



DEEP
LEARNING
INSTITUTE



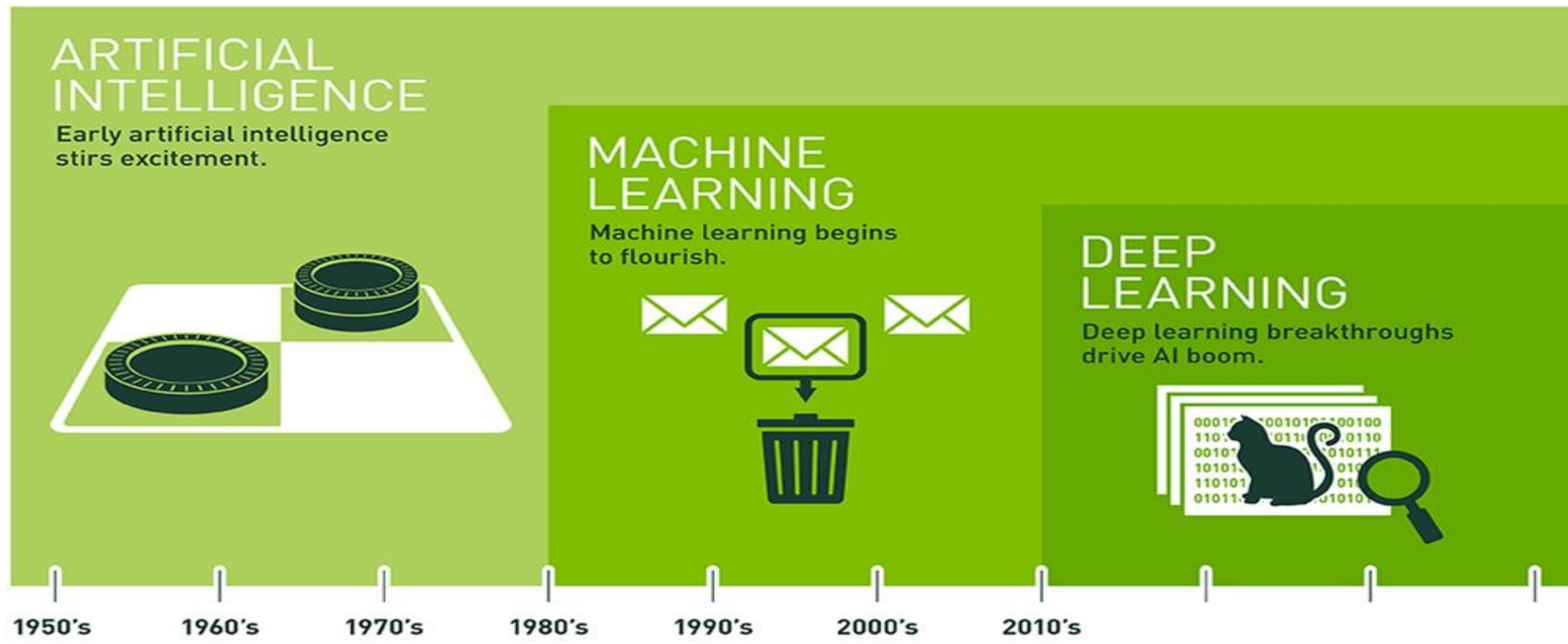
ODTÜ
METU

DEEP LEARNING DEMYSTIFIED

Dr. Alptekin Temizel
DLI Certified Instructor
Associate Professor, Graduate School of Informatics, METU

