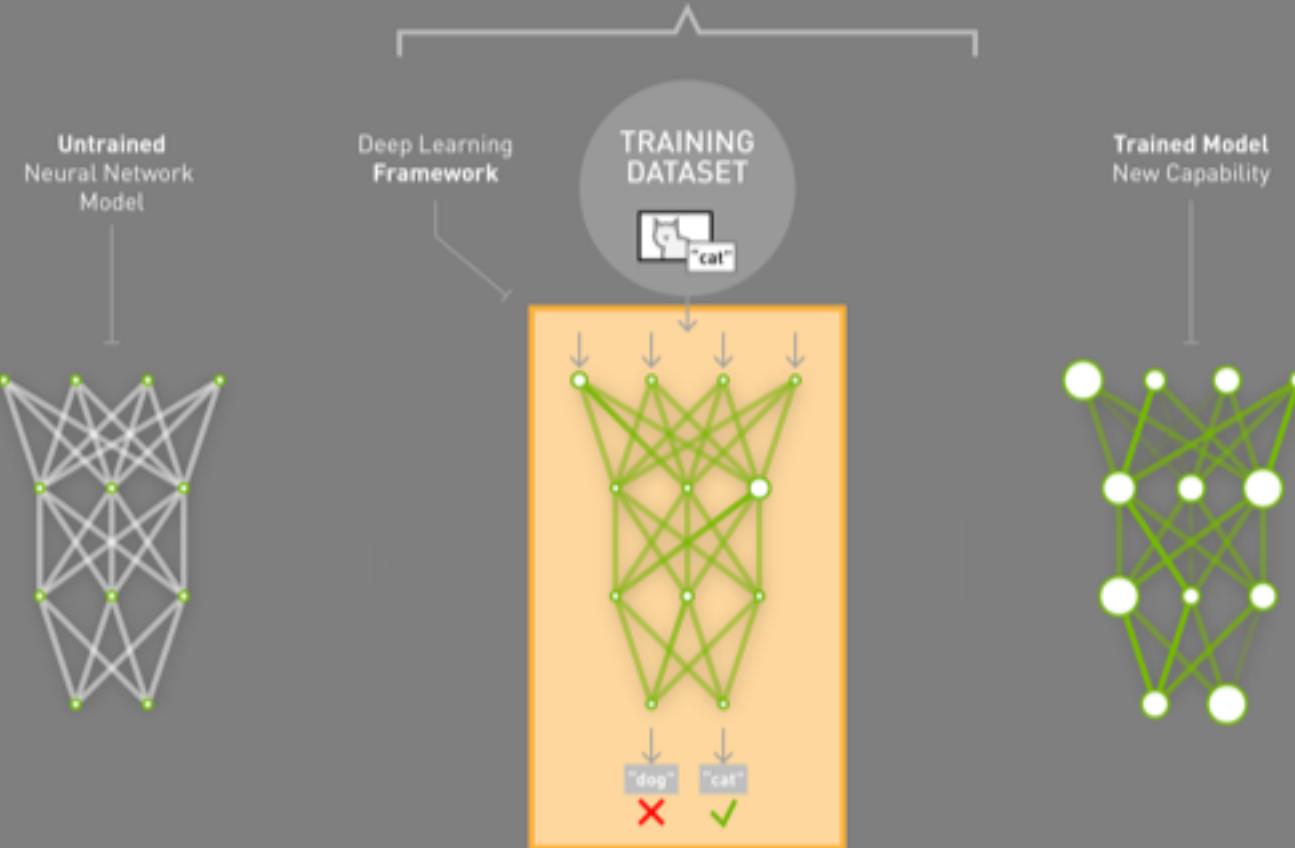
Learning a new capability
from existing data



