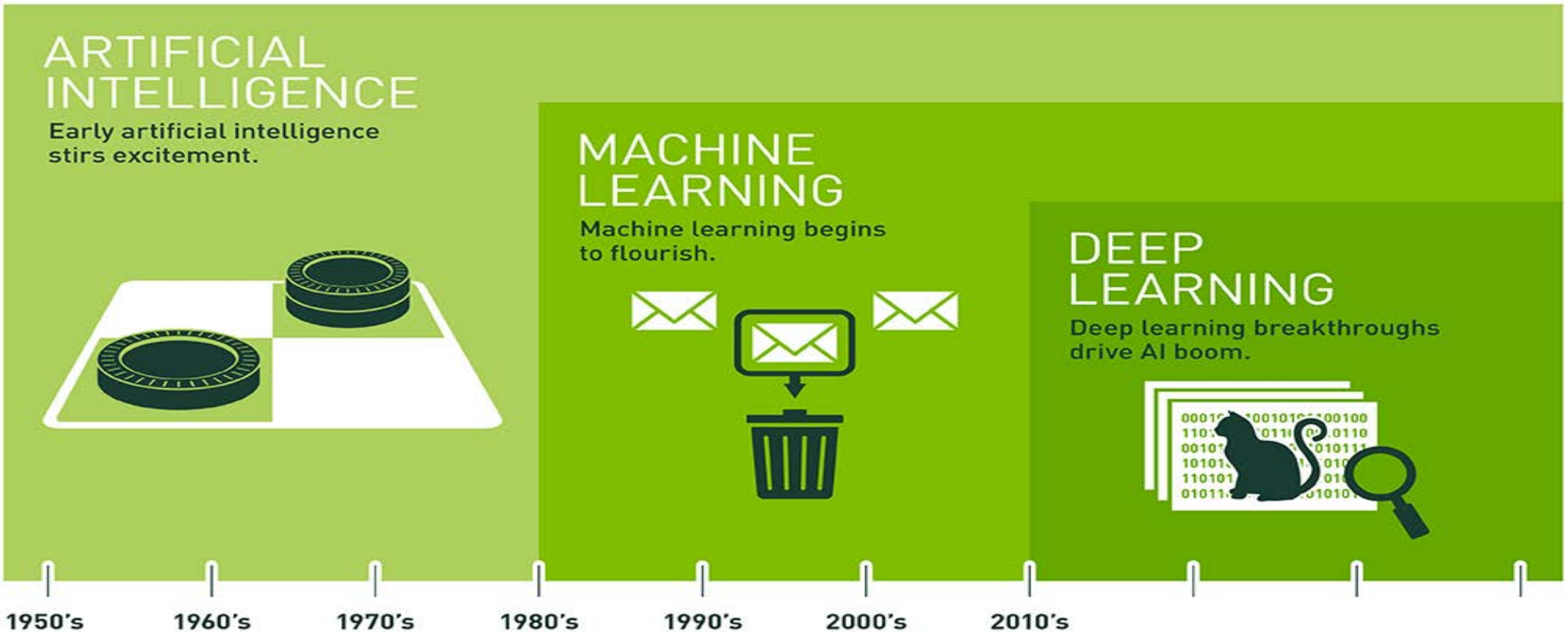
DEEP LEARNING DEMYSTIFIED

Will Ramey
Director, Developer Programs & Deep Learning Institute
NVIDIA Corporation

