

Artificial Intelligence 101

A brief overview:

Machine Learning
Deep Learning
Data Science

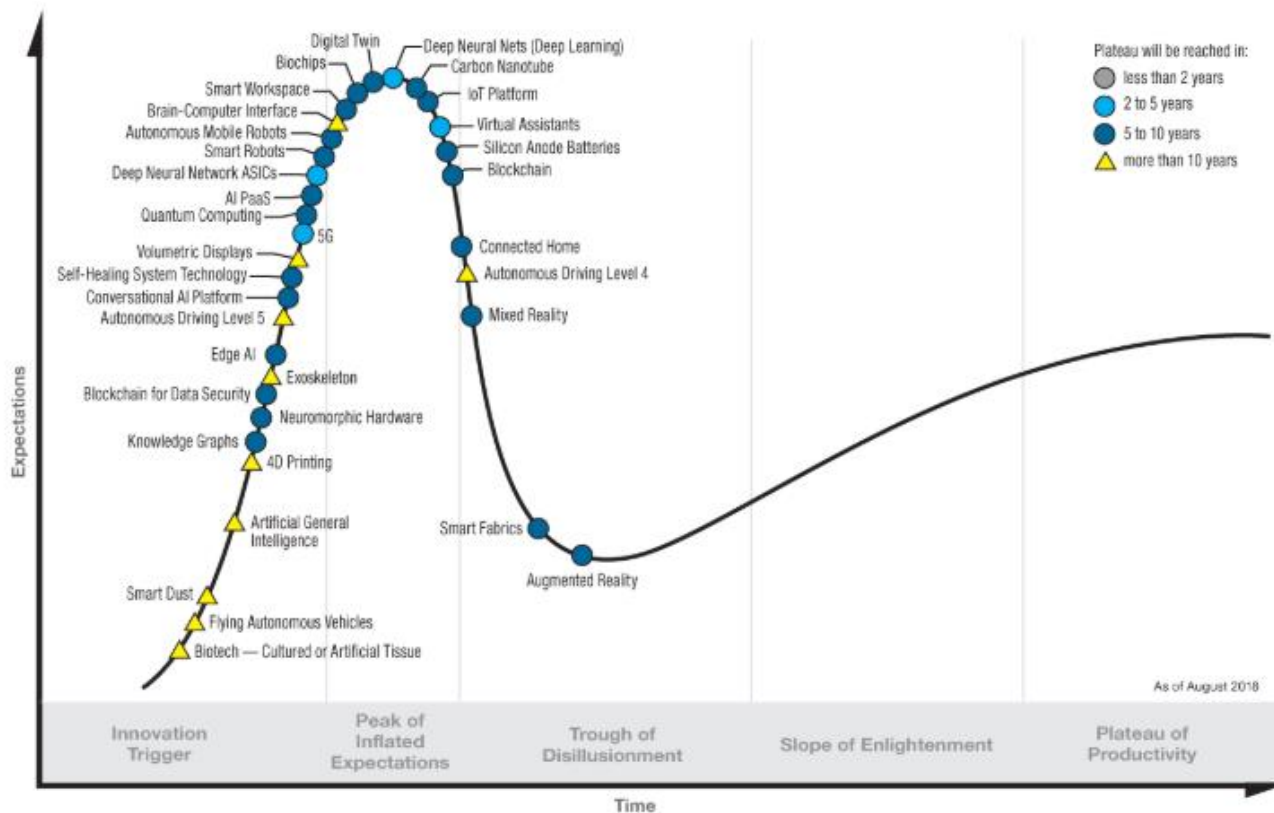
christian.schramm@dell.com

images courtesy of their respective owners

DELLEMC

What does Gartner say?

The Gartner Hype Cycle

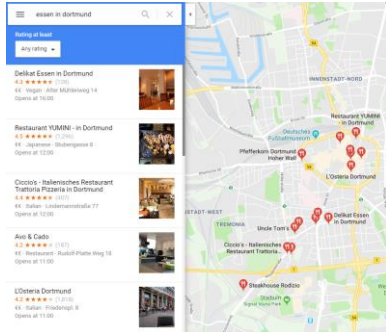
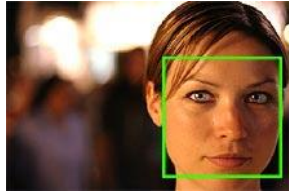


Voices on Artificial Intelligence

- „AI is the new electricity“ (Andrew Ng)
- McKinsey estimates the global market to be 13\$ trillion in 2030.
- AI already has a lot of applications today

AI is everywhere already

Have you been driving a car lately?






Frequently bought together

Total price: EUR 375,66
[Add both to Basket](#)

One of these items is dispatched sooner than the other. [Show details](#)

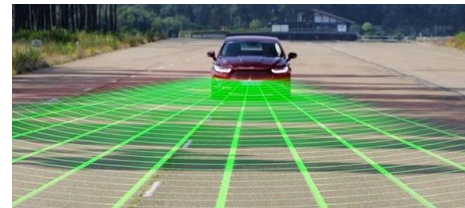
This item: Dell 210 AHJK U2417H (InVivo) Tyedge Monitor 61 cm (24 inches) EUR 226,00
Dell Bozz USB 3.0 Black (Gen 1) Type C Replicator Docking Station for Laptop EUR 149,66

Sponsored products related to this item

 Invision Monitor Arms ★★★★☆ 186 €69,99 /prime	 JOHNWILL 4K 15,6 Zoll Touchpanel Monitor FHD 3840 x 2160 IPS LCD-Monitor mit HDMI-EL... ★★★★★ 1672 €106,4 /prime	 AmazonBasics Laptop Sleeve ★★★★★ 1672 €10,64 /prime
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artificial intelligence

