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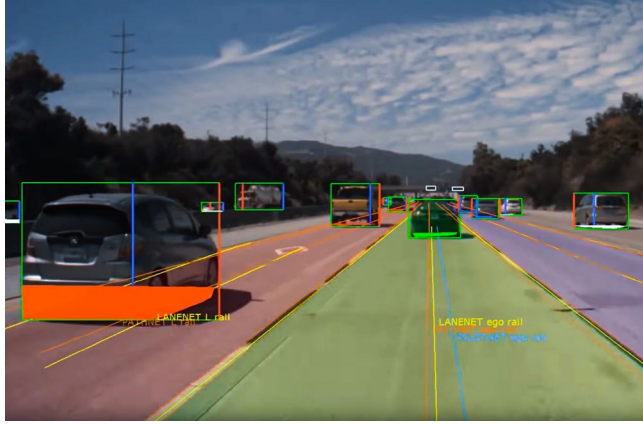

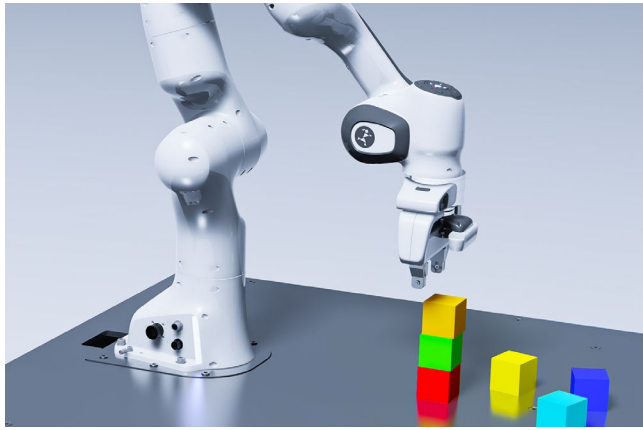

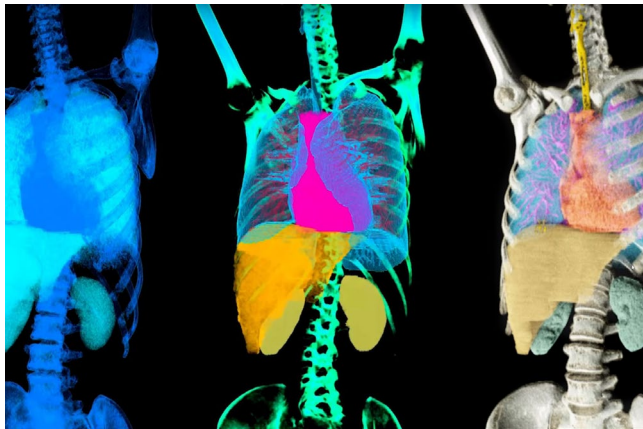

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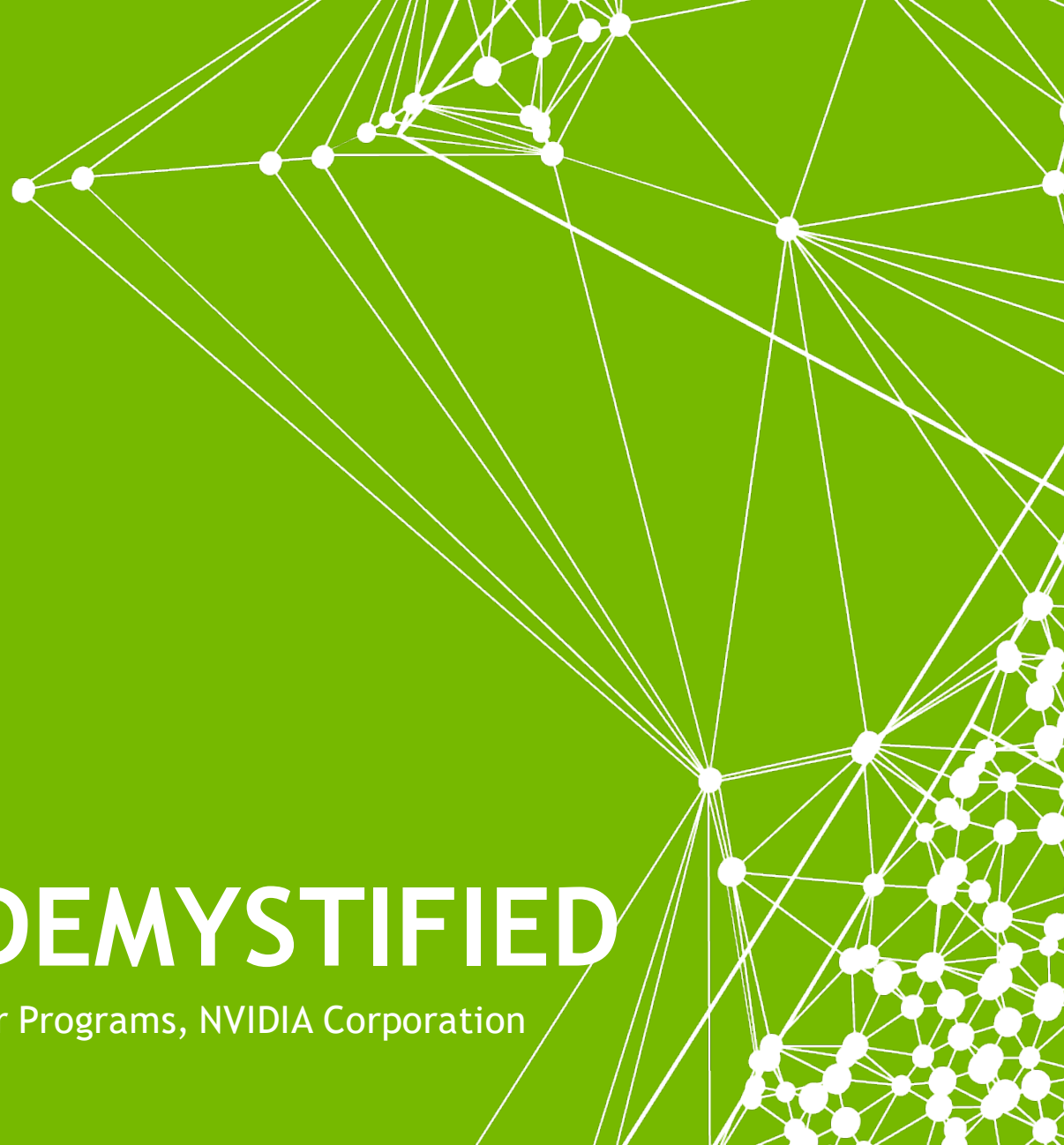


