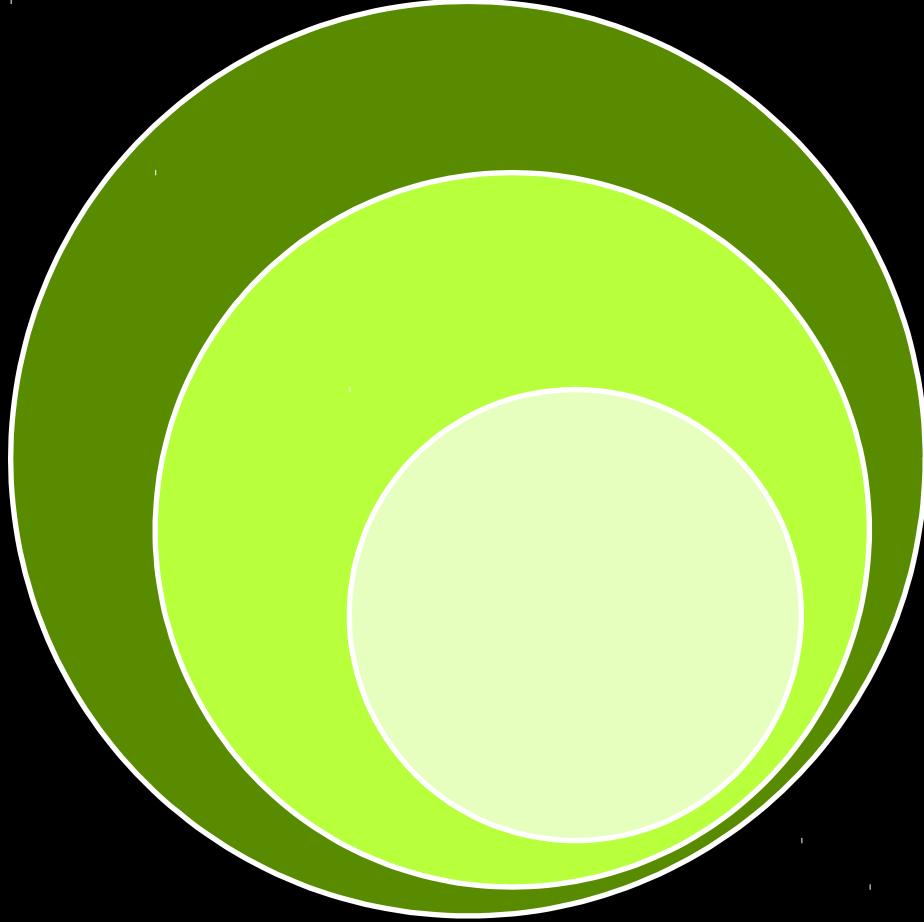




NVIDIA AI IN HEALTHCARE

Pablo Ribalta Lorenzo, 25.2.2019



Artificial intelligence

Grand project to build
non-human intelligence

Machine Learning

Machines that learn to be
smarter

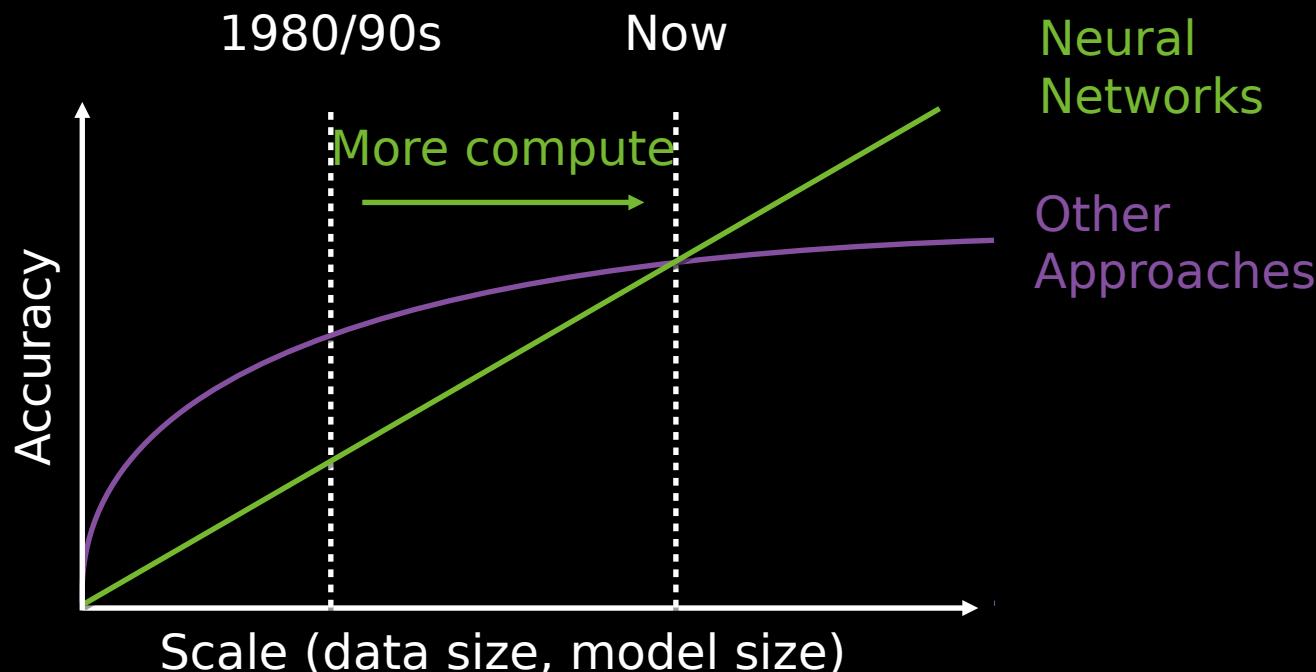
Deep Learning

Particular kind of machine
learning

WHAT IS DEEP LEARNING?