DEFINITIONS



DEEP LEARNING IS SWEEPING ACROSS INDUSTRIES

INTERNET SERVICES

Image/Video classification
Speech recognition
Natural language processing

MEDICINE

Cancer cell detection
Diabetic grading
Drug discovery

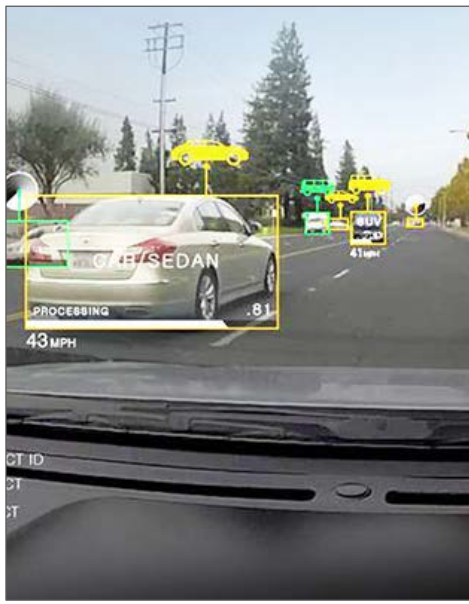
MEDIA & ENTERTAINMENT

Video captioning
Content based search
Real time translation

SECURITY & DEFENSE

Face recognition
Video surveillance
Cyber security

AUTONOMOUS MACHINES

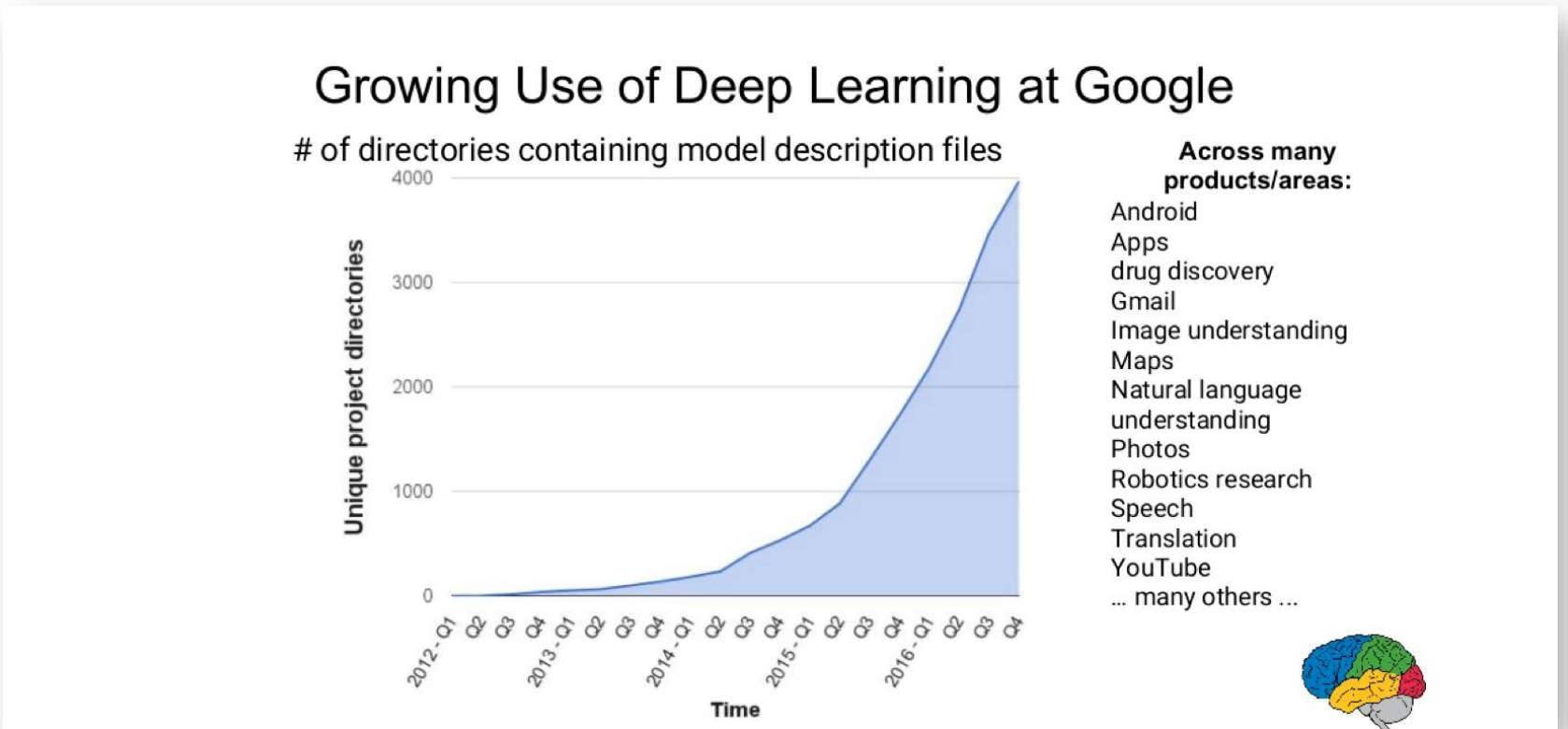


Pedestrian detection
Lane tracking
Recognize traffic signs

news.developer.nvidia.com/

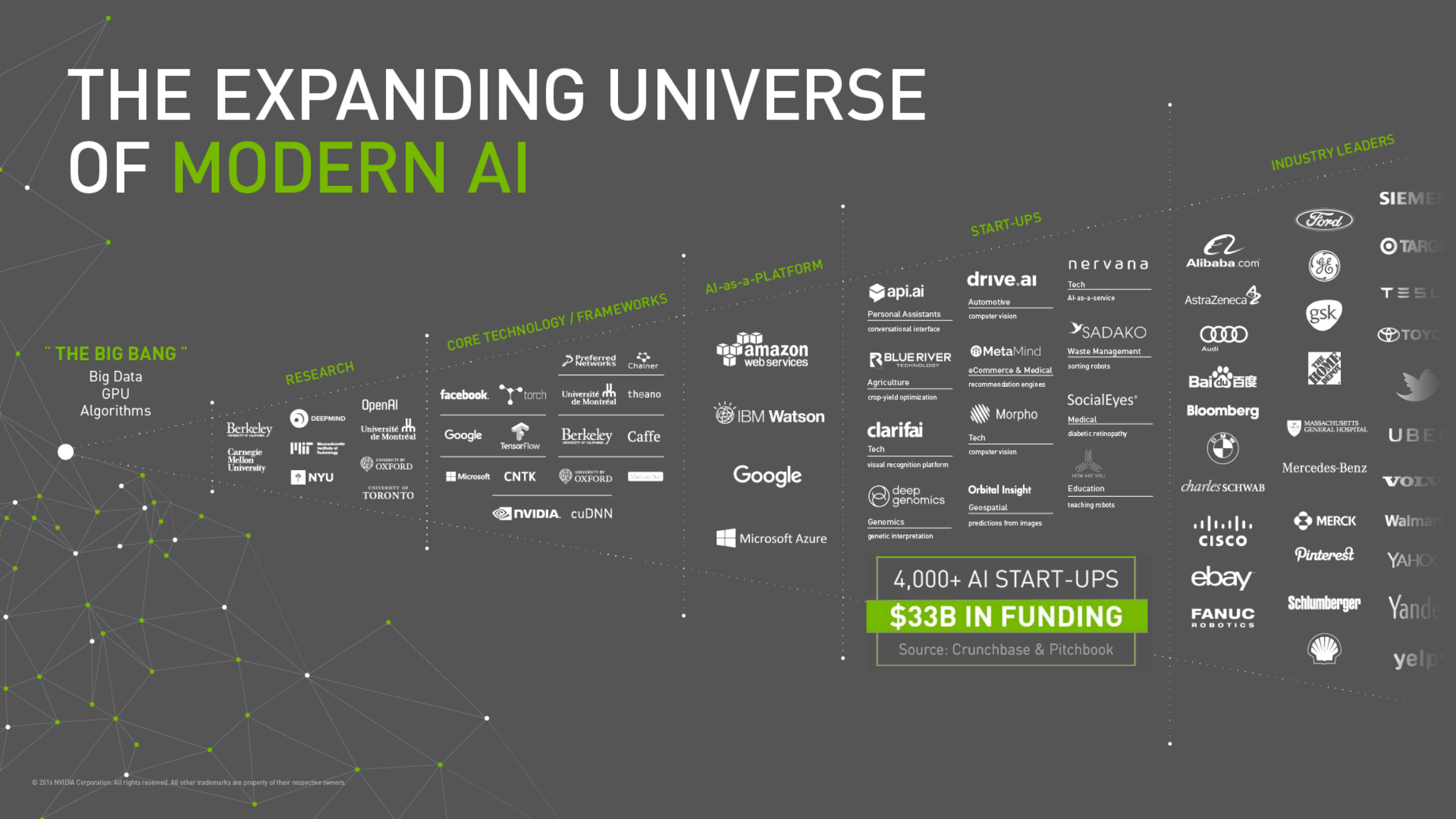
AI IS CRITICAL FOR INTERNET APPLICATIONS

Users expect intelligence in services