8 January 2018

DEFINITIONS

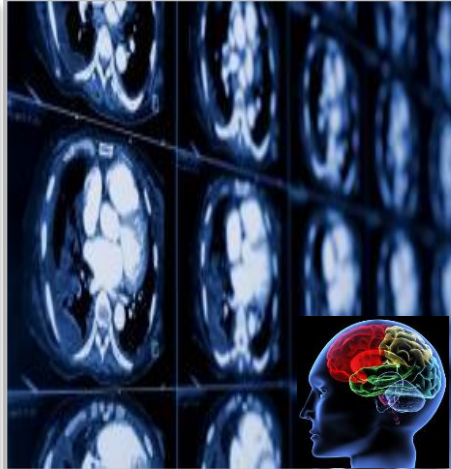


DEEP LEARNING IS SWEEPING ACROSS INDUSTRIES

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

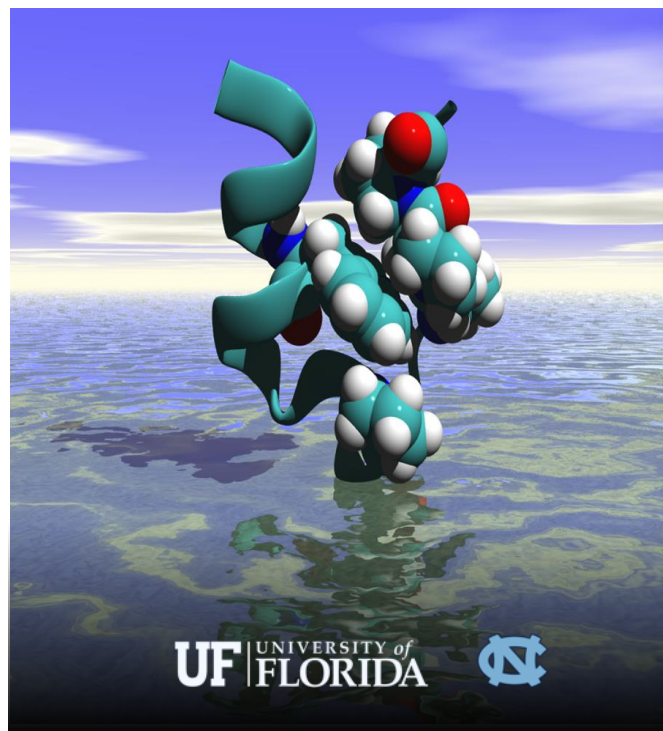
- Face recognition
- Video surveillance
- Cyber security

- Pedestrian detection
- Lane tracking
- Recognize traffic signs

DEEP LEARNING IS TRANSFORMING HPC



“Seeing” Gravity In Real Time



Accelerating Drug Discovery

92%

believe AI will impact their work

93%

using deep learning seeing positive results



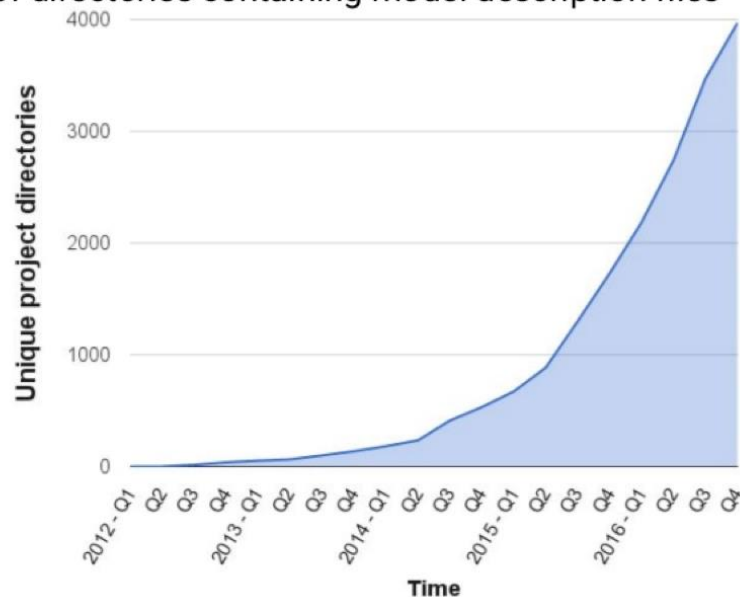
insideHPC.com Survey
November 2016

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 ...



