



DEEP
LEARNING
INSTITUTE

DEEP LEARNING DEMYSTIFIED

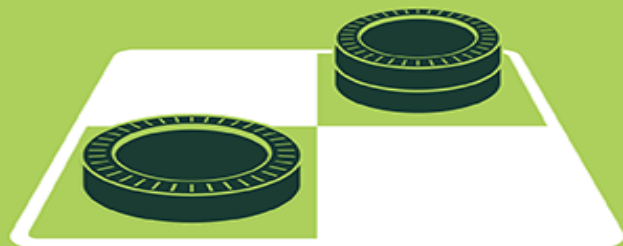
Will Ramey

Director, Developer Programs
NVIDIA Corporation

DEFINITIONS

ARTIFICIAL INTELLIGENCE

Early artificial intelligence stirs excitement.



MACHINE LEARNING

Machine learning begins to flourish.



DEEP LEARNING

Deep learning breakthroughs drive AI boom.



1950's

1960's

1970's

1980's

1990's

2000's

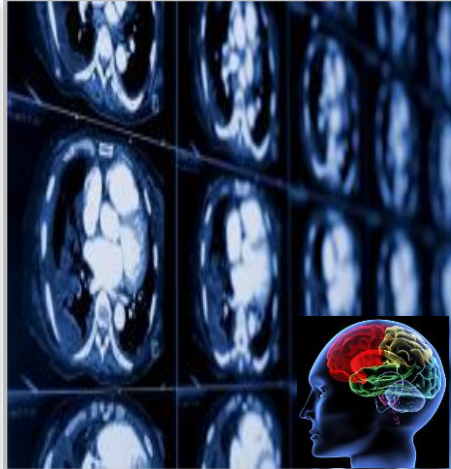
2010's

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

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

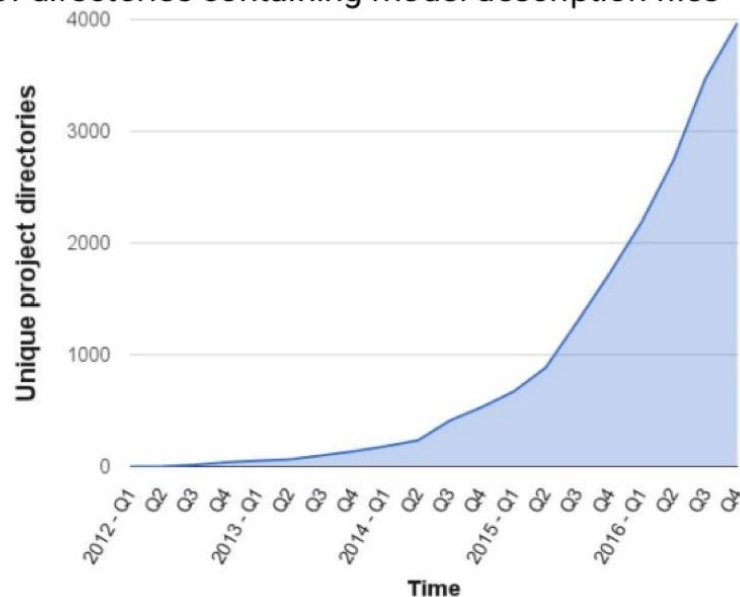


AI IS CRITICAL FOR INTERNET APPLICATIONS

Users Expect Intelligence In Services

Growing Use of Deep Learning at Google

of directories containing model description files



Across many products/areas:

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



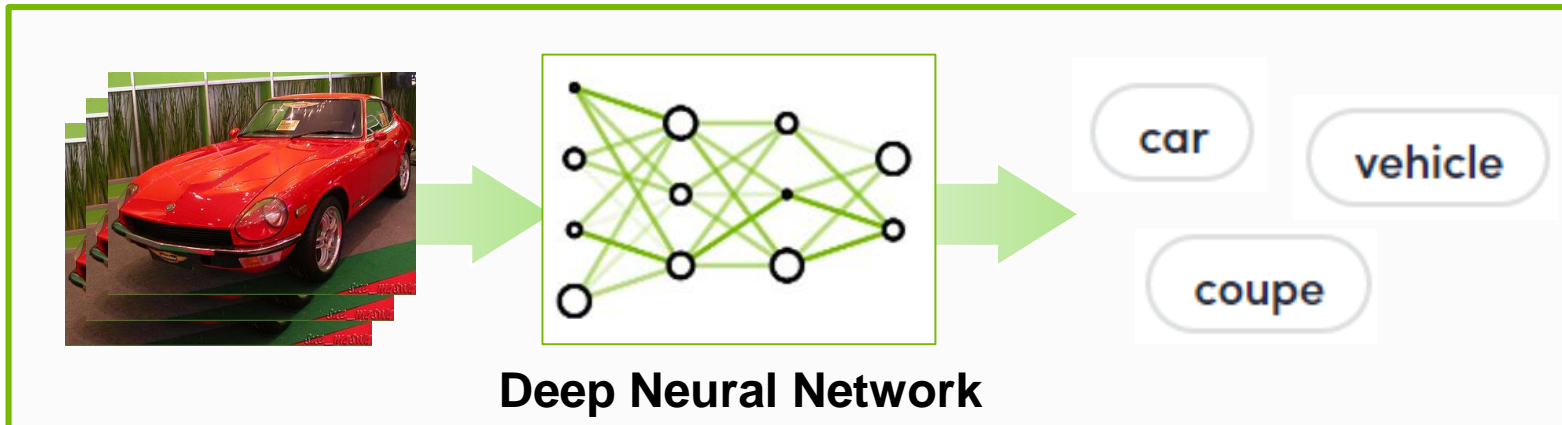
A NEW COMPUTING MODEL

Algorithms that Learn from Examples



Traditional Approach

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







Deep Learning Approach

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

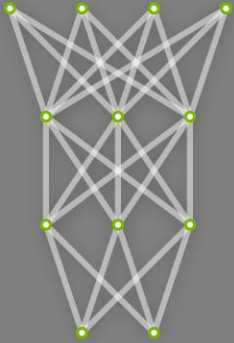
WHAT PROBLEM ARE YOU SOLVING?

Defining the AL/DL Task

INPUTS	QUESTION	AI/DL TASK	EXAMPLE OUTPUTS
 Text Data  Images  Video  Audio	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

DEEP LEARNING

Untrained
Neural Network
Model

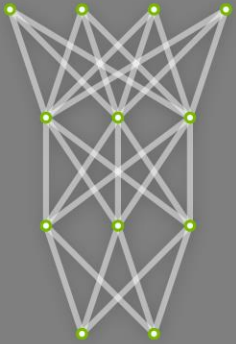


DEEP LEARNING

TRAINING

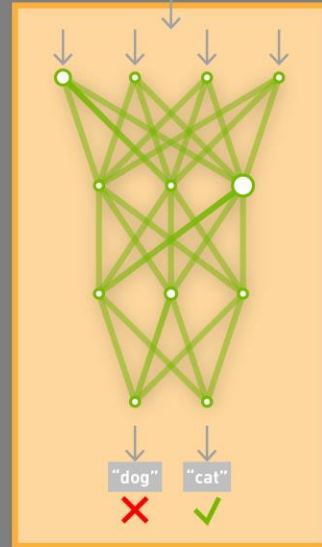
Learning a new capability
from existing data