NVIDIA | DEEP LEARNING INSTITUTE

DEEP LEARNING DEMYSTIFIED

Will Ramey, Sr. Director, Global Head of Developer Programs, NVIDIA Corporation

ACCELERATED DATA SCIENCE

DATA ANALYTICS

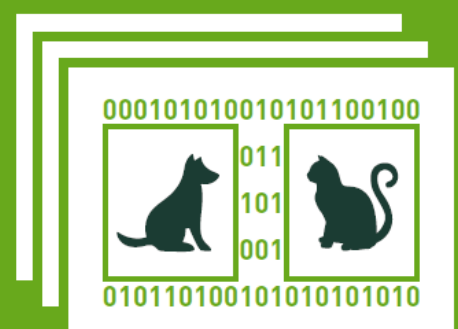
Extracting insights from big data

MACHINE LEARNING

Learning from examples in the data

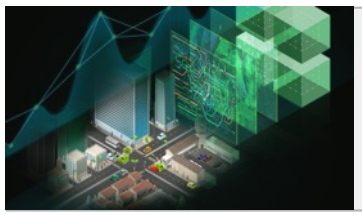
DEEP LEARNING

Automating feature engineering



GPU-ACCELERATED DATA SCIENCE

Use Cases in Every Industry

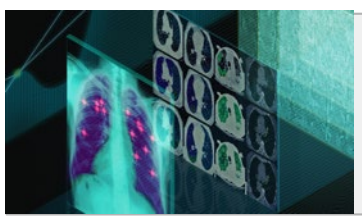


CONSUMER INTERNET

Ad Personalization
Click Through Rate Optimization
Churn Reduction

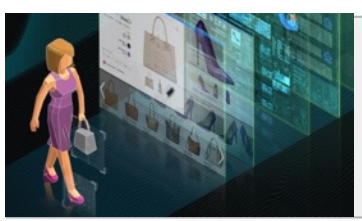
FINANCIAL SERVICES

Claim Fraud
Customer Service Chatbots/Routing
Risk Evaluation



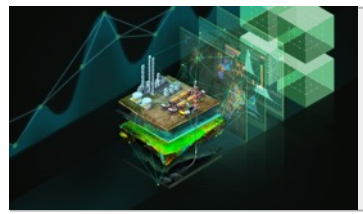
HEALTHCARE

Improve Clinical Care
Drive Operational Efficiency
Speed Up Drug Discovery



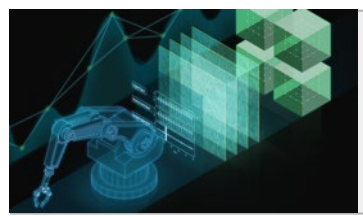
RETAIL

Supply Chain & Inventory Management
Price Management / Markdown Optimization
Promotion Prioritization And Ad Targeting



OIL & GAS

Sensor Data Tag Mapping
Anomaly Detection
Robust Fault Prediction



MANUFACTURING

Remaining Useful Life Estimation
Failure Prediction
Demand Forecasting

TELECOM

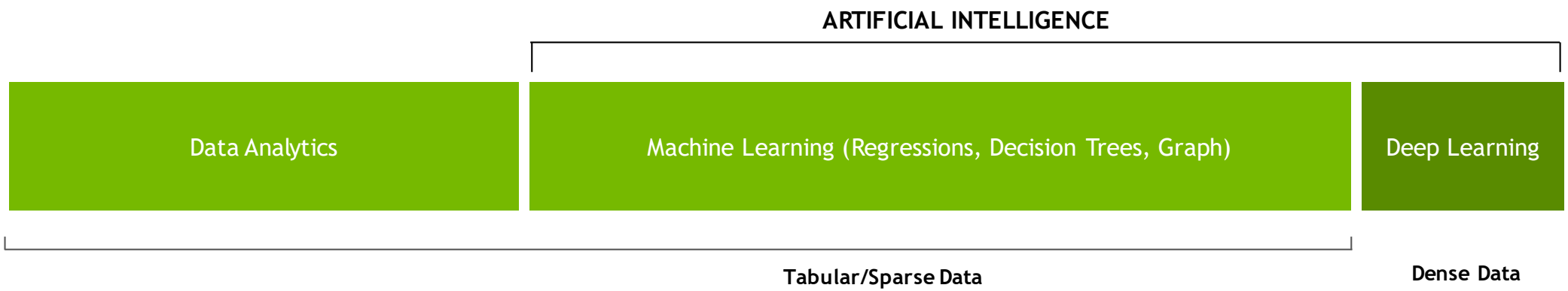
Detect Network/Security Anomalies
Forecasting Network Performance
Network Resource Optimization (SON)

AUTOMOTIVE

Personalization & Intelligent Customer Interactions
Connected Vehicle Predictive Maintenance
Forecasting, Demand, & Capacity Planning

