



DEEP  
LEARNING  
INSTITUTE

# DEEP LEARNING DEMYSTIFIED

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DLI Certified Instructor

# DEFINITIONS

## ARTIFICIAL INTELLIGENCE

Early artificial intelligence stirs excitement.



## MACHINE LEARNING

Machine learning begins to flourish.



## DEEP LEARNING

Deep learning breakthroughs drive AI boom.

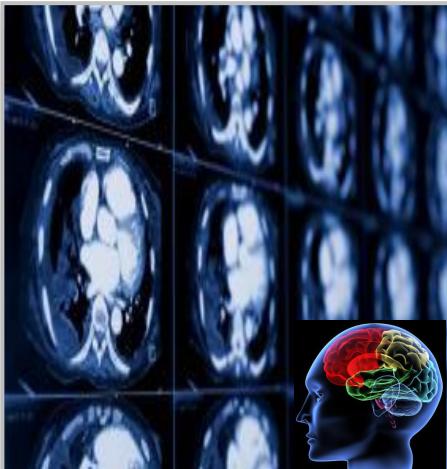


# DEEP LEARNING IS SWEEPING ACROSS INDUSTRIES

Internet Services



Medicine



Media & Entertainment



Security & Defense



Autonomous Machines

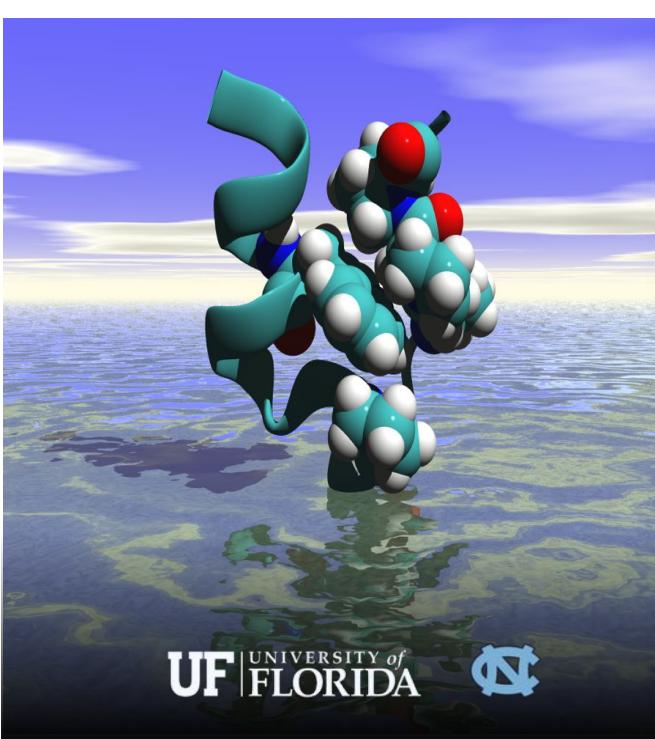


- Image/Video classification
- Cancer cell detection
- Speech recognition
- Diabetic grading
- Natural language processing
- Drug discovery
- Video captioning
- Content based search
- Real time translation
- Face recognition
- Video surveillance
- Cyber security
- Pedestrian detection
- Lane tracking
- Recognize traffic signs