Untrained
Neural Network
Model



Deep Learning
Framework

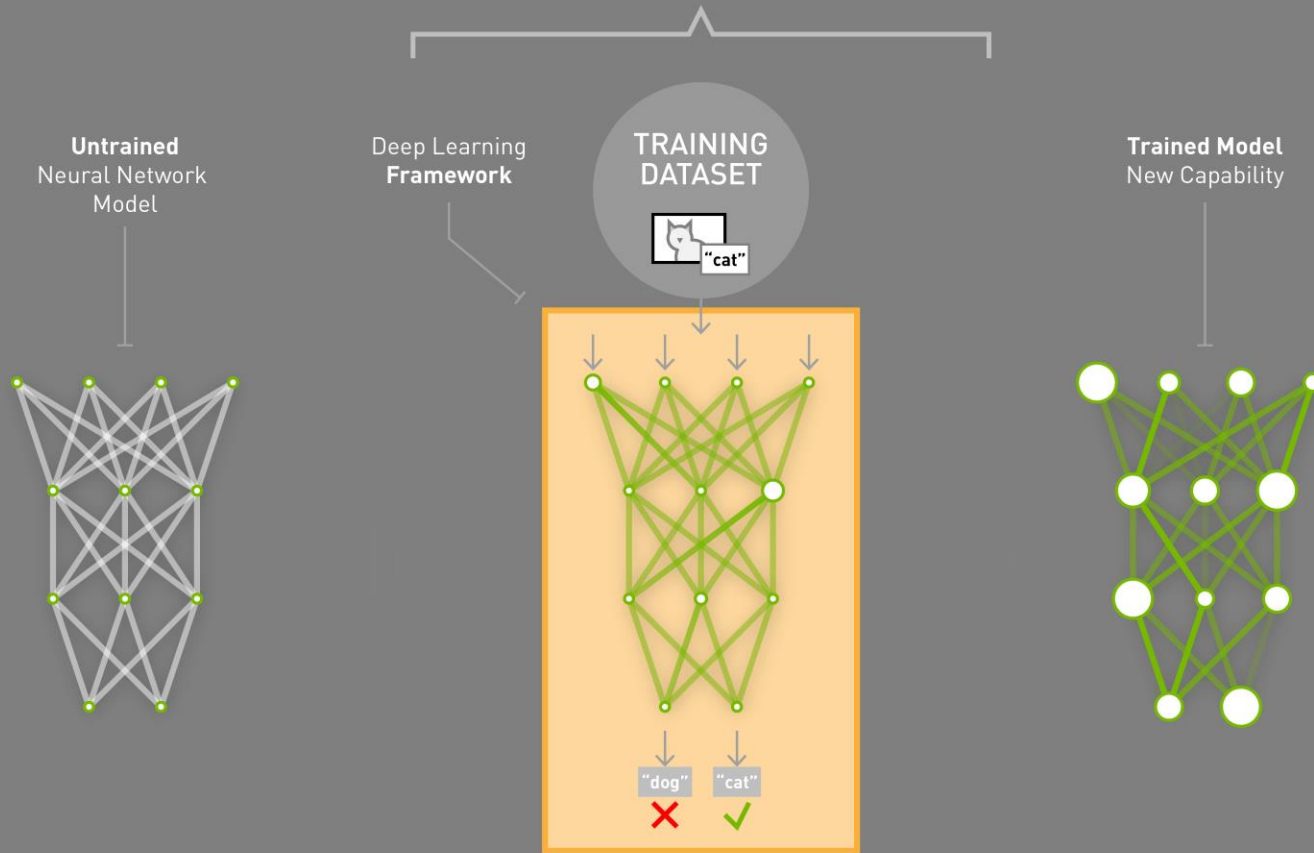
TRAINING
DATASET



DEEP LEARNING

TRAINING

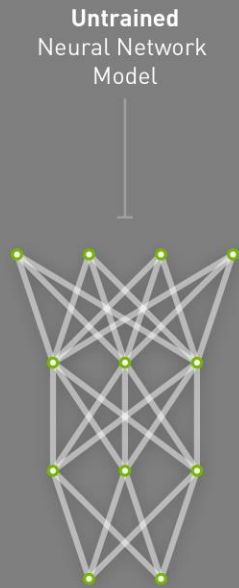
Learning a new capability
from existing data



DEEP LEARNING

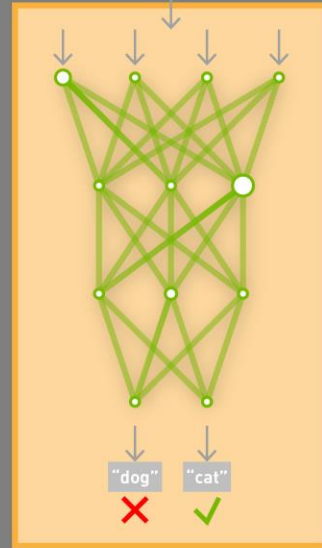
TRAINING

Learning a new capability
from existing data



Deep Learning
Framework

TRAINING
DATASET



Trained Model
New Capability



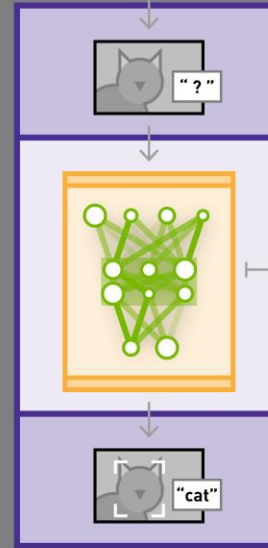
INFERENCE

Applying this capability
to new data

NEW
DATA



App or Service
Featuring Capability



Trained Model
Optimized for
Performance

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

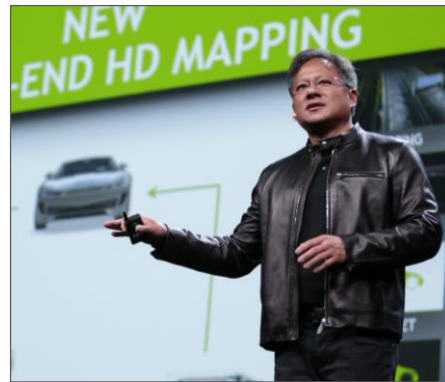
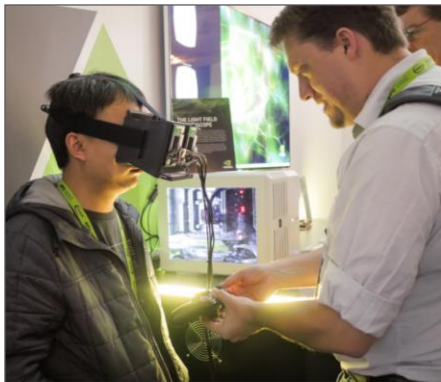
On-site workshops and online courses presented by certified instructors

Covering complete workflows for proven application use cases

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

www.nvidia.com/dli

GPU TECHNOLOGY CONFERENCE



ADVANCE YOUR DEEP LEARNING TRAINING AT GTC

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

.....