BEYOND DEEP LEARNING

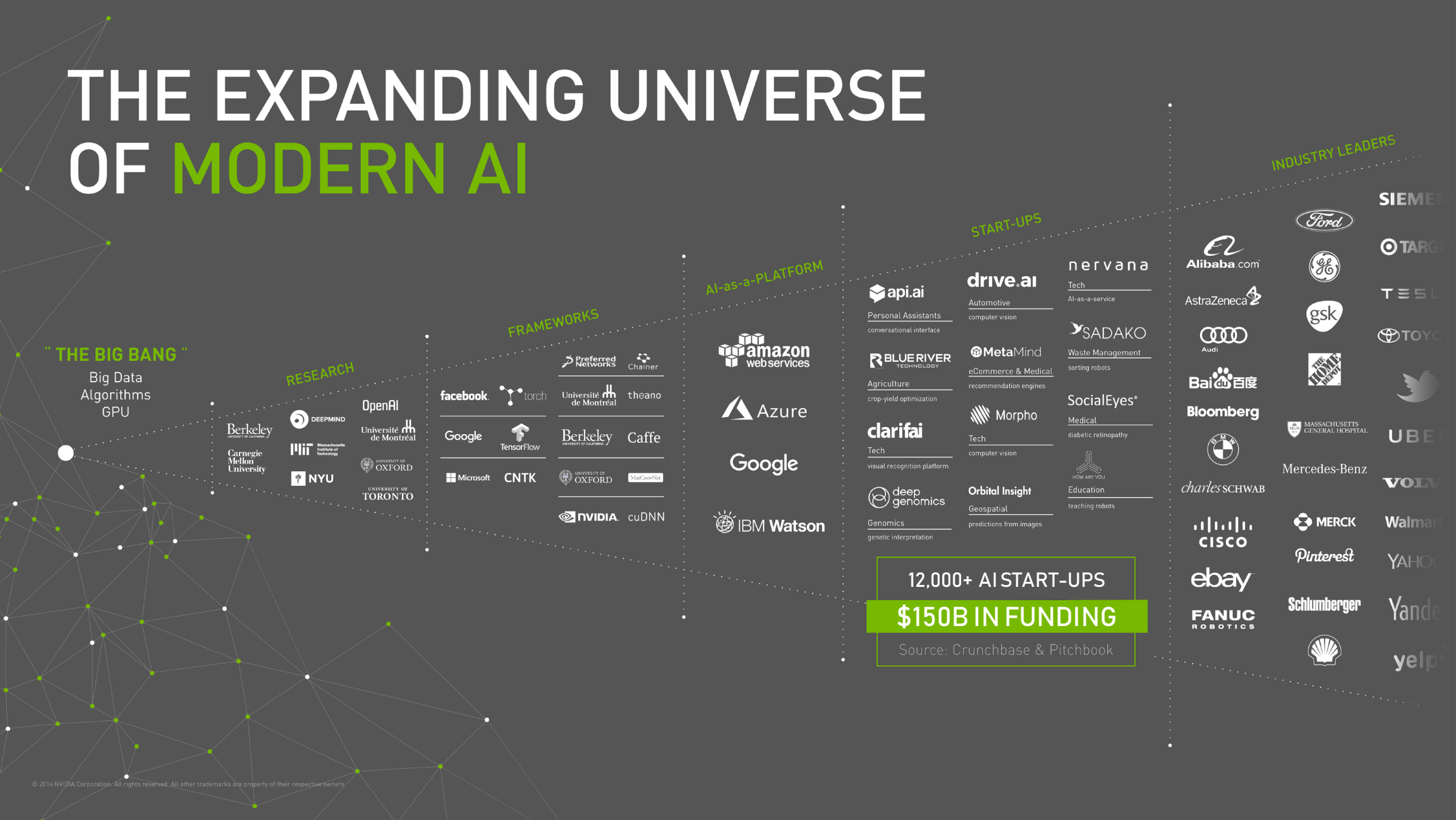
Opportunities to Accelerate Data Science



2.2 exabytes (2.2B GB) of data created daily – McKinsey

$260B annual revenue by 2022 for big data and business analytics – IDC

THE EXPANDING UNIVERSE OF MODERN AI



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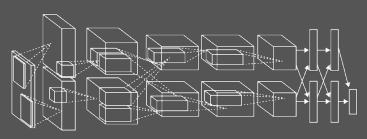
WHAT PROBLEM ARE YOU SOLVING?

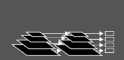
Defining the AI/DL task

INPUTS	BUSINESS QUESTIONS	AI / DL TASK	EXAMPLE OUTPUTS		
			HEALTHCARE	RETAIL	FINANCE
Text Data Images Video Audio	Is “it” **present** or not?	Detection	Cancer Detection	Targeted Ads	Cybersecurity
	What **type** of thing is “it”?	Classification	Image Classification	Basket Analysis	Credit Scoring
	To what **extent** is “it” present?	Segmentation	Tumor Size / Shape Analysis	Build 360° Customer View	Credit Risk Analysis
	What is the likely **outcome**?	Prediction	Survivability Prediction	Sentiment & Behavior Recognition	Fraud Detection
	What will likely satisfy the objective?	Recommendations	Therapy Recommendation	Recommendation Engine	Algorithmic Trading