Source: Jeff Dean, leads the Google Brain team, making machines intelligent. www.wsdm-conference.org/2016/slides/WSDM2016-Jeff-Dean.pdf

THE EXPANDING UNIVERSE OF MODERN AI



A NEW COMPUTING MODEL

Algorithms that learn from examples

MACHINE LEARNING

TRADITIONAL APPROACH

Requires domain experts

Time=consuming experimentation

Custom algorithms

Not scalable to new problems

Car

Vehicle

Coupe

A NEW COMPUTING MODEL

Algorithms that learn from examples

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Requires domain experts
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Not scalable to new problems

Car
Vehicle
Coupe

DEEP LEARNING

DEEP NEURAL NETWORKS

Learn from data
Easily to extend
Accelerated with GPUs

Car
Vehicle
Coupe

WHAT PROBLEM ARE YOU SOLVING?

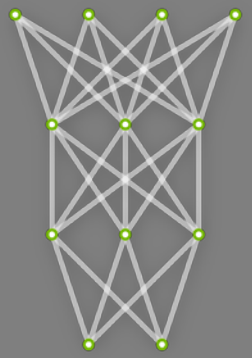
Defining the AI/DL Task

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

DEEP LEARNING APPLICATION DEVELOPMENT

DEEP LEARNING APPLICATION DEVELOPMENT

Untrained
Neural Network
Model



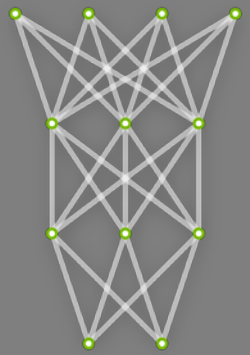
TRAINING
DATASET

DEEP LEARNING APPLICATION DEVELOPMENT

TRAINING

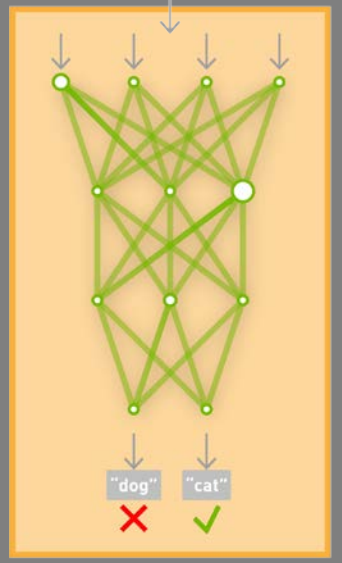
Learning a new capability
from existing data

Untrained
Neural Network
Model



Deep Learning
Framework

TRAINING
DATASET



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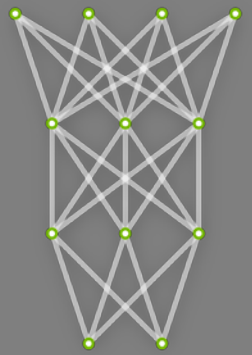
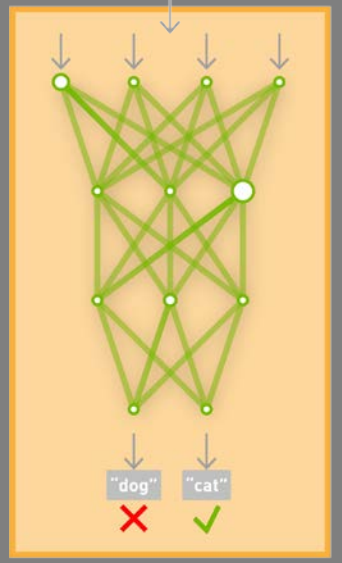
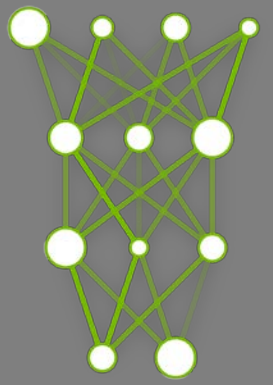