Tokyo, December 12-13

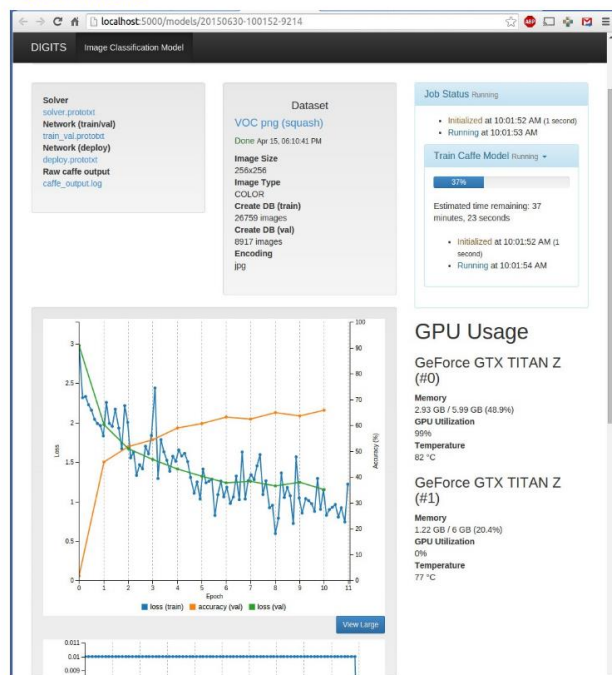
Silicon Valley, March 26-29

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

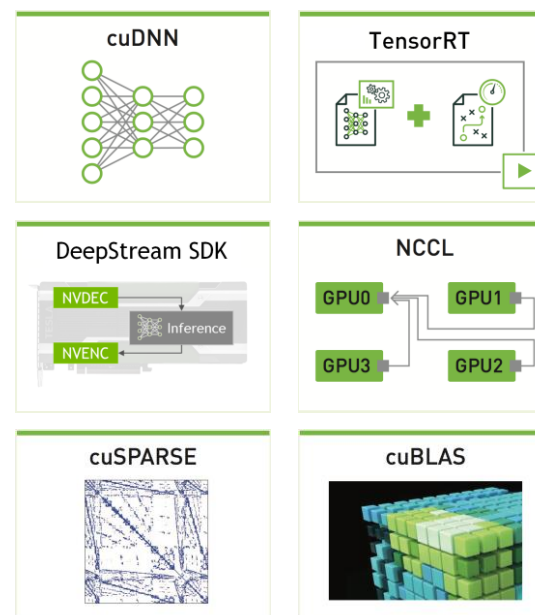
Design and train deep learning models using a high-level interface. Choose a deep learning framework that best suits your needs based on your choice of programming language, platform, and target application.

[Learn more](#)



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

INFERENCE

FULLY INTEGRATED DL SUPERCOMPUTER



DGX-1 & DGX Station

DESKTOP



Titan X Pascal

DATA CENTER



Tesla P100
Tesla V100

DATA CENTER

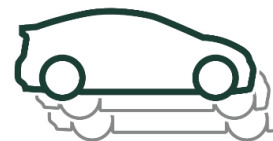


Tesla P100/V100



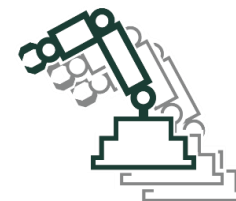
Tesla P4

AUTOMOTIVE



Drive PX2

EMBEDDED



Jetson TX2

CHALLENGES

Deep Learning Needs	Solutions
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?

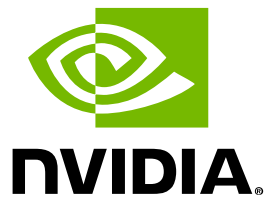
Project Checklist

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'S NEXT?

- Listen to the NVIDIA AI Podcast - <https://blogs.nvidia.com/ai-podcast>
- Review examples of AI in action - <https://news.developer.nvidia.com>
- Work through DLI online training - <https://www.nvidia.com/dli>
- Register for GTC Silicon Valley - <https://www.gputechconf.com>

Contact us at nvdli@nvidia.com



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