DEEP LEARNING

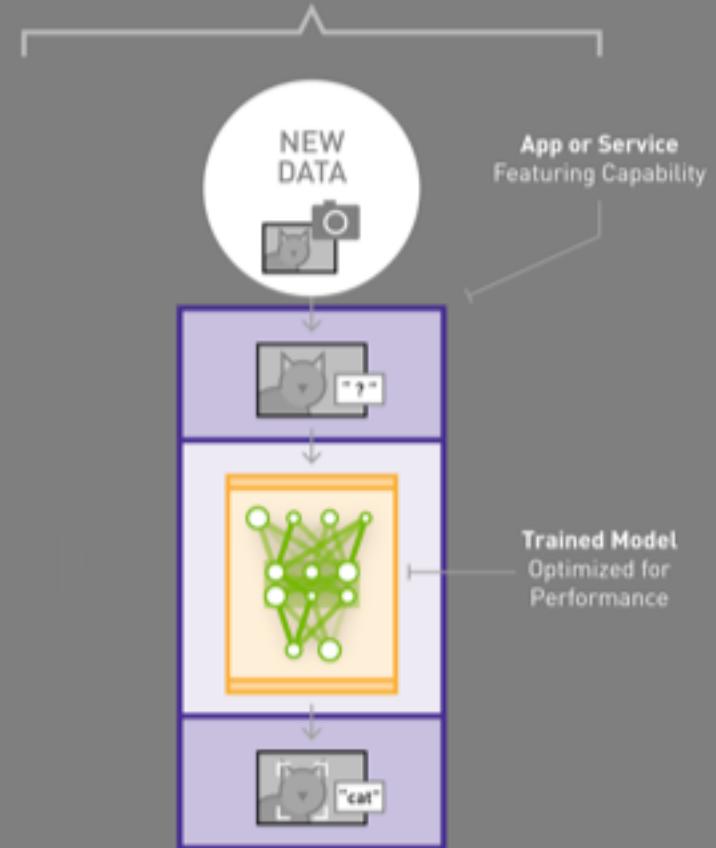
TRAINING

Learning a new capability
from existing data



INFERENCE

Applying this capability
to new data



CHALLENGES

Deep Learning Needs	Why
Data Scientists	New computing model
Latest Algorithms	Rapidly evolving
Fast Training	Impossible -> Practical
Deployment Platforms	Must be available everywhere

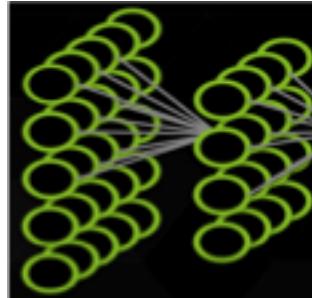
NVIDIA DEEP LEARNING INSTITUTE

Online self-paced labs and instructor-led workshops on deep learning and accelerated computing

Take self-paced labs at
www.nvidia.com/dlilabs

View upcoming workshops and request a workshop onsite at www.nvidia.com/dli

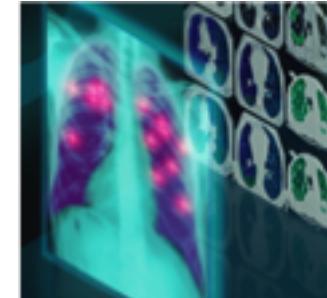
Educators can join the University Ambassador Program to teach DLI courses on campus and access resources. Learn more at www.nvidia.com/dli



Fundamentals



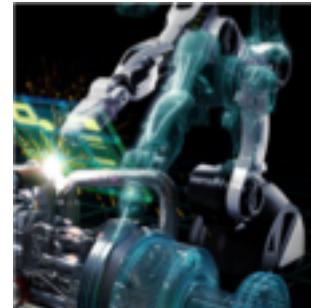
Autonomous Vehicles



Healthcare



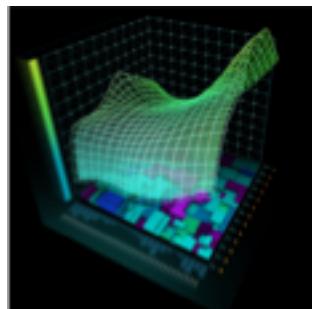
Intelligent Video Analytics



Robotics



Game Development & Digital Content



Finance

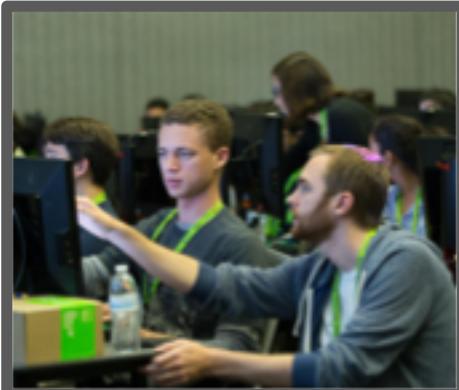
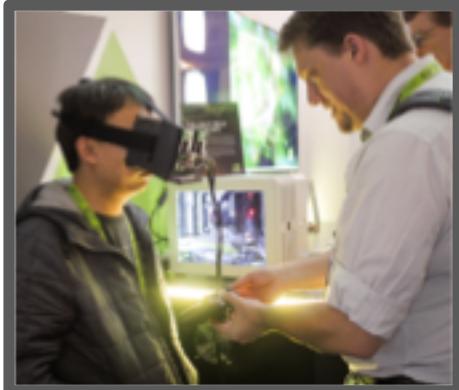


Accelerated Computing



Virtual Reality

GPU TECHNOLOGY CONFERENCE



ADVANCE YOUR DEEP LEARNING TRAINING AT GTC

Don't miss the world's most important event for GPU developers

Silicon Valley, May 8-11
Beijing, September 26-27
Munich, October 10-11
Israel, October 18

Washington DC, November 1-2
Tokyo, December 12-13
Silicon Valley, March 26-29, 2018

DEEP LEARNING SOFTWARE

NVIDIA DIGITS™

Interactively manage data and train deep learning models for image classification without the need to write code.