Deep Learning
Framework

TRAINING
DATASET



Trained Model
New Capability



DEEP LEARNING APPLICATION DEVELOPMENT

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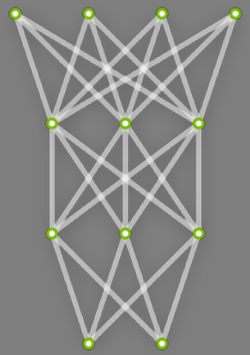

Deep Learning
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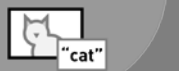

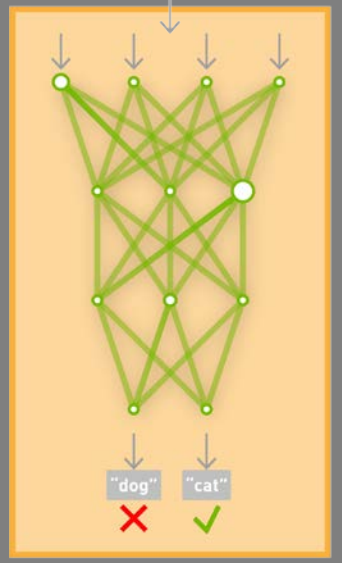

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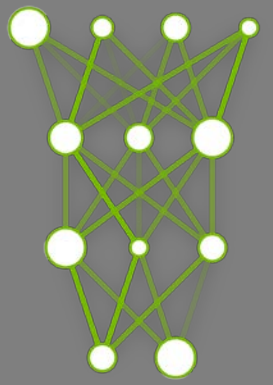
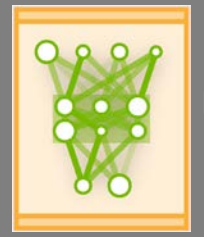


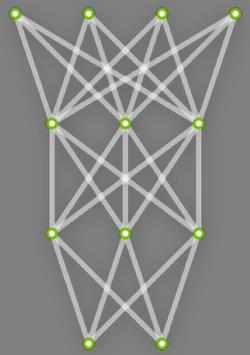


Trained Model
Optimized for
Performance

DEEP LEARNING APPLICATION DEVELOPMENT

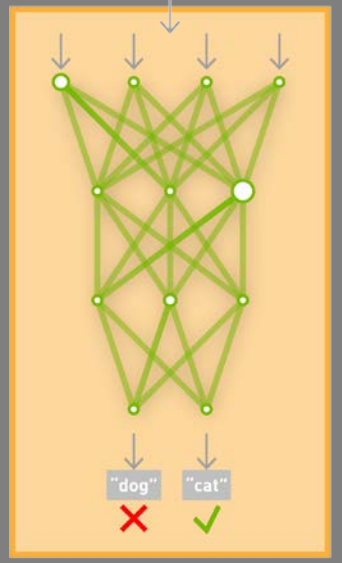
TRAINING
Learning a new capability
from existing data

Untrained
Neural Network
Model



Deep Learning
Framework

TRAINING
DATASET



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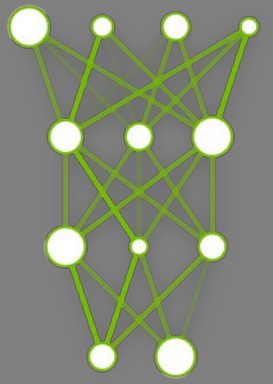
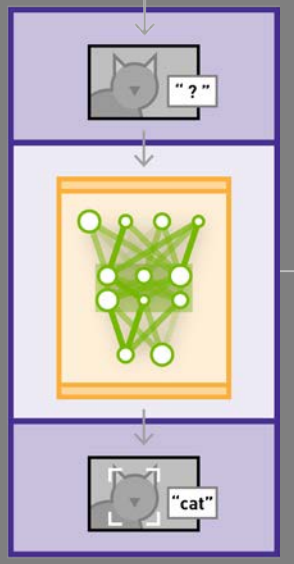