Modern Reincarnation of Artificial Neural Networks

Collection of simple **trainable** mathematical units, organized in layers, that work together to solve complicated tasks



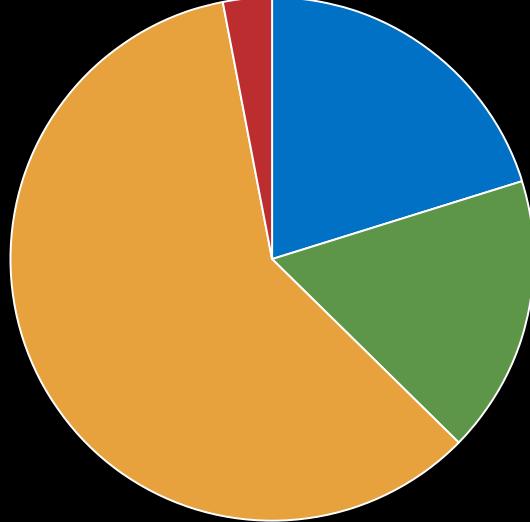
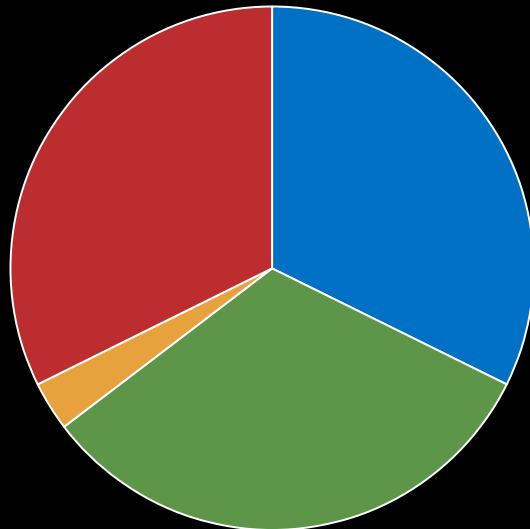
What's New

Layered network architecture,
New training math,
Scale

Key benefit

Highly accurate
Learns features from raw data
No feature engineering required

Traditional Computer Vision



REBALANCES EFFORT INVESTED TO INNOVATE

- Data preparation
- Feature engineering
- Numerical optimization
- Model architecture

NOT REAL DATA. Based on my experience

How much data is “enough”?