CAMBRIAN EXPLOSION

Convolutional Networks





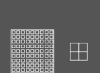
Encoder/Decoder

ReLu

BatchNorm

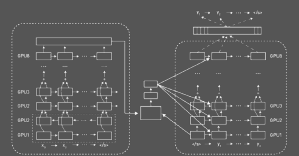
Concat

Dropout



Pooling

Recurrent Networks



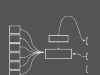
LSTM

GRU

Beam Search

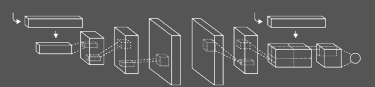
WaveNet

CTC



Attention

Generative Adversarial Networks



3D-GAN

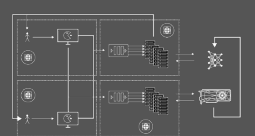
MedGAN

Conditional GAN

Coupled GAN

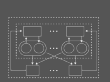
Speech Enhancement GAN

Reinforcement Learning



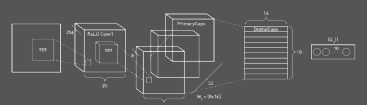
DQN

Simulation



DDPG

New Species



Mixture of Experts

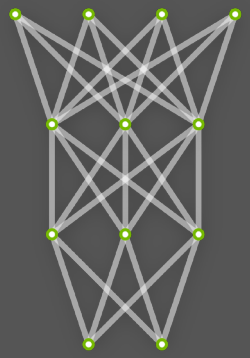
Neural Collaborative Filtering

Block Sparse LSTM

DEEP LEARNING APPLICATION DEVELOPMENT

DEEP LEARNING APPLICATION DEVELOPMENT

Untrained
Neural Network
Model

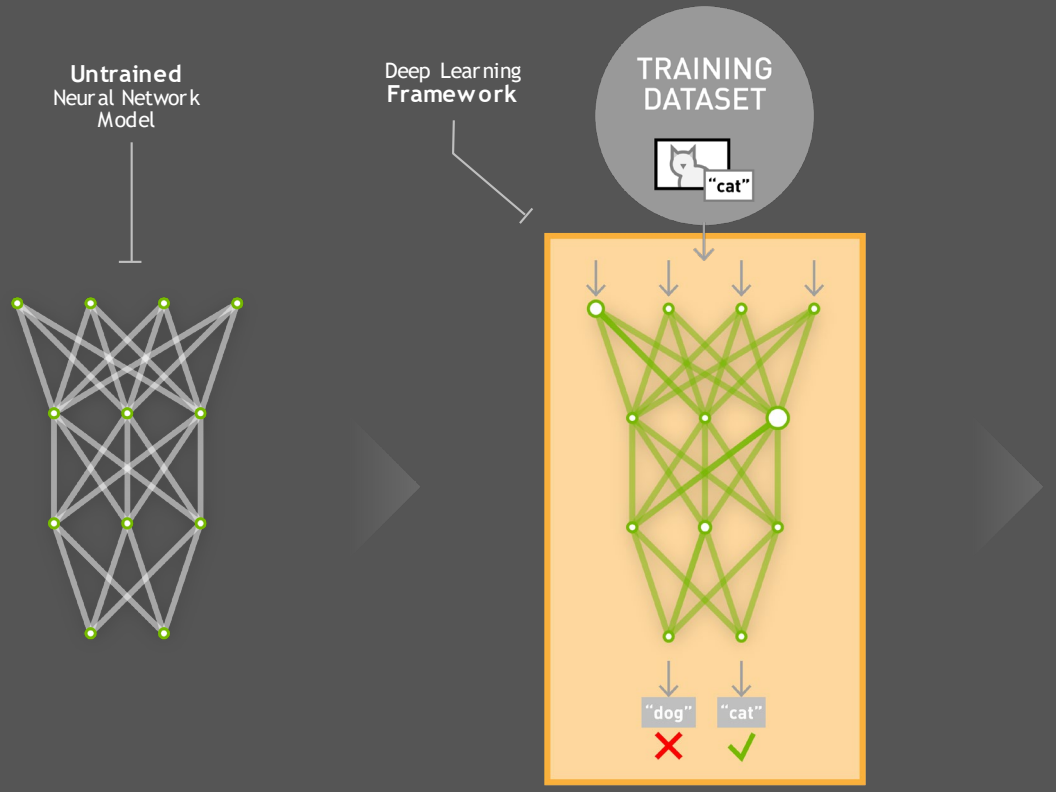


TRAINING
DATASET

DEEP LEARNING APPLICATION DEVELOPMENT

TRAINING

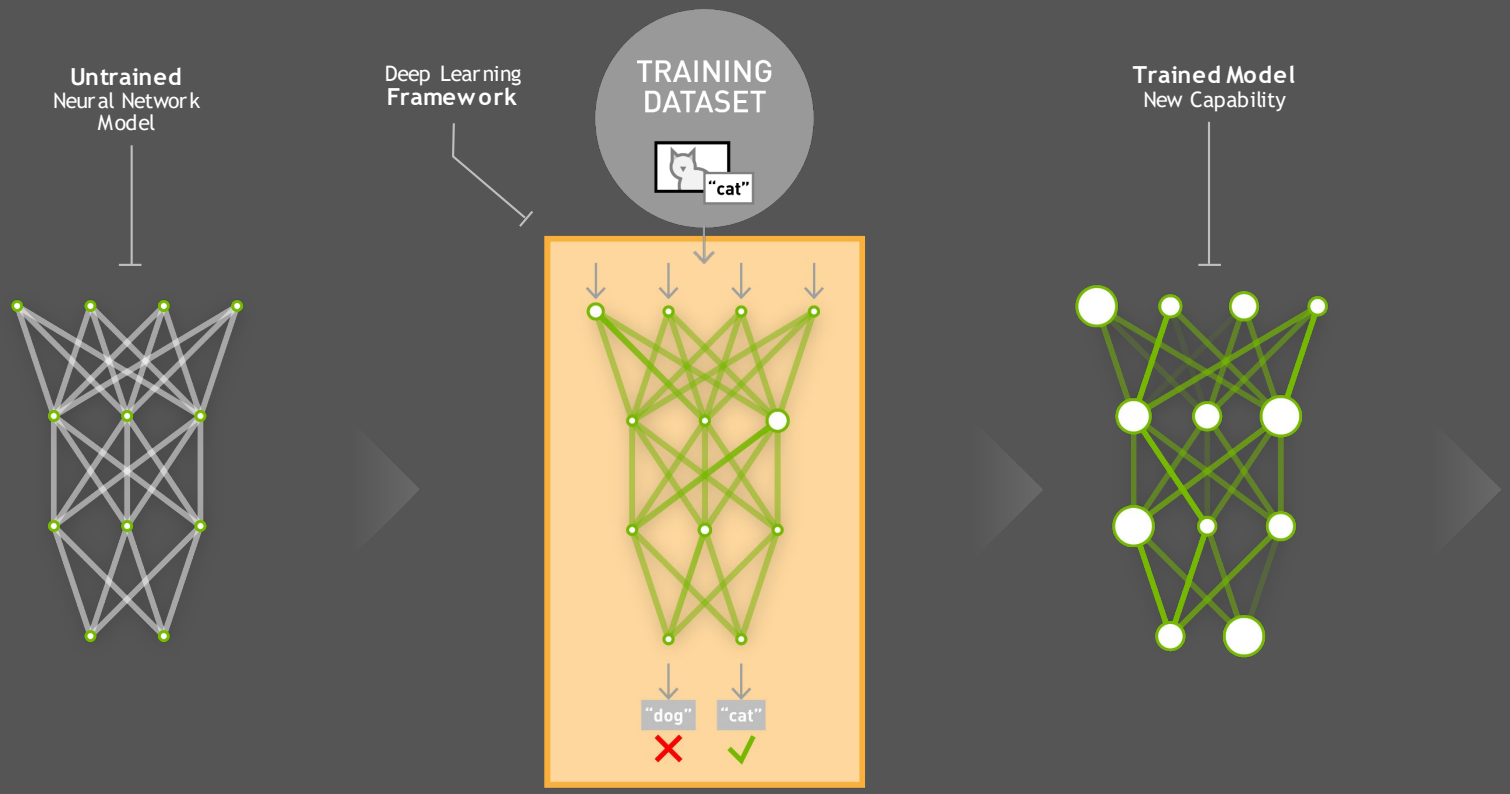
Learning a new capability
from existing data