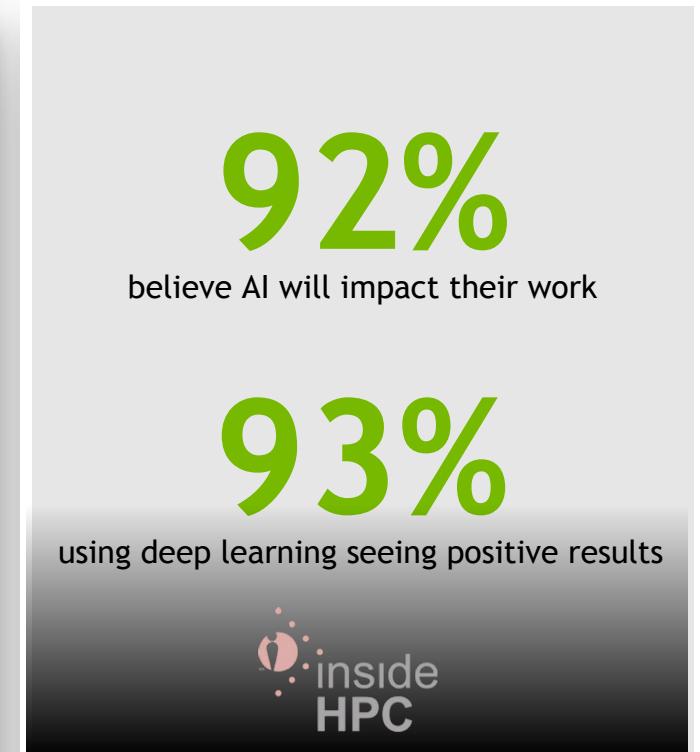
# DEEP LEARNING IS TRANSFORMING HPC



“Seeing” Gravity In Real Time



Accelerating Drug Discovery

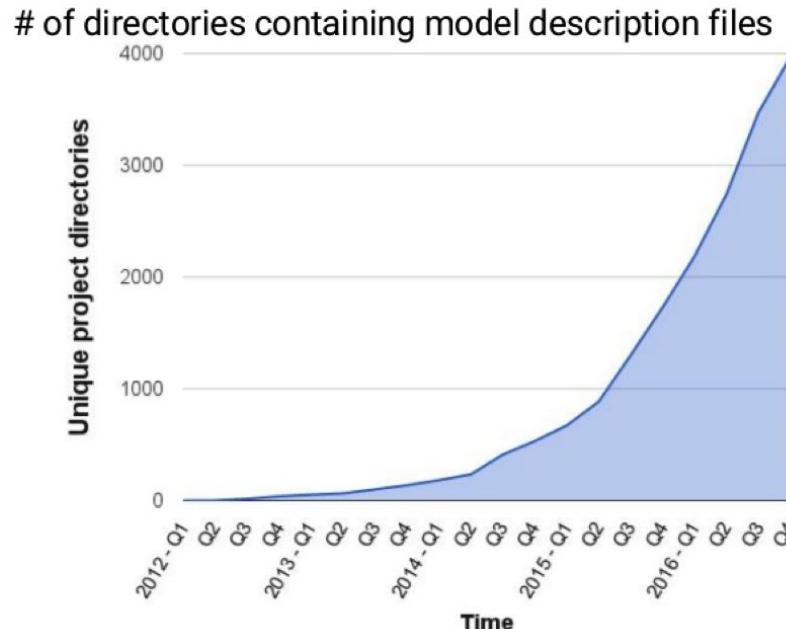


insideHPC.com Survey  
November 2016

# AI IS CRITICAL FOR INTERNET APPLICATIONS

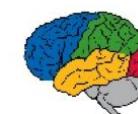
## Users Expect Intelligence In Services