More is better, but diminishing returns beyond a certain Level

General rule of thumb: >5k positives per class

Key is good relevant data

WHERE CAN MACHINE LEARNING MAKE THE BIGGEST IMPACT

Lots of data to look
Through
Screening & routine imaging

Expertise is limited
Algorithm can scale and
Enhance experts

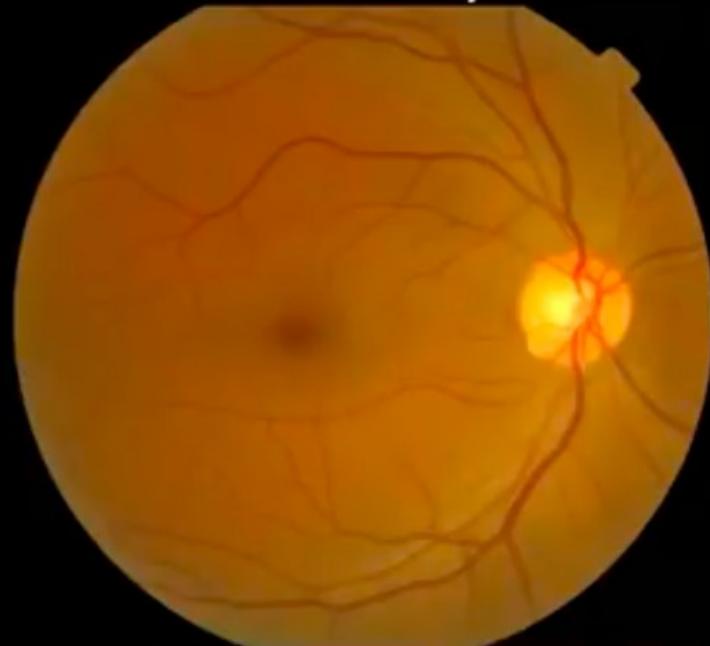


Silvestrin C, 2016. Europe's Looming Radiology Capacity Challenge

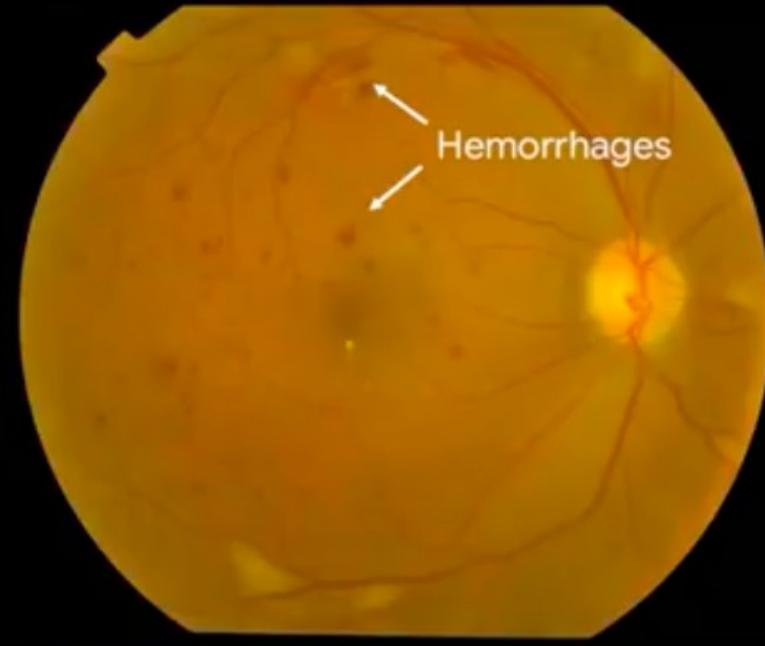
DIAGNOSING DIABETIC RETINOPATHY

Analysis of retinal fundus images

Healthy



Diseased



No DR

Mild DR

Moderate DR

Severe DR

Proliferative DR

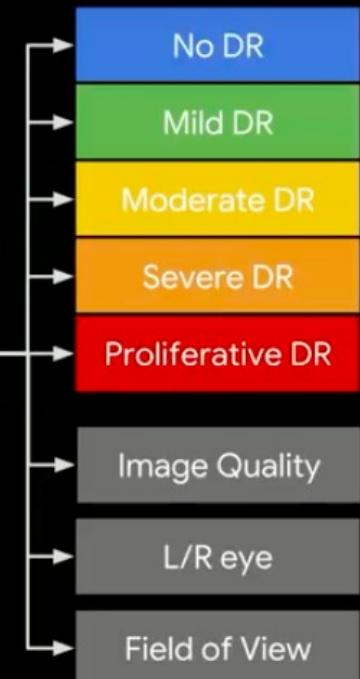
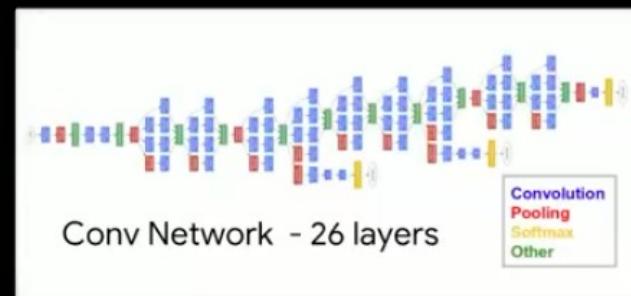
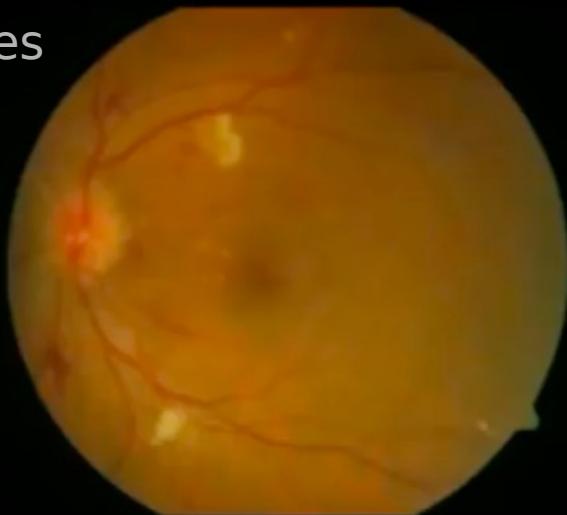
DIAGNOSING DIABETIC RETINOPATHY