DEEP LEARNING APPLICATION DEVELOPMENT

TRAINING

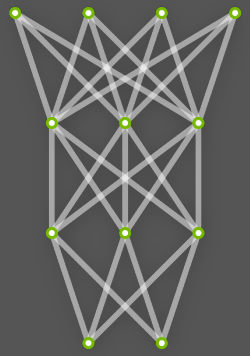
Learning a new capability from existing data



DEEP LEARNING APPLICATION DEVELOPMENT

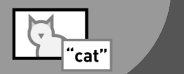
TRAINING
Learning a new capability
from existing data

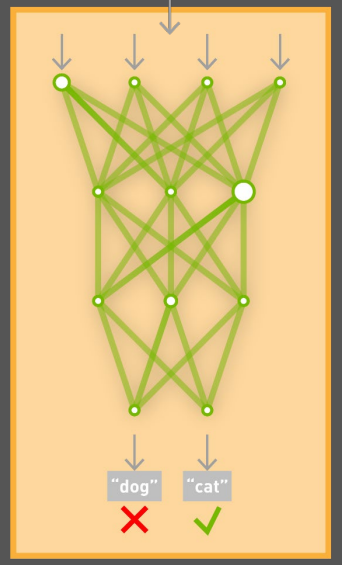
Untrained
Neural Network
Model



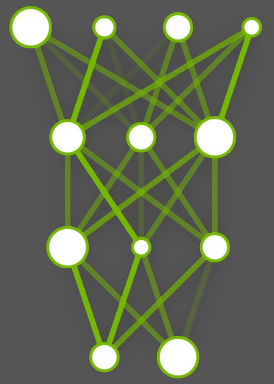
Deep Learning
Framework

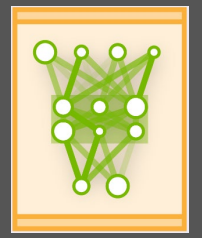
TRAINING
DATASET





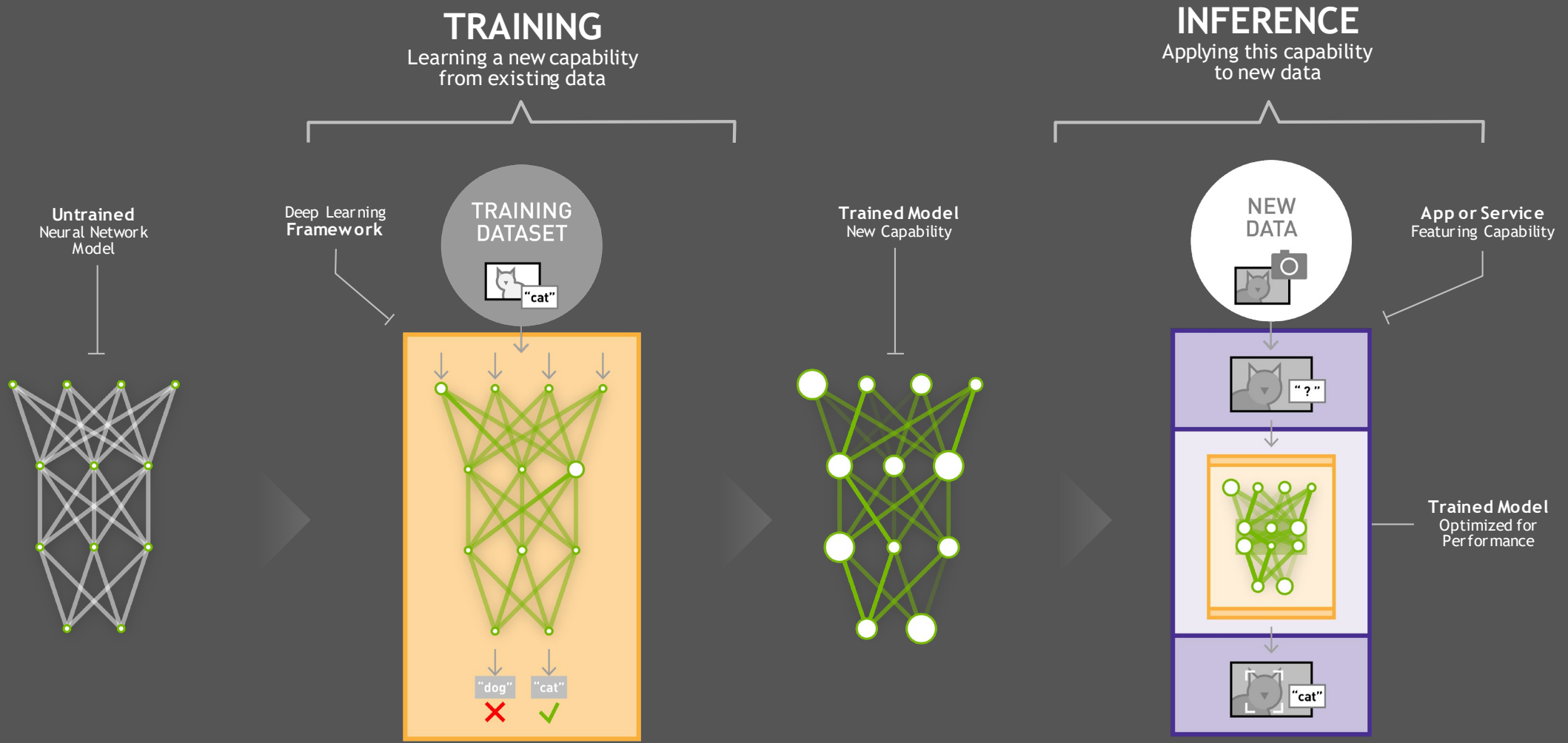
Trained Model
New Capability





Trained Model
Optimized for
Performance

DEEP LEARNING APPLICATION DEVELOPMENT



CHALLENGES

DEEP LEARNING NEEDS	WHY
New Skills	New computing model
Latest Algorithms	Rapid evolving
Fast Training	Impossible -> Practical
Deployment Platforms	Must be available everywhere