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

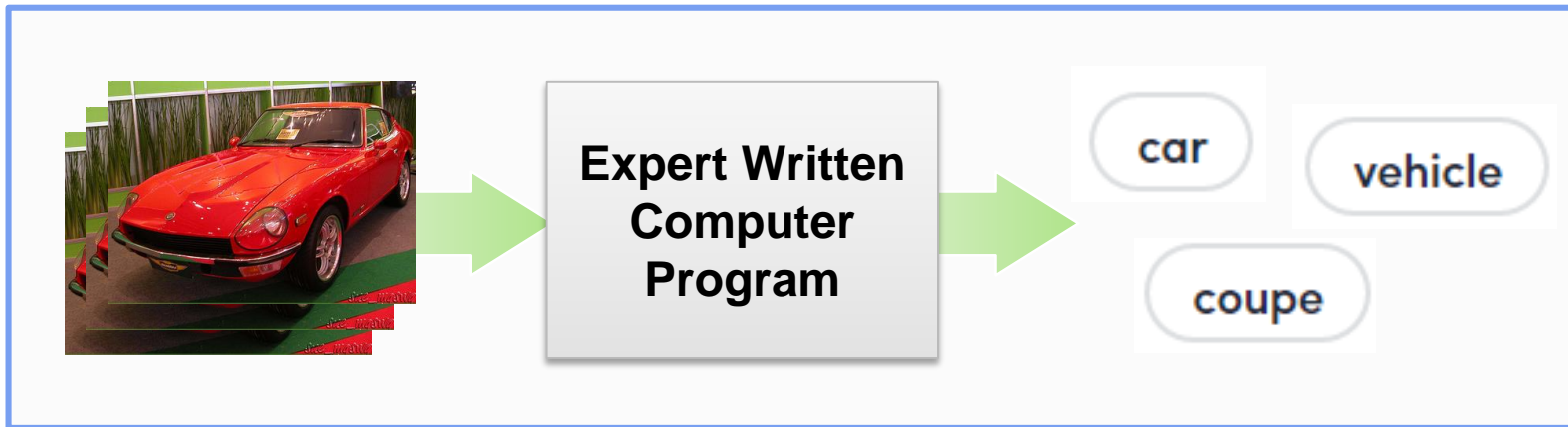
Source: Venture Scanner

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

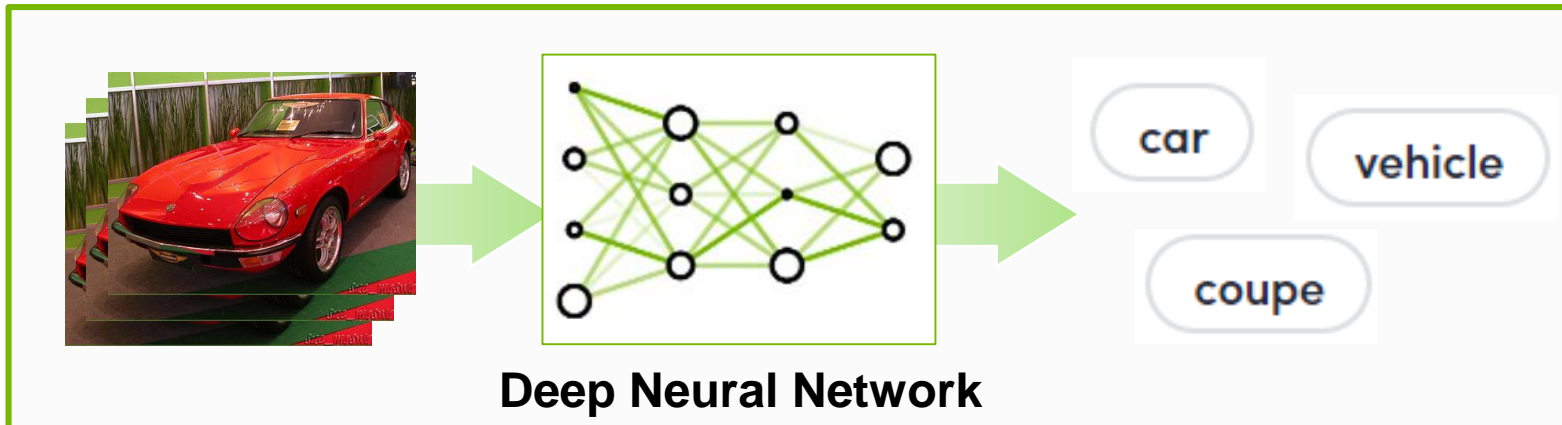
A NEW COMPUTING MODEL

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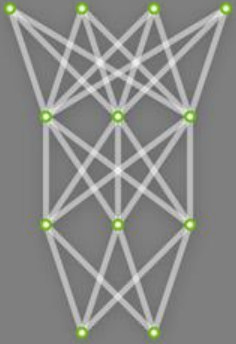


Deep Learning Approach

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

DEEP LEARNING

Untrained
Neural Network
Model

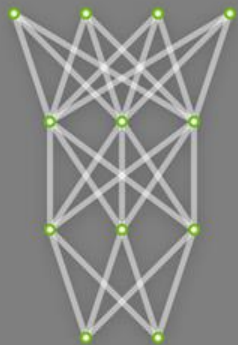


DEEP LEARNING

TRAINING

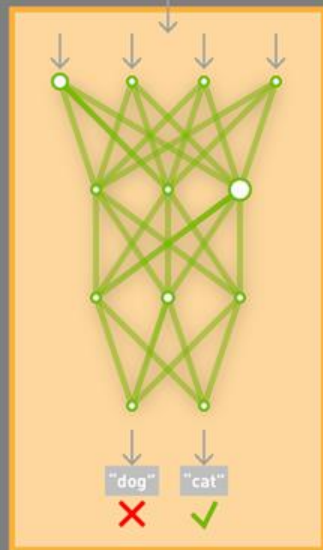
Learning a new capability
from existing data