Dataset

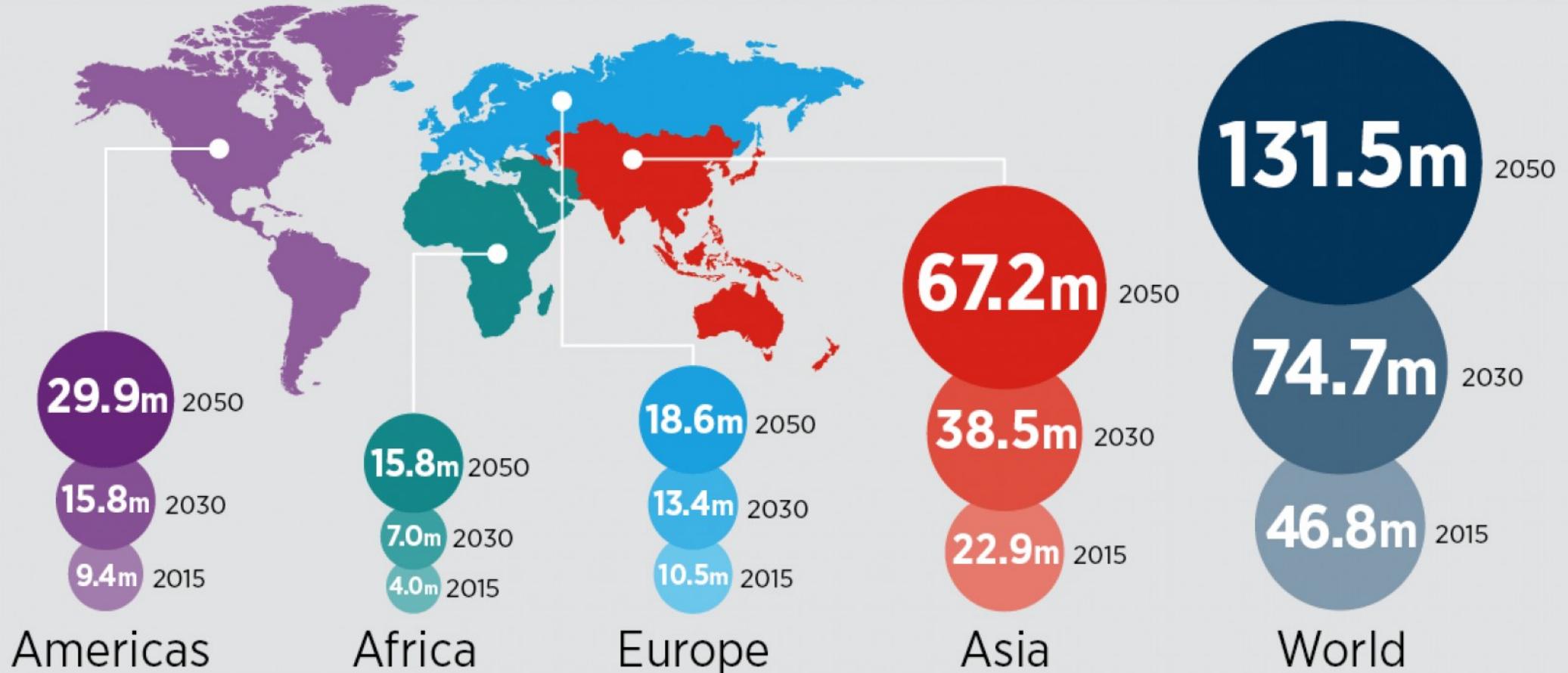
More than 800k images

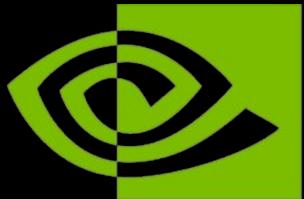
Ground truth

54 ophthalmologists
145k labeled images



People living with dementia around the world





NVIDIA DIGITS



NVIDIA DIGITS: END TO END DIAGNOSTIC OF ALZHEIMER'S DISEASE

End to end diagnostic platform