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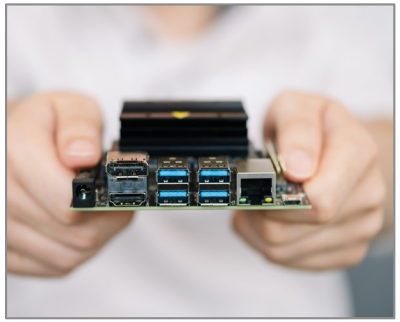
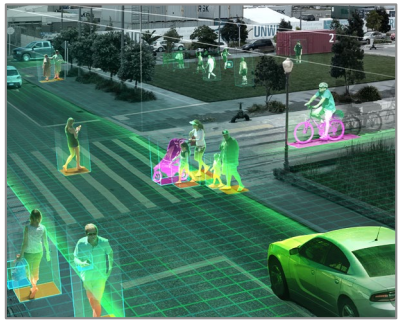
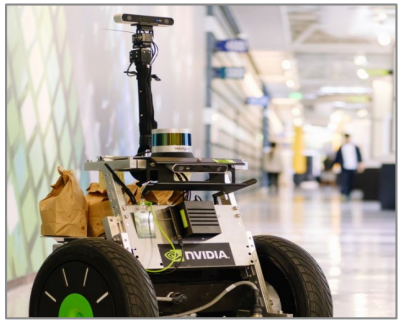


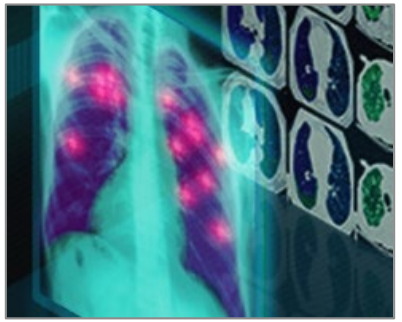
Getting Started with AI on Jetson Nano



Deep Learning for Intelligent Video Analytics

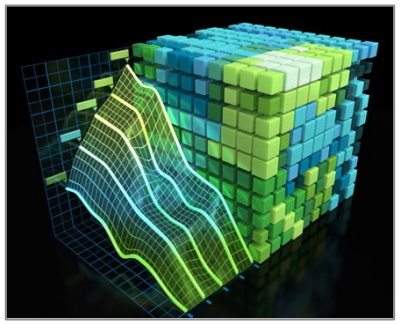


Deep Learning for Robotics



Deep Learning for Healthcare Image Analysis

Fundamentals of Accelerated Data Science with RAPIDS



Fundamentals of Accelerated Computing with CUDA Python

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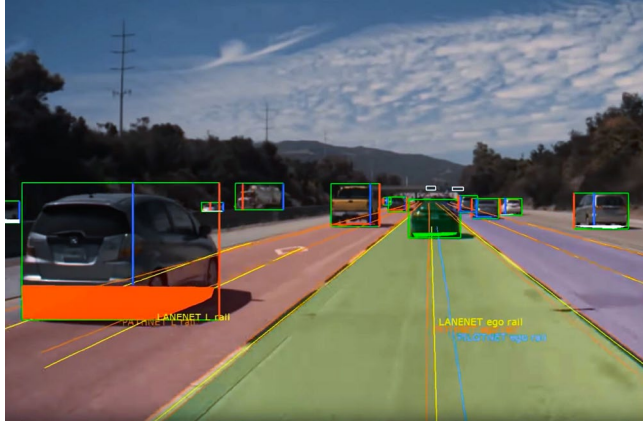

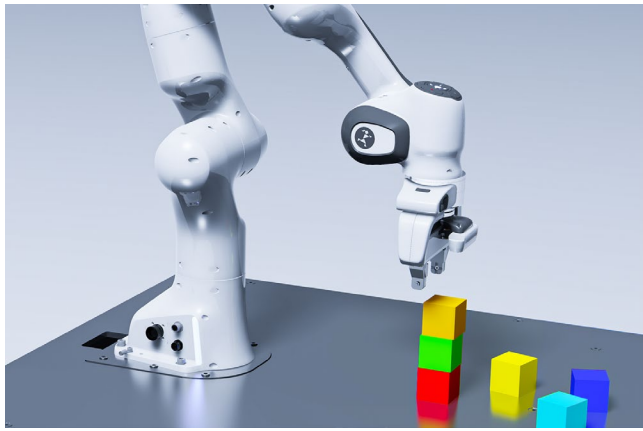

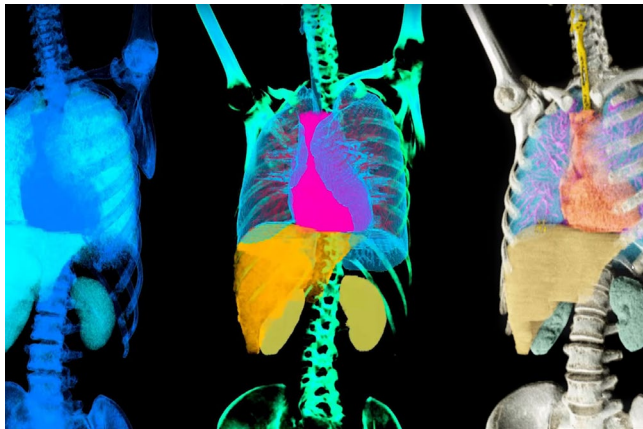

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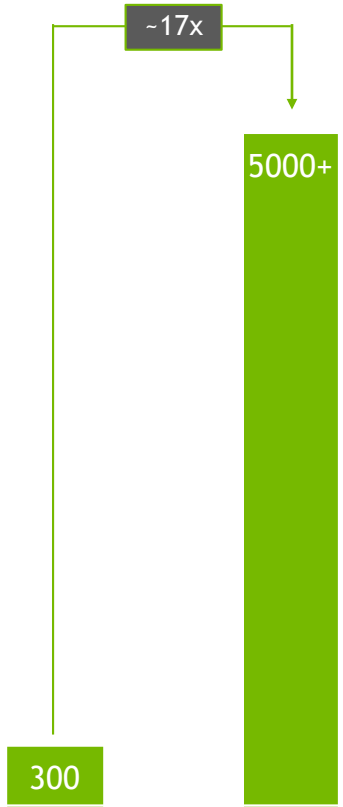