### 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



## CORE TECHNOLOGY / FRAMEWORKS



## AI-as-a-PLATFORM



## START-UPS



1,000+ AI START-UPS

\$5B IN FUNDING

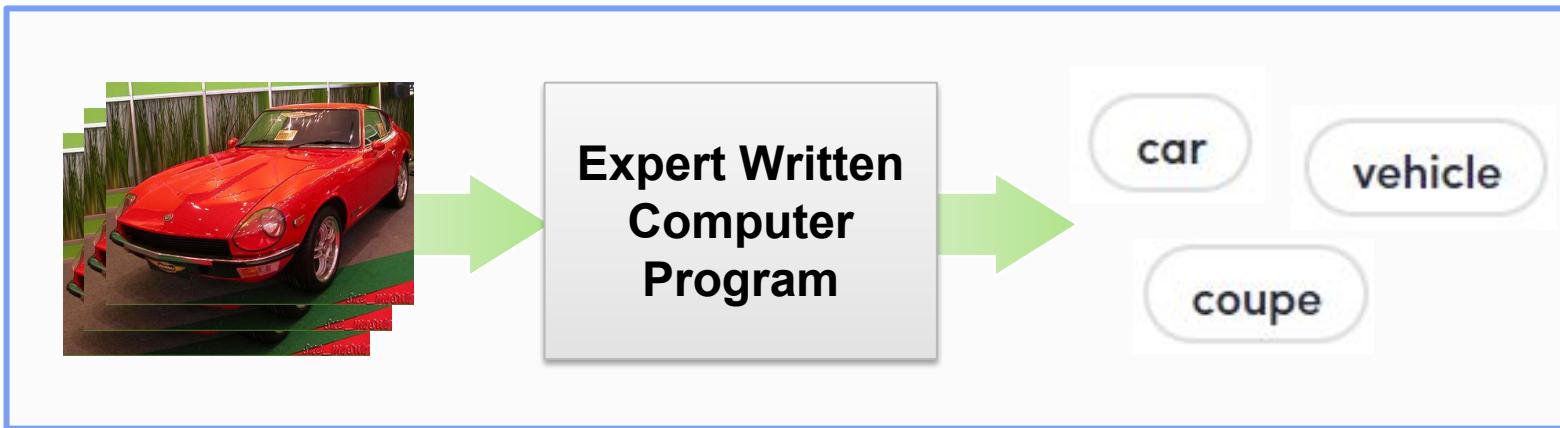
Source: Venture Scanner

## INDUSTRY LEADERS



# A NEW COMPUTING MODEL

Algorithms that Learn from Examples

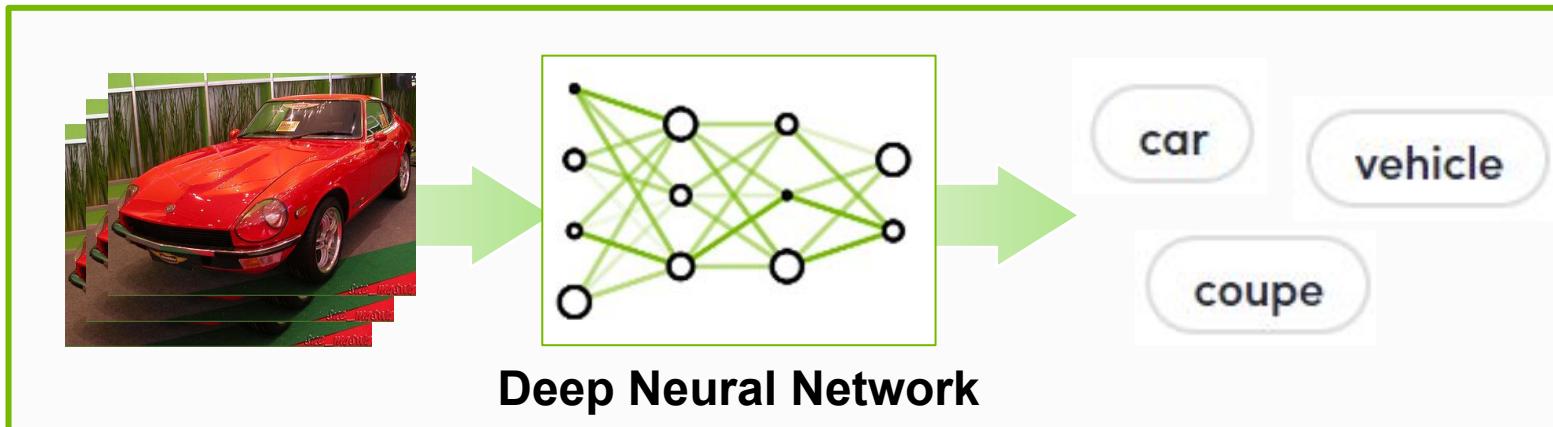
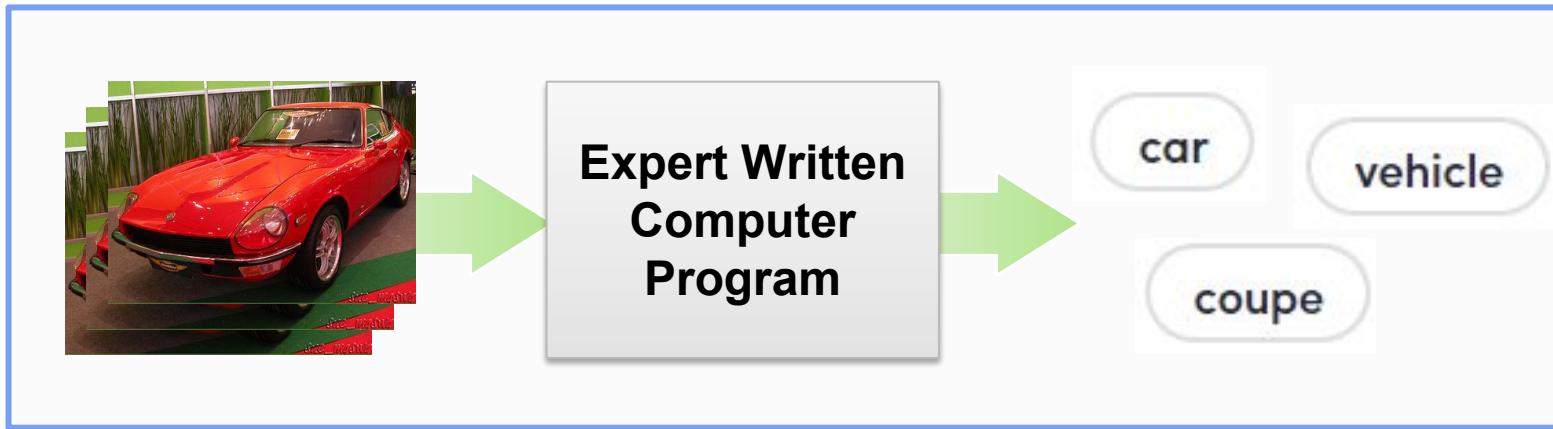