INFERENCE
Applying this capability
to new data

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

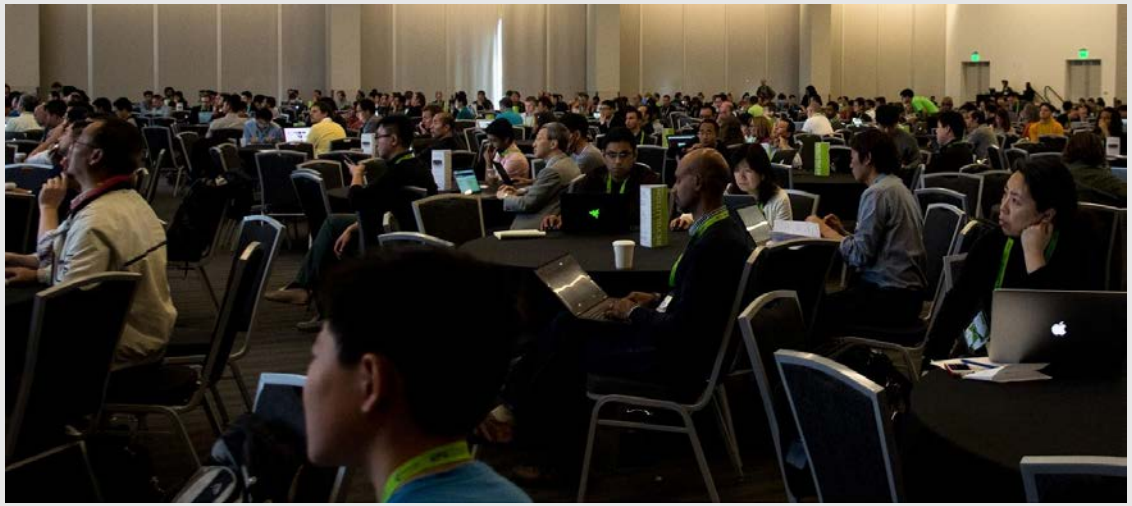
Hands-on training for data scientists and software engineers

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

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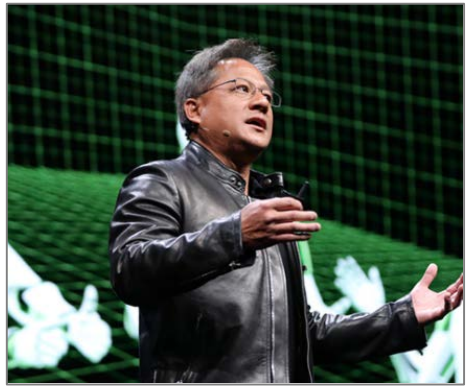


DISCOVER

See how GPU technologies are creating amazing breakthroughs in important fields such as deep learning

INNOVATE

Hear about disruptive innovations as early-stage companies and startups present their work

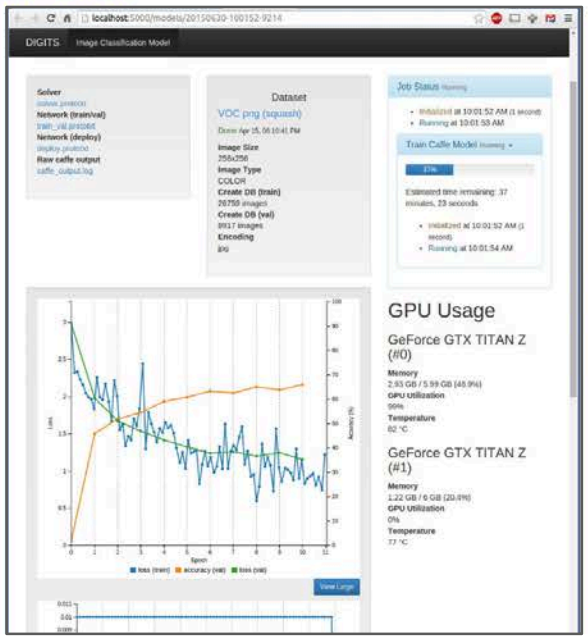
Register with code NVWRAMEY for a 25% discount at www.nvidia.com/gtc
Save up to $700 by registering before Feb 16th

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.