Untrained
Neural Network
Model



Deep Learning
Framework

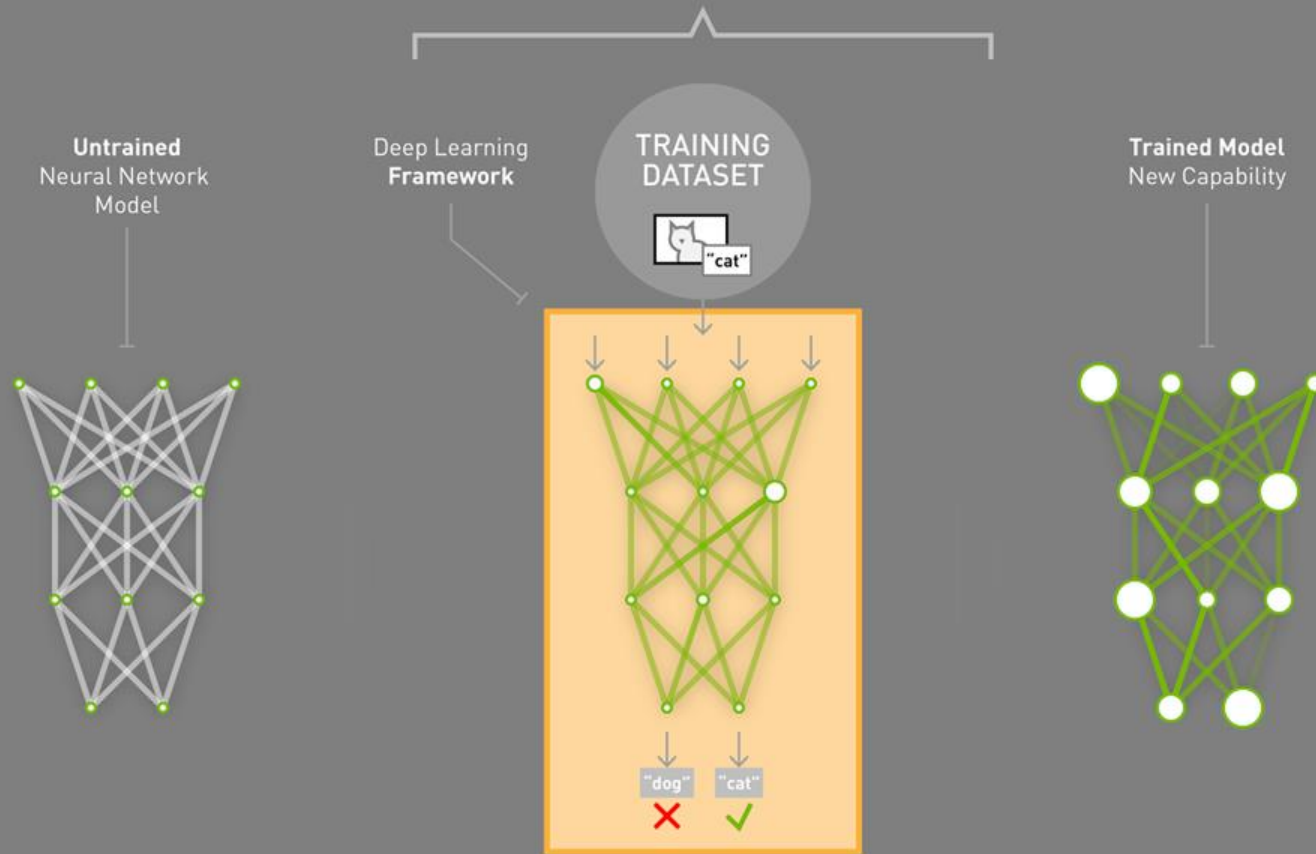
TRAINING
DATASET



DEEP LEARNING

TRAINING

Learning a new capability
from existing data



DEEP LEARNING

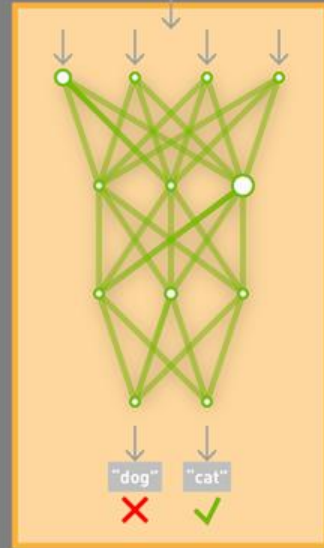
TRAINING

Learning a new capability
from existing data



Deep Learning
Framework

TRAINING
DATASET



Trained Model
New Capability



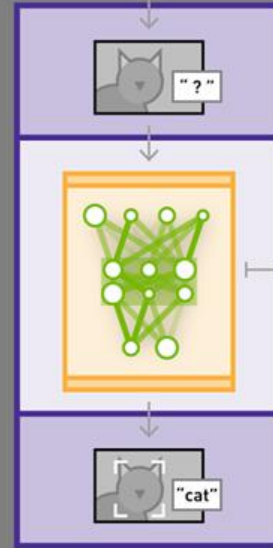
INFERENCE

Applying this capability
to new data

NEW
DATA



App or Service
Featuring Capability



Trained Model
Optimized for
Performance

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

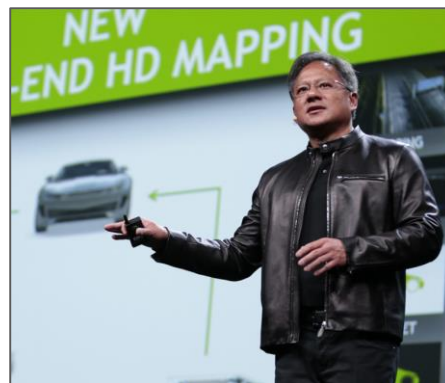
On-site workshops and online courses presented by certified instructors