## Traditional Approach

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

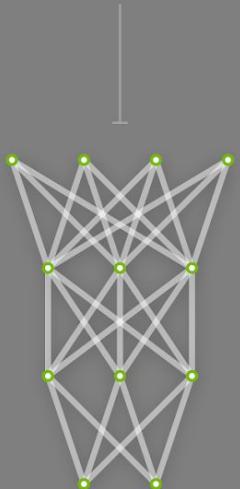
# A NEW COMPUTING MODEL

## Algorithms that Learn from Examples



# DEEP LEARNING

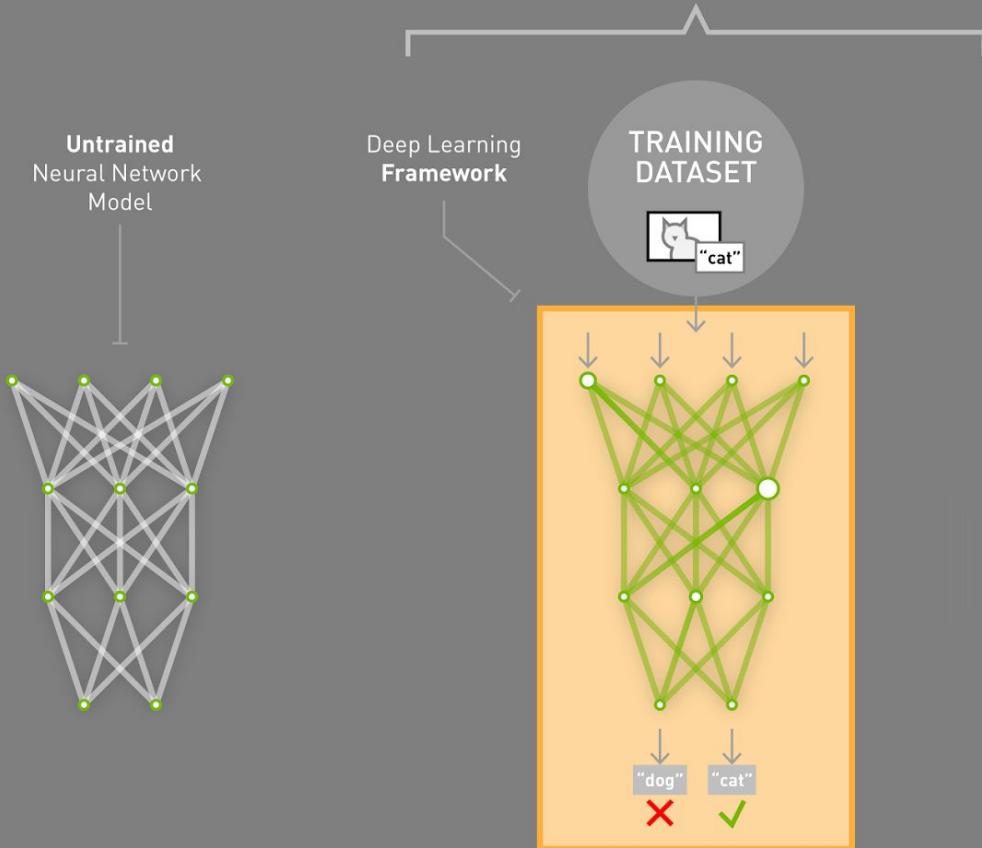
**Untrained**  
Neural Network  
Model



# DEEP LEARNING

## TRAINING

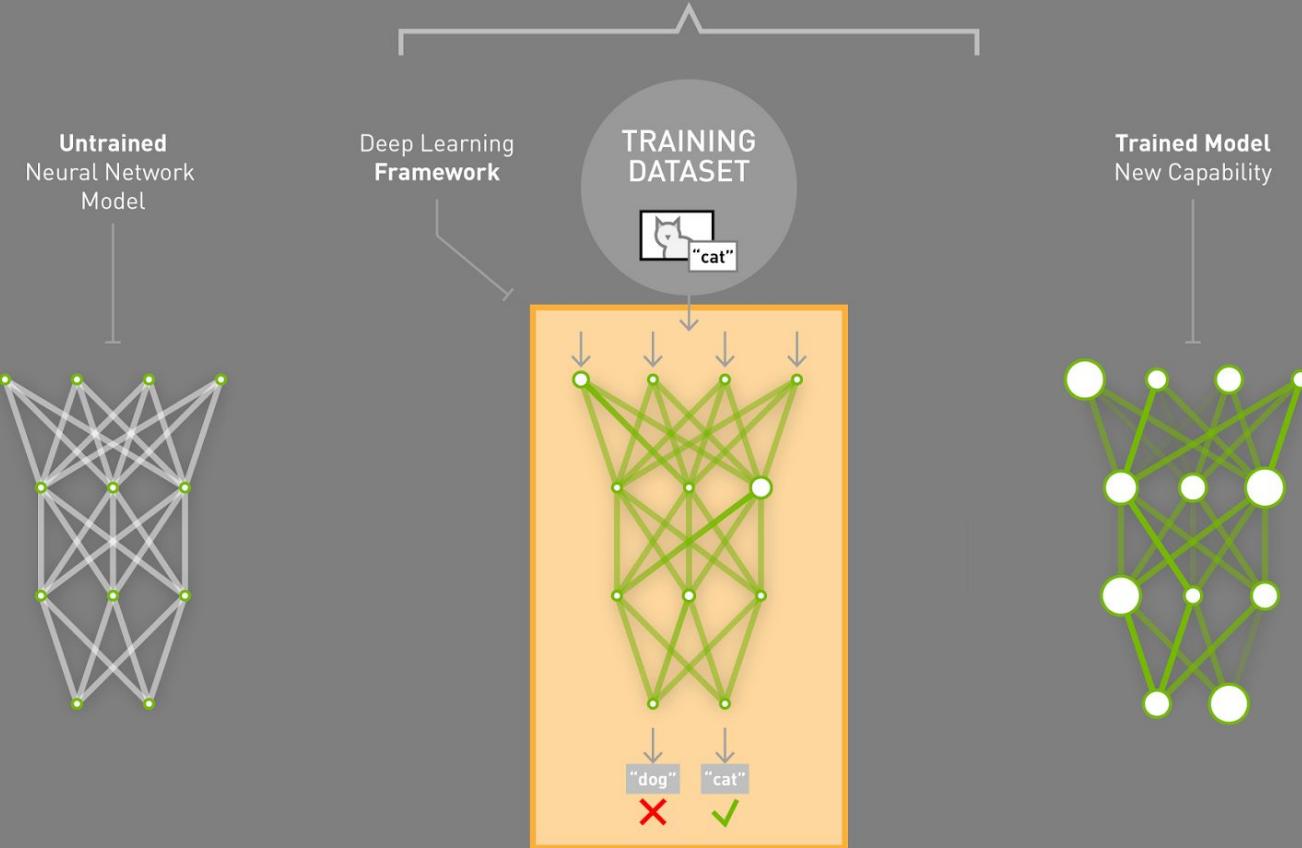
Learning a new capability  
from existing data