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TRAINING

Training Data

Data Management

Training

Model Assessment

Trained Neural Network

Caffe2 Chainer Microsoft Cognitive Toolkit mxnet PyTorch PaddlePaddle TensorFlow

INFERENCE

Data center

TensorRT

Embedded

JETPACK SDK

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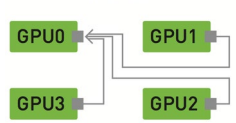
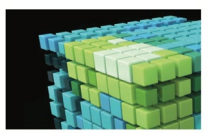
cuDNN

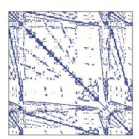
NCCL



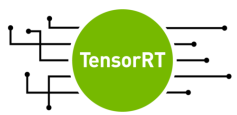
cuBLAS



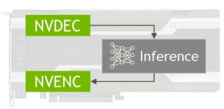
cuSPARSE



TensorRT



DeepStream SDK



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- SOTA across domains and popular frameworks
- Sample code to build and deploy your models

Secure & Reliable
- Scanned for vulnerabilities and crypto
- Tested on workstations, servers, cloud

Scalable
- Supports multi-GPU & multi-node systems

Runs Anywhere
- Multi-cloud, On-prem, Hybrid, Edge
- Bare metal, VMs, Kubernetes
- X86 & ARM

RECOMMENDERS	CONVERSATIONAL AI	VIDEO ANALYTICS	HEALTHCARE	RETAIL	MANUFACTURING	
						MORE…
Neural Collab. Filtering, Variation Autoencoder	Jasper, Tacotron, WaveGlow, GNMT	Object Detection, Image Classification	Clara, BioBERT,	BERT, Transformer	Defect Detection, Predictive Maintenance	

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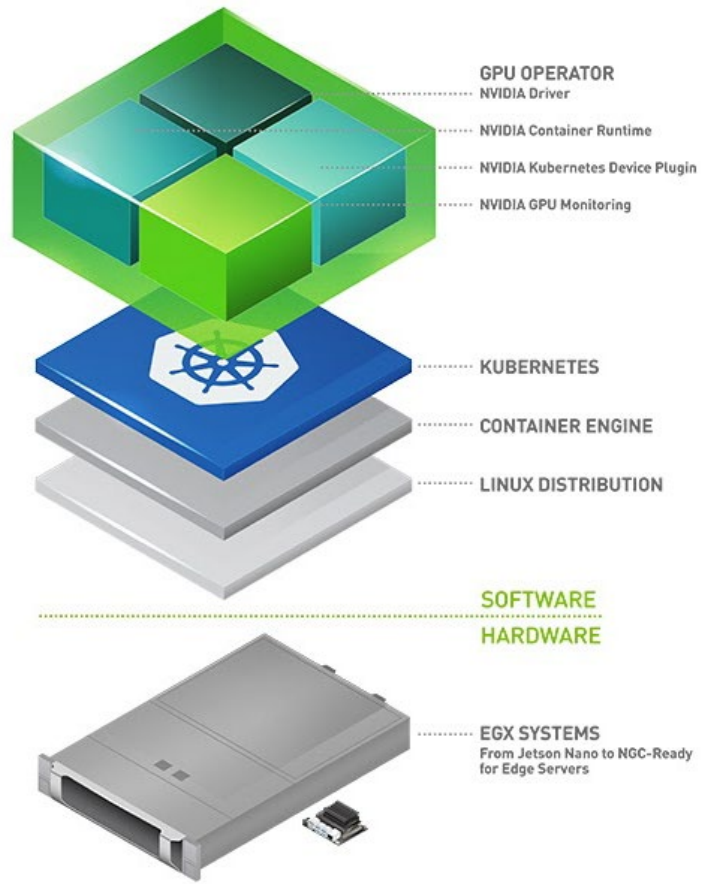
NVIDIA EGX PLATFORM

AI Scalability from Edge to Data Center

Securely deploy and manage containerized AI frameworks and applications, including NVIDIA TensorRT™, TensorRT Inference Server, and DeepStream

Includes Kubernetes plug-in, container runtime, NVIDIA drivers, and GPU monitoring

Optimized for NGC-Ready Edge Systems, from Jetson Nano to GPU servers in the cloud or datacenter



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END-TO-END PRODUCT FAMILY

HPC / TRAINING

NVIDIA GPU CLOUD

INFERENCE

FULLY INTEGRATED AI SYSTEMS

DGX-1

DGX-2

DESKTOP

TITAN

WORKSTATION

DGX Station

VIRTUAL WS

Virtual GPU

DATA CENTER

Tesla V100

SERVER PLATFORM

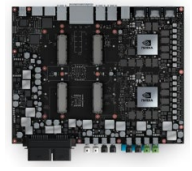
HGX1/HGX2

DATA CENTER

Tesla T4

Tesla V100

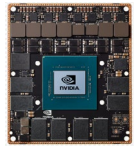
AUTOMOTIVE



Drive AGX Pegasus

EMBEDDED

Jetson Nano



Jetson AGX Xavier

SOLUTIONS

DEEP LEARNING NEEDS	SOLUTIONS
New Skills	Deep Learning Institute, GTC
Latest Algorithms	GPU Accelerated Frameworks, DL SDK
Fast Training	DGX, V100, TITAN V
Deployment Platforms	TensorRT, NGC, EGX, V100/T4, Drive AGX, Jetson AGX

READY TO GET STARTED?

