DEEP LEARNING DEMYSTIFIED

November 2016
A NEW COMPUTING MODEL

Algorithms that Learn from Examples

Expert Written Computer Program

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

Deep Neural Network

Deep Learning Approach
- Learn from data
- Easily to extend
- Speedup with GPUs
### DEEP LEARNING IS SWEEPING ACROSS INDUSTRIES

<table>
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<tr>
<th>Internet Services</th>
<th>Medicine</th>
<th>Media &amp; Entertainment</th>
<th>Security &amp; Defense</th>
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<tr>
<td>Image/Video classification</td>
<td>Cancer cell detection</td>
<td>Video captioning</td>
<td>Face recognition</td>
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<td>Speech recognition</td>
<td>Diabetic grading</td>
<td>Content based search</td>
<td>Video surveillance</td>
<td>Lane tracking</td>
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<td>Natural language processing</td>
<td>Drug discovery</td>
<td>Real time translation</td>
<td>Cyber security</td>
<td>Recognize traffic signs</td>
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Molecular energetics studies can lead to breakthroughs in drug discovery and materials science, but traditional computing approaches are time-consuming and expensive. Researchers at the University of Florida and the University of North Carolina leveraged GPU deep learning to develop ANAKIN-ME, which can reproduce molecular energy surfaces with super speed, extremely high accuracy, and at 1-10/millionth the cost of current computational methods.
AN AI MONITOR OF EARTH’S VITALS

The Earth’s climate has changed throughout history, but in recent years there have been record increases in temperature, glacial retreat and rising sea levels. NASA Ames is using satellite imagery to measure the effects of carbon and greenhouse gas emissions on the planet. To do so, they developed DeepSat—a deep learning framework for satellite image classification trained on a GPU-powered supercomputer. The enhanced satellite imagery will help scientists plan to protect ecosystems and farmers improve crop production.
DEEP LEARNING

TRAINING
Learning a new capability from existing data

INFEERENCE
Applying this capability to new data

Untrained Neural Network Model
## CHALLENGES

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<th>Deep Learning Needs</th>
<th>Why</th>
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<td>Data Scientists</td>
<td>New computing model</td>
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<td>Latest Algorithms</td>
<td>Rapidly evolving</td>
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<td>Fast Training</td>
<td>Impossible -&gt; Practical</td>
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<td>Deployment Platform</td>
<td>Must be available everywhere</td>
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NVIDIA DEEP LEARNING INSTITUTE
Hands-on Training for Data Scientists and Software Engineers

Training organizations and individuals to solve challenging problems using Deep Learning

On-site workshops and online courses presented by certified experts

Covering complete workflows for proven application use cases
Self-driving cars, recommendation engines, medical image classification, intelligent video analytics and more

www.nvidia.com/dli
DIGITS DEEP LEARNING WORKFLOWS

**IMAGE CLASSIFICATION**

- 98% Dog
- 2% Cat

Classify images into classes or categories
Object of interest could be anywhere in the image

**OBJECT DETECTION**

Find instances of objects in an image
Objects are identified with bounding boxes

**IMAGE SEGMENTATION**

Partition image into multiple regions
Regions are classified at the pixel level

New in DIGITS 5
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

FULLY INTEGRATED DL SUPERCOMPUTER
DGX-1

DESKTOP
Titan X Pascal

DATA CENTER
Tesla P100
Tesla P40

INFEERENCE

DATA CENTER
Tesla P4
Tesla P40

AUTOMOTIVE
Drive PX2

EMBEDDED
Jetson TX1
# CHALLENGES

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<td>Data Scientists</td>
<td>DIGITS, DLI Training, GTC</td>
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<tr>
<td>Latest Algorithms</td>
<td>DL SDK, GPU-Accelerated Frameworks</td>
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<td>Fast Training</td>
<td>DGX, P100, P40, TITAN X</td>
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<td>Deployment Platform</td>
<td>TensorRT, P40, P4, Jetson, Drive PX</td>
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GPU TECHNOLOGY CONFERENCE

May 8 - 11, 2017 | Silicon Valley | #GTC17
www.gputechconf.com

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Connect with technology experts from NVIDIA and other leading organizations

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

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