# DEEP LEARNING

## TRAINING

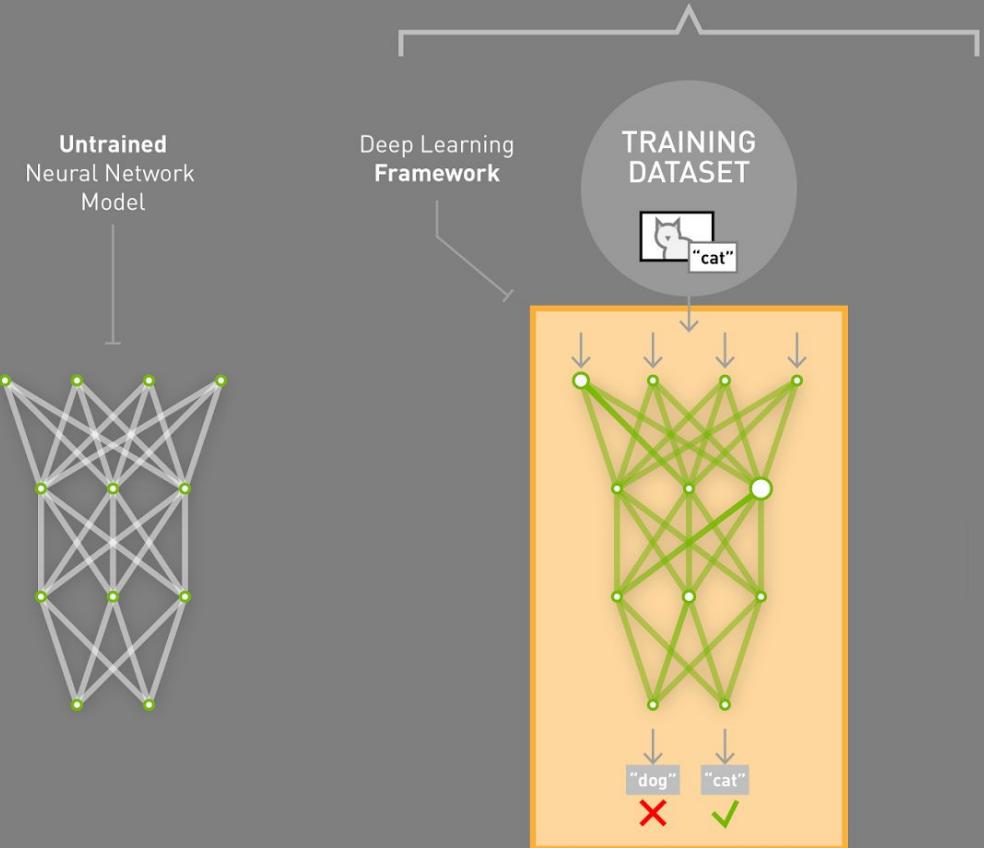
Learning a new capability  
from existing data