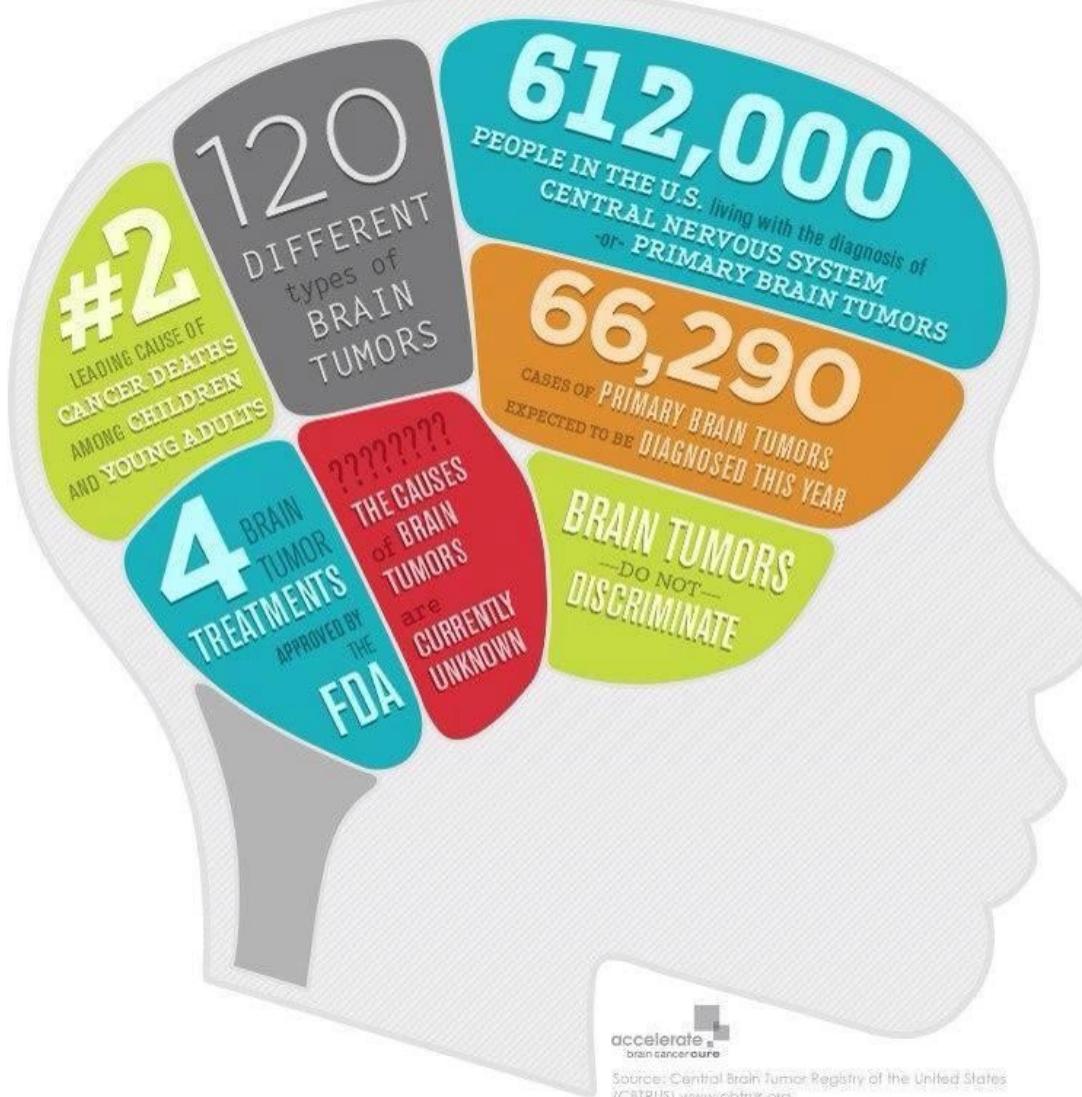
Data acquisition and conversion

Data preprocessing and preparation

Classification

Ultrafast analysis

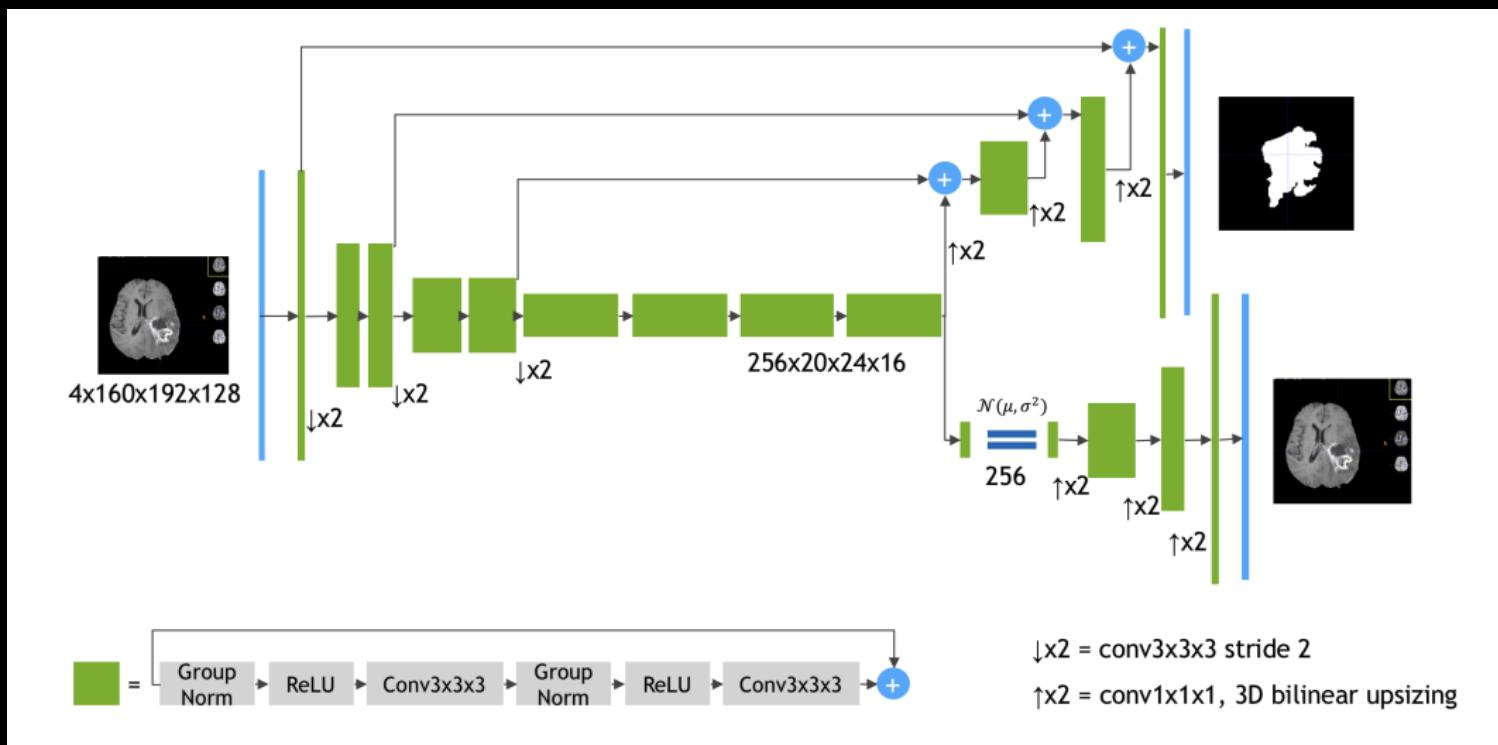
Machine learning can increase the throughput of
A practitioner by several orders of magnitude



Source: Central Brain Tumor Registry of the United States (CBTRUS) www.cbtrus.org