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



DEEP LEARNING TRAINING AT GTC

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

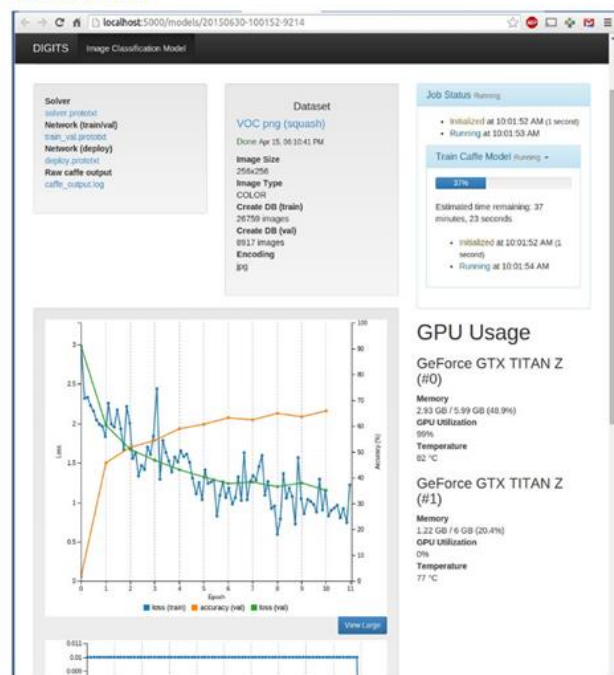
Israel, October 18
Washington DC, November 1-2
Tokyo, December 12-13

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.

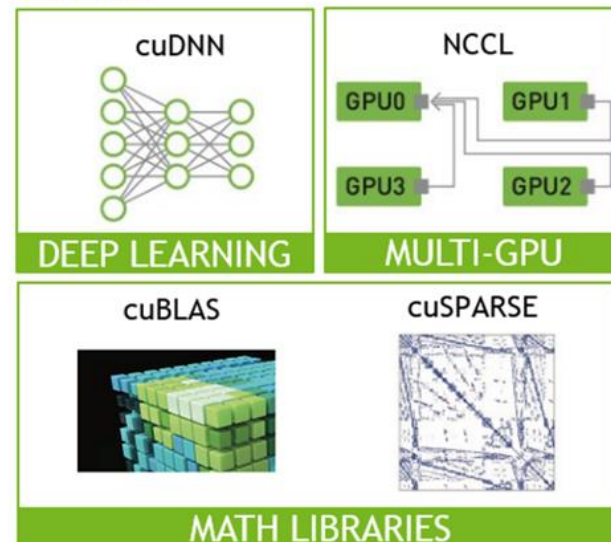
[Learn more](#)



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 INTEGRATED DL SUPERCOMPUTER



DGX-1 & DGX Station

DESKTOP



Titan X Pascal

DATA CENTER



Tesla P100
Tesla V100

INFERENCE

DATA CENTER

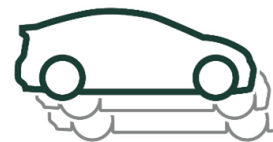


Tesla P100/V100



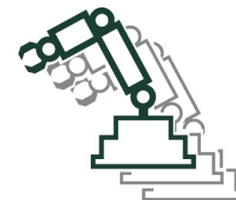
Tesla P4

AUTOMOTIVE



Drive PX2

EMBEDDED



Jetson TX1





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  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

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 NVIDIA Engineer Uses Deep Learning to Keep Cats from Pooping on His Lawn

Progressive Growing of GANs for Improved Quality, Stability, and Variation

Tero Karras (NVIDIA), Timo Aila (NVIDIA), Samuli Laine (NVIDIA), Jaakko Lehtinen (NVIDIA and Aalto University)



Picture: Two imaginary celebrities that were dreamed up by a random number generator.

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

REGISTER FOR A DLI WORKSHOP

<https://www.nvidia.com/en-us/deep-learning-ai/education/>
<https://openzeka.com/blog/>

Contact us at nvdli@nvidia.com



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CERTIFICATE OF ATTENDANCE

This certificate is awarded to

for completion of

Image Classification with DIGITS
Neural Network Deployment with DIGITS and TensorRT
Object Detection with DIGITS

A handwritten signature in black ink, appearing to read "Mark Ebersole".

Mark Ebersole
Director, NVIDIA Deep Learning Institute

OCT/21/2017
Date Issued