# DEEP LEARNING

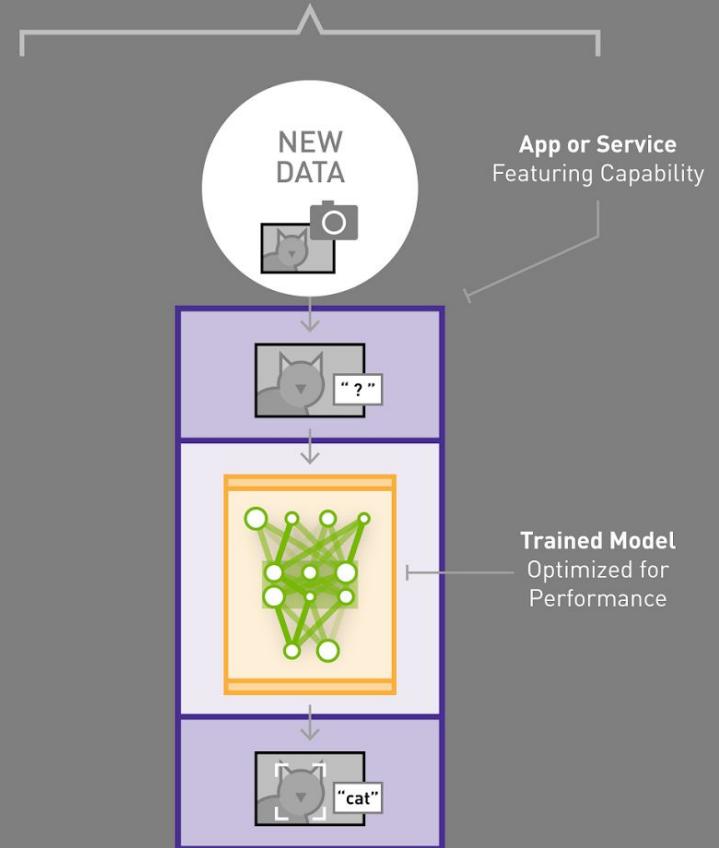
## TRAINING

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

Hands-on Training for Data Scientists and Software Engineers



Helping the world to solve challenging problems using AI and deep learning

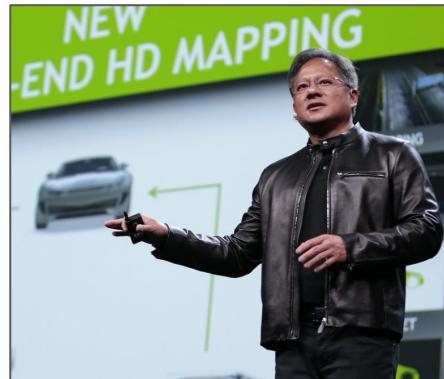
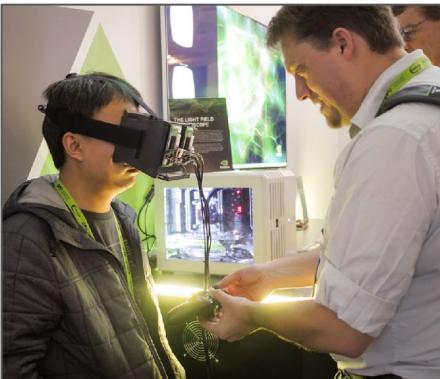
On-site workshops and online courses presented by certified instructors

Covering complete workflows for proven application use cases

Self-Driving Cars, Healthcare, Intelligent Video Analytics, IoT/Robotics, Finance and more

[www.nvidia.com/dli](http://www.nvidia.com/dli)