SUCCESS STORY: NVIDIA TOPS RESULT IN BRAIN TUMOR DETECTION CONTEST

NVIDIA winner at BRATs 2018

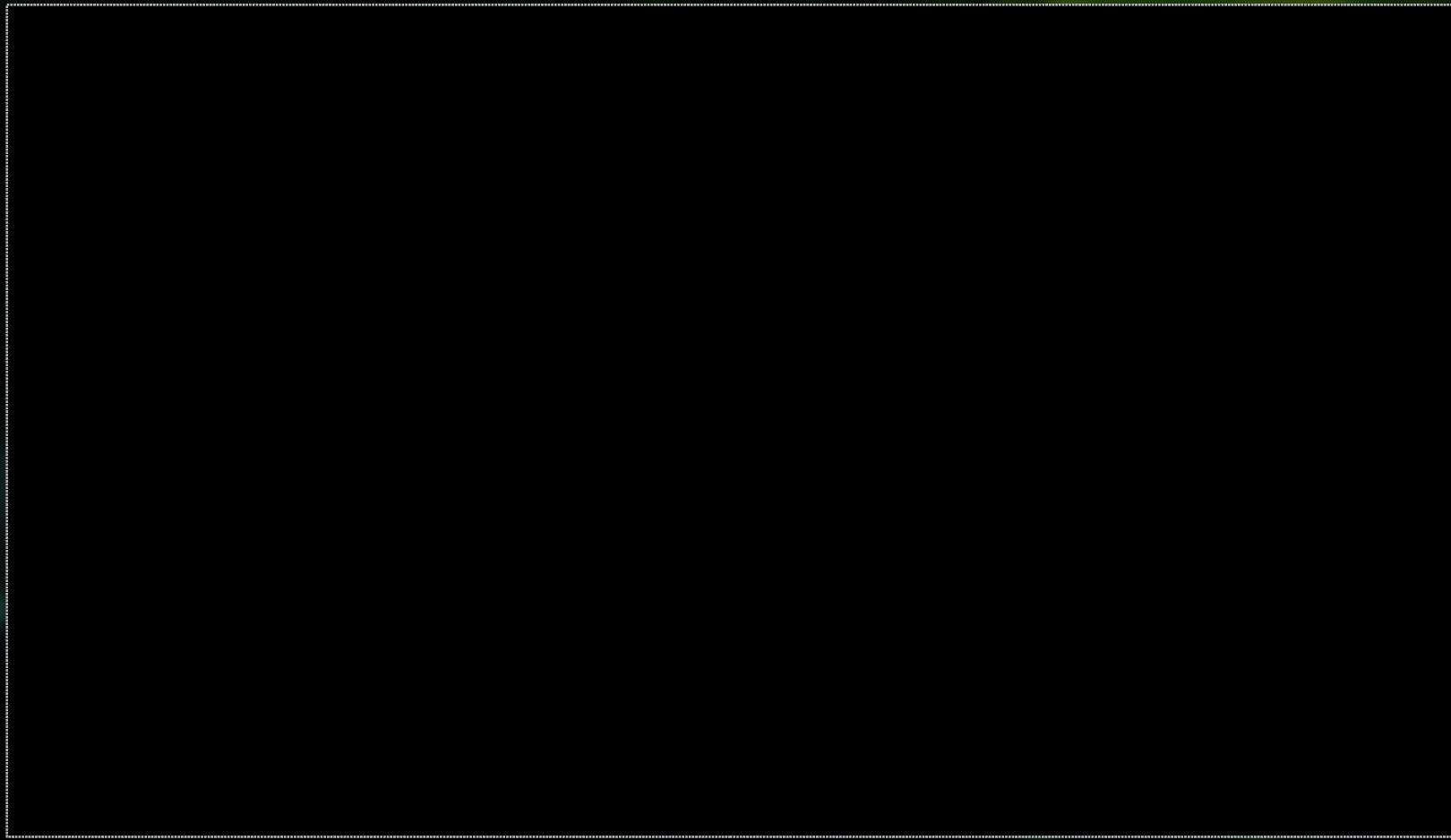


Top result

NVIDIA scientist deliver
Top result at BRATs challenge

Multi modal

This network can fuse the
Results from different
Modalities and deliver a
unified response