[Learn more](#)



Deep Learning Frameworks

Design and train deep learning models using a high-level interface. Choose a deep learning framework that best suits your needs based on your choice of programming language, platform, and target application.

[Learn more](#)



Caffe2



mxnet

MINERVA



Purine

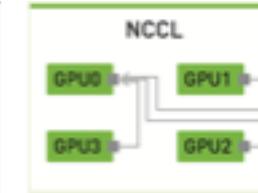
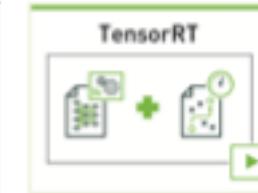
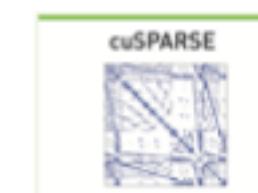
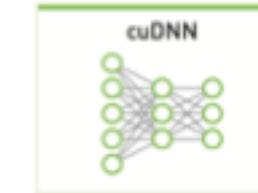
MatConvNet



theano

NVIDIA Deep Learning SDK

This SDK delivers high- performance multi-GPU acceleration and industry-vetted deep learning algorithms, and is designed for easy drop-in acceleration for deep learning frameworks.



developer.nvidia.com/deep-learning

END-TO-END PRODUCT FAMILY

TRAINING

FULLY INTEGRATED DL SUPERCOMPUTER



DGX-1 & DGX Station

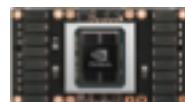


DESKTOP



Titan X Pascal

DATA CENTER



Tesla P100
Tesla V100

INFERENCE

DATA CENTER

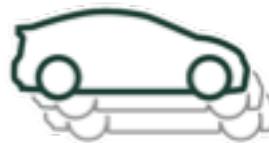


Tesla P100/V100



Tesla P4

AUTOMOTIVE



Drive PX2

EMBEDDED



Jetson TX1

CHALLENGES

Deep Learning Needs	Why
Data Scientists	New computing model
Latest Algorithms	Rapidly evolving
Fast Training	Impossible -> Practical
Deployment Platforms	Must be available everywhere

CHALLENGES

Deep Learning Needs	NVIDIA Delivers
Data Scientists	Deep Learning Institute, GTC, DIGITS
Latest Algorithms	DL SDK, GPU-Accelerated Frameworks
Fast Training	DGX, V100, P100, TITAN X
Deployment Platforms	TensorRT, P100, P4, Drive PX, Jetson

READY TO GET STARTED?

Project Checklist

1. What problem are you solving, what are the DL tasks?
2. What data do you have/need, and how is it labeled?
3. Which deep learning framework & tools will you use?
4. On what platform(s) will you train and deploy?

WHAT PROBLEM ARE YOU SOLVING?

Defining the AI/DL Tasks

INPUTS	QUESTION	AI/DL TASK	EXAMPLE OUTPUTS
 Text Data  Images	Is “it” <u>present</u> or not?	Detection	Cancer Detection
	What <u>type</u> of thing is “it”?	Classification	Tumor Identification
	To what <u>extent</u> is “it” present?	Segmentation	Tumor Size/Shape Analysis
	What is the likely <u>outcome</u> ?	Prediction	Survivability Prediction
	What will likely <u>satisfy the objective</u> ?	Recommendation	Therapy Recommendation

SELECTING A DEEP LEARNING FRAMEWORK

Considerations

1. Type of problem
2. Training & deployment platforms
3. DNN models available, layer types supported
4. Latest algos & GPU acceleration: cuDNN, NCCL, etc.
5. Usage model/interfaces: GUI, command line, programming language, etc.
6. Easy to install and get started: containers, docs, code samples, tutorials, ...
7. Enterprise integration, vendors, ecosystem

START SIMPLE, LEARN FAST



How One NVIDIAian Uses Deep Learning to
Keep Cats from Pooping on His Lawn

WHAT'S NEXT?

Learn More

Listen to the [NVIDIA AI Podcast](#)
Review [examples of AI in action](#)

Take a Self-Paced Lab

[www.nvidia.com/dlilabs](#)

Attend an Instructor-Led Workshop

Or request a workshop onsite
[www.nvidia.com/dli](#)

Join the Developer Program

<https://developer.nvidia.com/join>

Contact us at nvdli@nvidia.com



www.nvidia.com/dli

DEEP
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