# 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

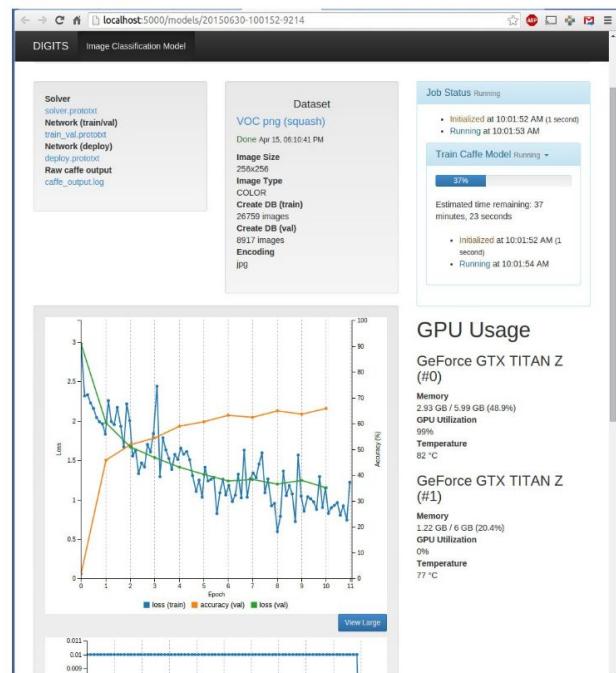
Tokyo, December 12-13

# 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**

**MINERVA**

  
**KERAS**  
  
**TensorFlow**



**mxnet**

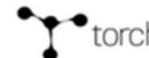


**theano**

**DL4J**  
deeplearning4j

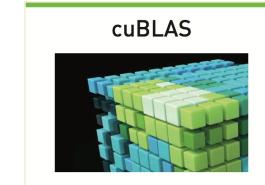
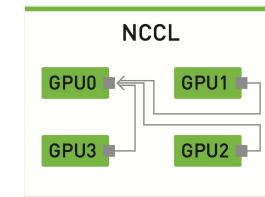
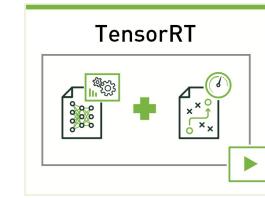
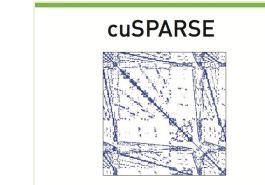
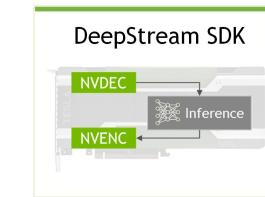
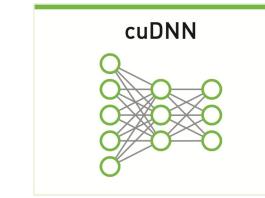


**MatConvNet**



## 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](http://developer.nvidia.com/deep-learning)

# END-TO-END PRODUCT FAMILY

# FULLY INTEGRATED DL SUPERCOMPUTER



## DGX-1 & DGX Station



# DESKTOP



Titan X Pascal

## DATA CENTER



Tesla P100  
Tesla V100

## DATA CENTER

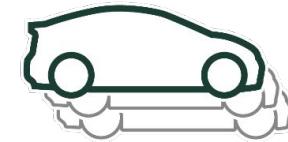


Tesla P100/V100



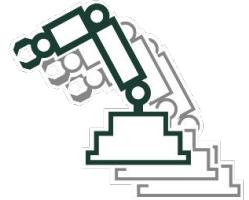
Tesla P4

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 satisfy the <u>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](http://www.nvidia.com/dlilabs)

## REGISTER FOR A DLI WORKSHOP

July 6<sup>th</sup> Image Classification with DIGITS

<http://nv/InternDL1>

July 20<sup>th</sup> Object Detection with DIGITS

<http://nv/InternDL2>

Aug 8<sup>th</sup> Neural Network Deployment with DIGITS and TensorRT <http://nv/InternDL3>

Contact us at [nvdli@nvidia.com](mailto:nvdli@nvidia.com)



[www.nvidia.com/dli](http://www.nvidia.com/dli)

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