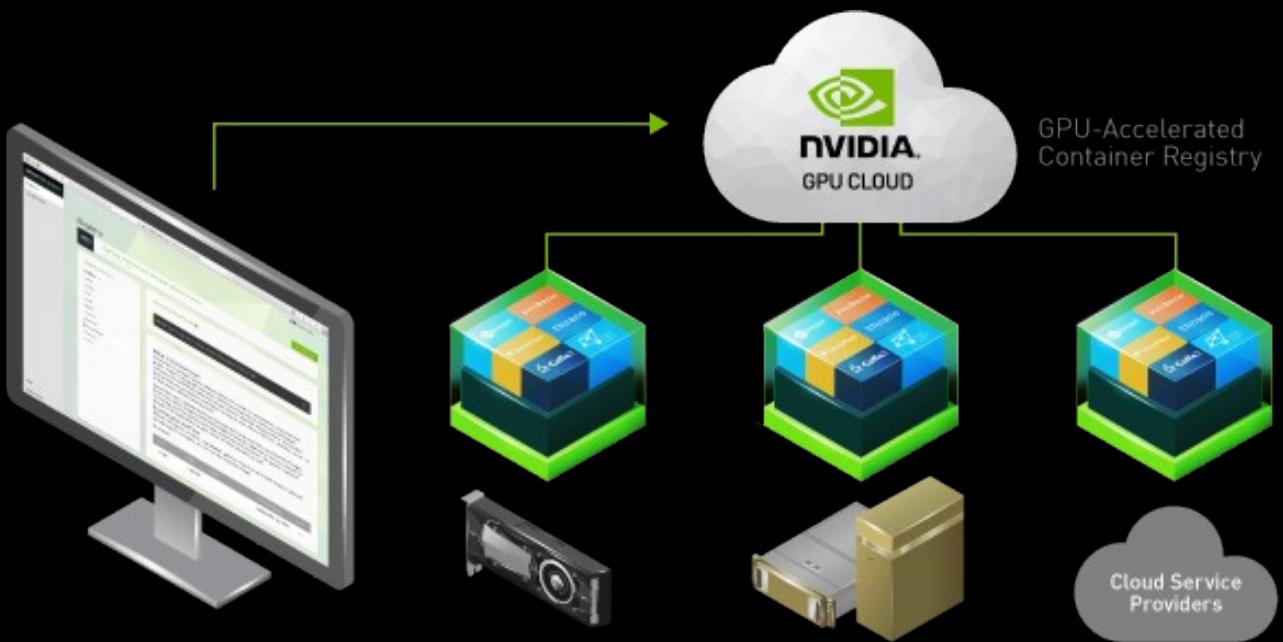
WANT TO CONTINUE OUR WORK? THESE ARE OUR TOOLS

NVIDIA
Contain
ers

NVIDIA
Hardwar
e

ARTIFICIAL INTELLIGENCE CONTAINERS

Ready-to-run deep learning software



Performance

Containers provide developers
With record-setting performance

Access from anywhere

Available to anyone —at no cost—

Innovation for all

Containers ship optimized versions
Of the most popular models and
Architectures ready to use