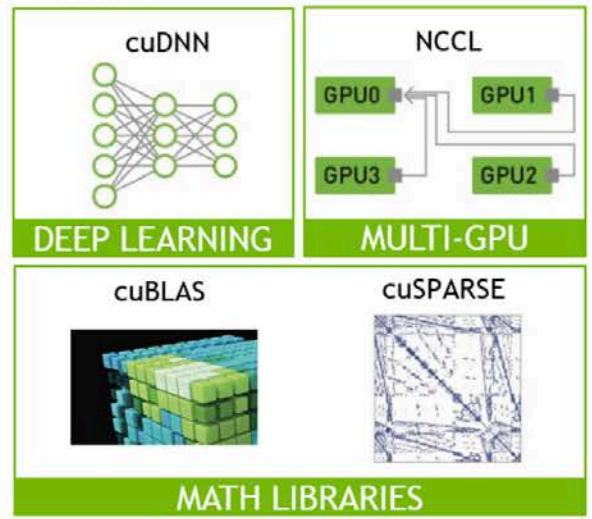
Learn more

Caffe2 · Chainer · Microsoft Cognitive Toolkit · mxnet · PaddlePaddle · PYTORCH · TensorFlow · theano · torch

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.

Learn more



developer.nvidia.com/deep-learning

END-TO-END PRODUCT FAMILY

TRAINING

FULLY INTERGRATED DL SUPERCOMPUTER

DGX-1 & DGX Station

DESKTOP

TITAN V

DATA CENTER

Tesla P100
Tesla V100

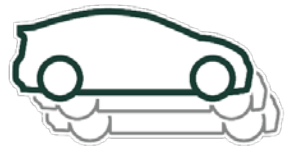
INFERENCE

DATA CENTER

Tesla P100/V100

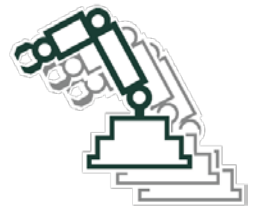
Tesla P4

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 V
Deployment Platforms	TensorRT, V100/P100/P4, Drive PX, Jetson

READY TO GET STARTED?

Project checklist

What problem are you solving, what are the DL tasks?

What data do you have/need, and how is it labeled?

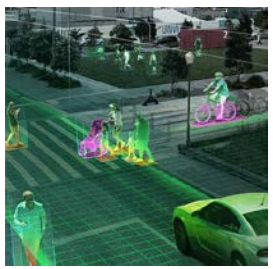
Which deep learning framework & tools will you use?

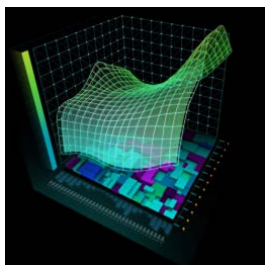
On what platform(s) will you train and deploy?

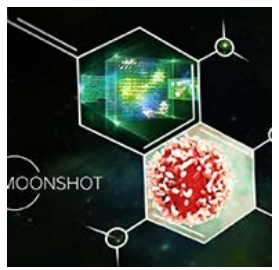
Internet Services


Robotics

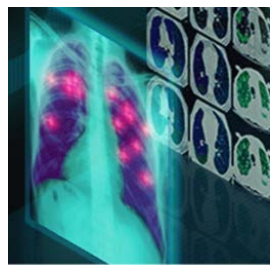

Digital Content Creation


Intelligent Video Analytics


Finance



Genomics


Healthcare


Autonomous Vehicles

Media & Entertainment


Security & Defense

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