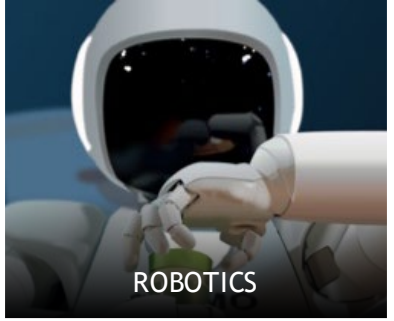
Project Checklist

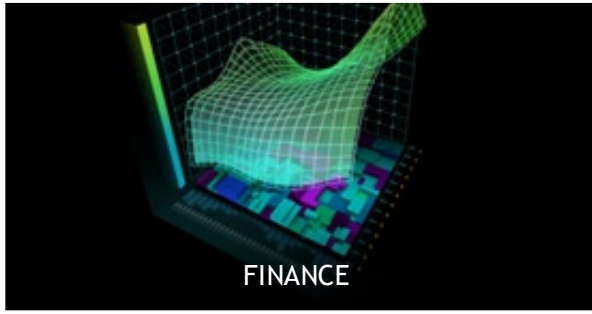
What problem are you solving,
what are the AI/DL tasks?

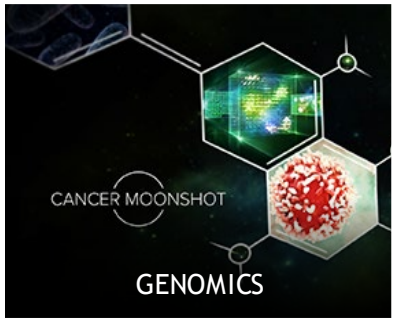
What data do you have/need,
how is it labeled?

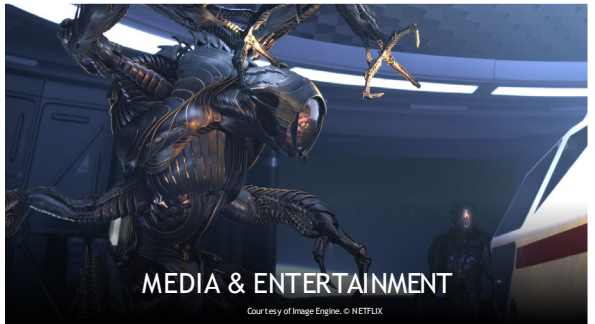
Which tools & environment will you use?

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









WHAT'S NEXT?

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Join the Developer Program	developer.nvidia.com/join
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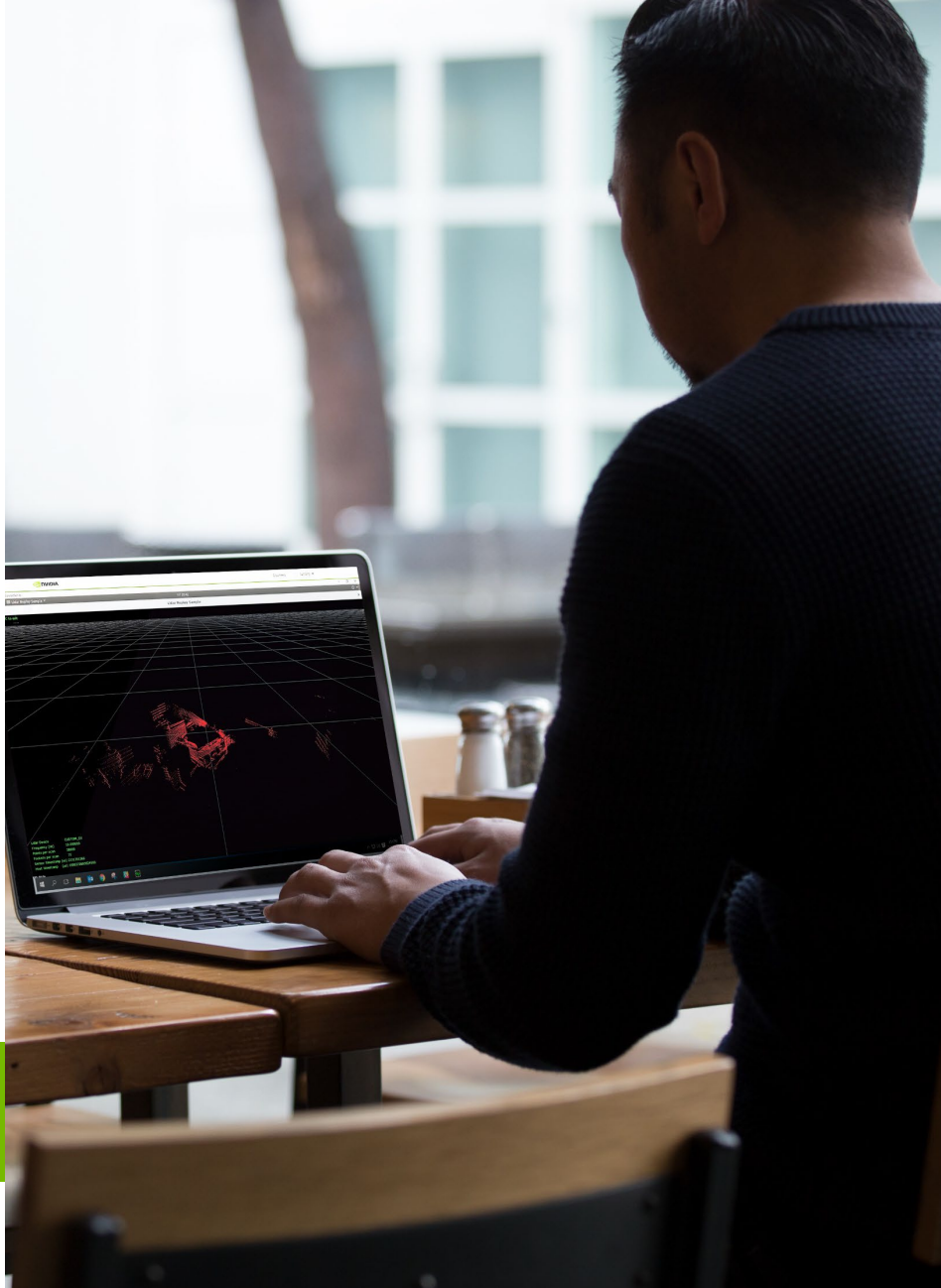
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