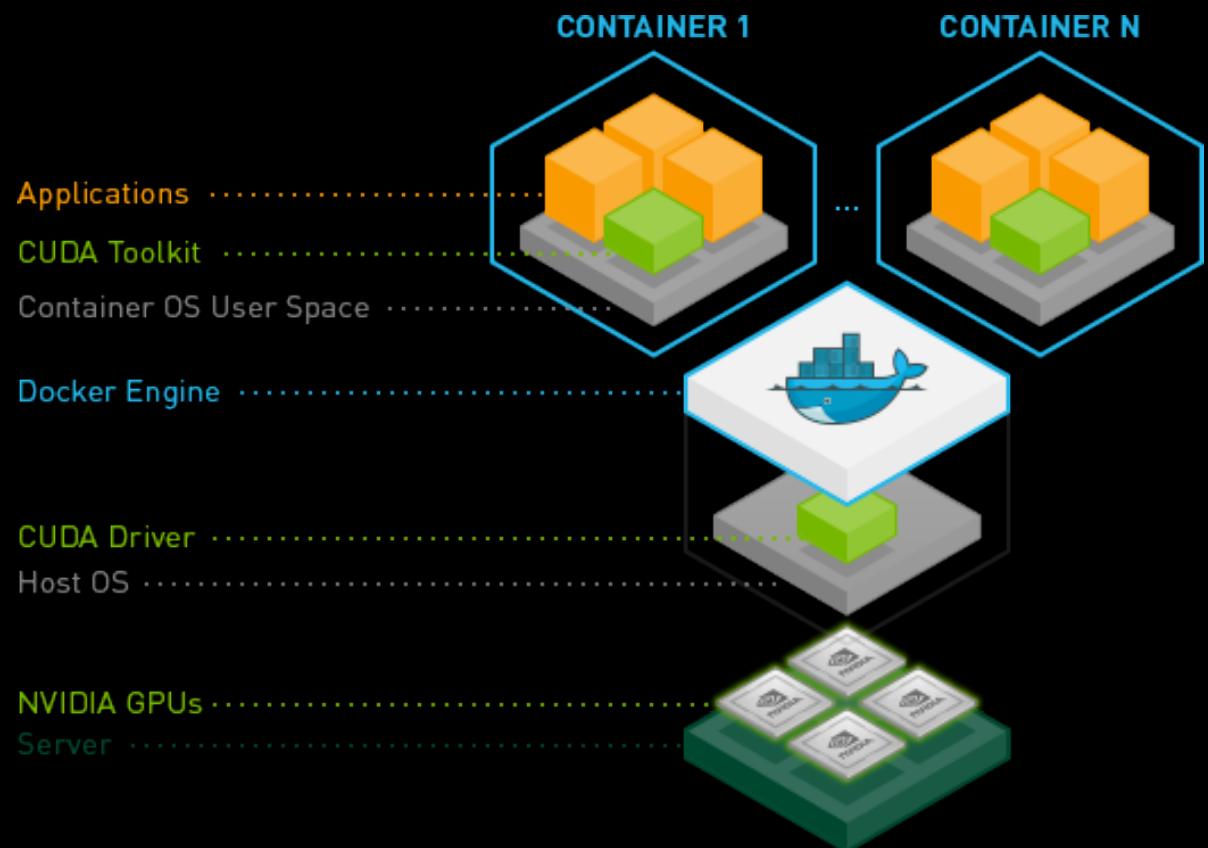
ARTIFICIAL INTELLIGENCE CONTAINERS

Ready-to-run deep learning software

Platform independent
Enjoy deep learning on your favorite
OS thanks to docker

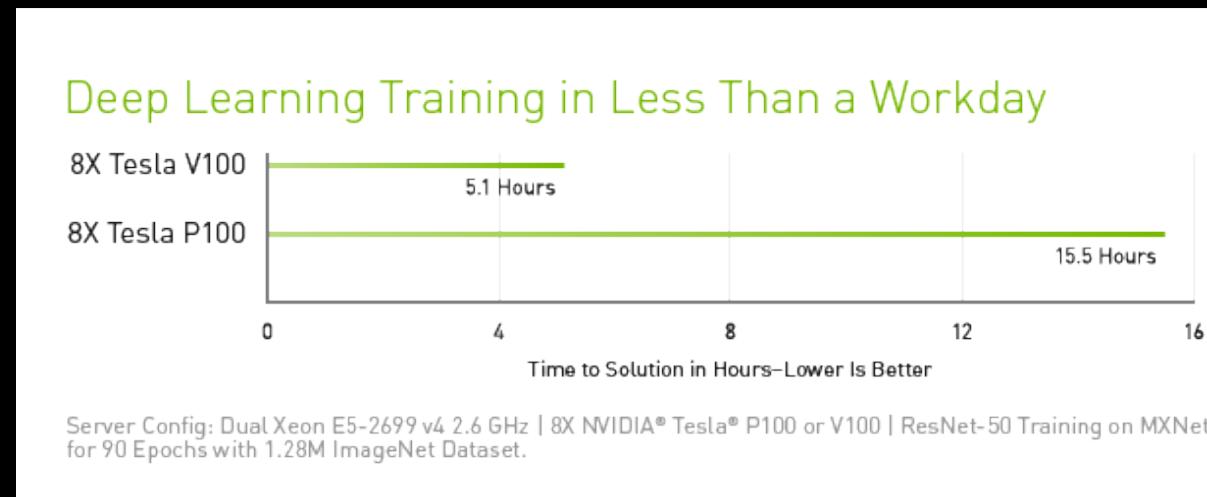
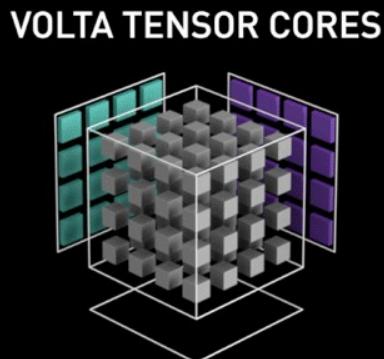
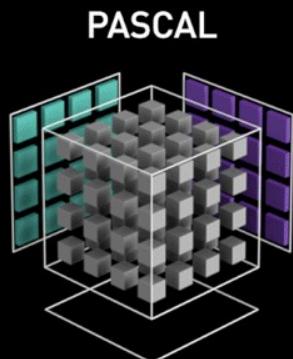
Want to know more?
Try it out, now:

<https://github.com/NVIDIA/nvidia-docker>



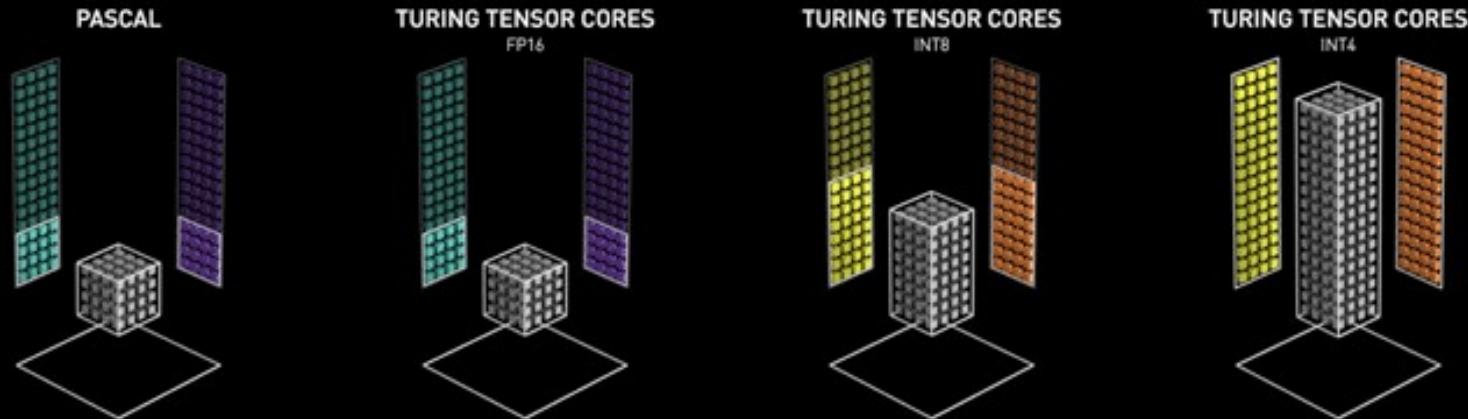
NVIDIA HARDWARE

Tensor cores in the NVIDIA Volta architecture



NVIDIA HARDWARE

Tensor cores in the NVIDIA Volta architecture



NVIDIA HEALTHCARE

Worldwide distributed team



DOES THIS SOUND INTERESTING?

NVIDIA Poland supports AI healthcare research

Do you want to get started in ML?

Check out our containers. They include examples and support all major frameworks.

Are you a researcher?

We sponsor research institutions doing exciting work and requiring a Tensor Core boost. We recently granted the University of Warsaw 35 Volta GPUs for research

Do you want to be part of our mission?

Just let me know! Send your cv at pribalta@nvidia.com or look for me in LinkedIn



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