- ai artificial intelligence
- applications of artificial intelligence
- advantages of artificial intelligence
- history of artificial intelligence
- machine learning vs artificial intelligence
- google artificial intelligence
- types of artificial intelligence
- elon musk artificial intelligence
- allen institute for artificial intelligence
- artificial intelligence



Artificial Intelligence

Drilling down

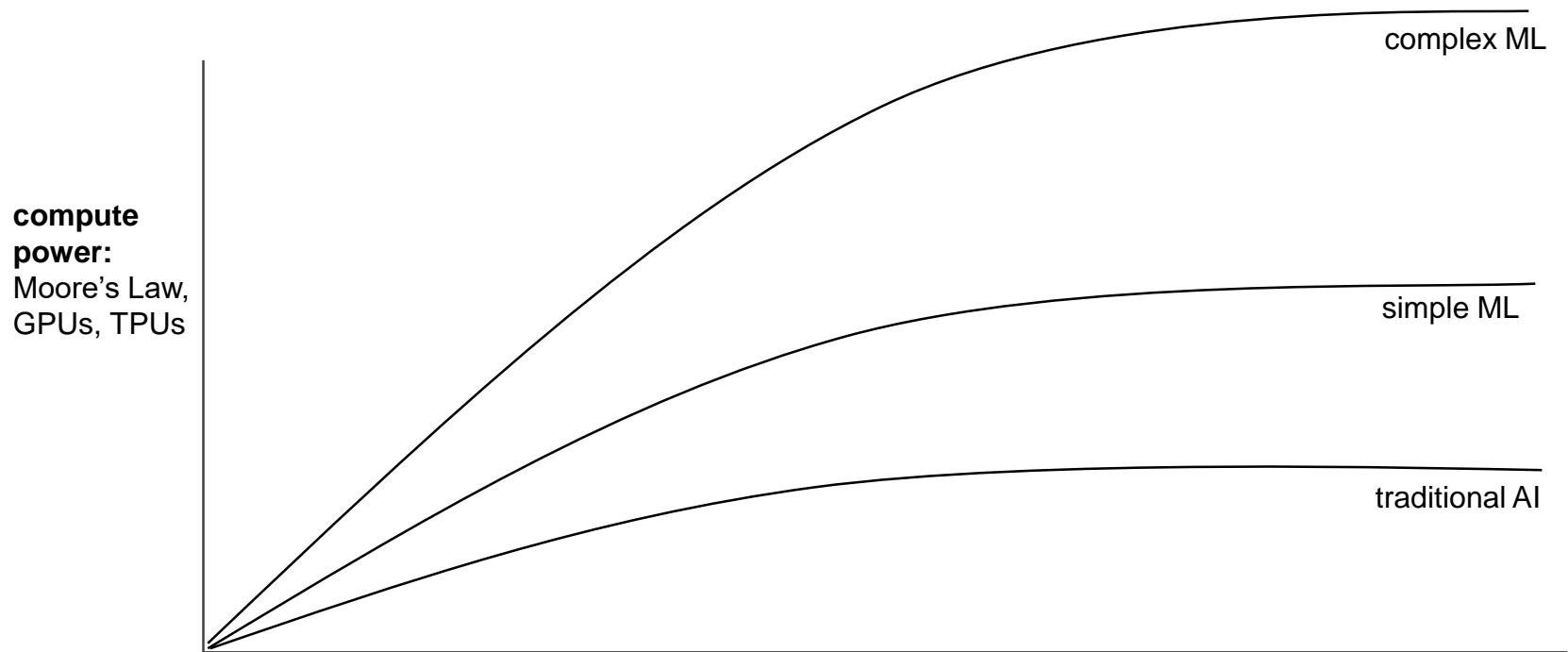
- **artificial near intelligence**
 - play games (Go), drive cars, recommend movies, show ads
 - great progress in specialized areas

- **artificial general intelligence**
 - mimic human behavior
 - world domination ... of course
 - next to no progress



Why does this happen?

Explosive development of data and compute power



data: 90% of all data known to mankind is less than 24 months old: media files in social networks, IoT etc.

Accelerated development

Picking up speed

traditional programming



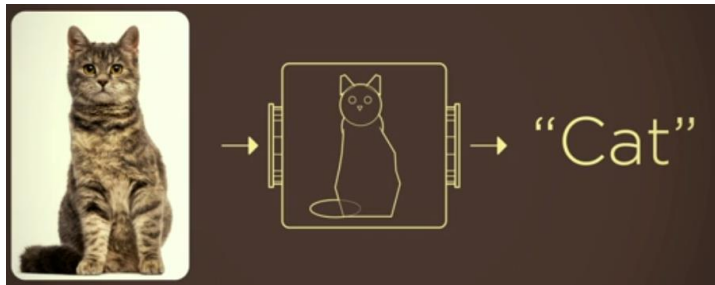
machine learning



easy-to-use frameworks: Tensorflow, Keras, PyTorch etc.

The mathematical approach is insufficient

by programming:



how humans learn



result?

teaching computers:
ImageNet (2007): 15m images in 22,000 categories

A brief overview

30.000 feet and counting

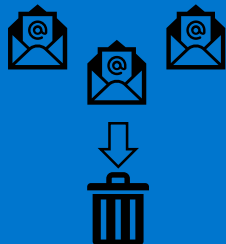
1940s

Artificial Intelligence:
Mimicking human behavior



1980s

Machine Learning:
Subset of AI, uses statistical methods to enable machines to improve with experience



2010s

Deep Learning:
Subset of ML, computation based on multi-layer neural networks



AI and Data Science

Complementary subjects

Machine Learning:

“Field of study that gives computers the ability to learn without being explicitly programmed” (Samuel Arthur, 1959)

Data Science:

“extracts knowledge and insights from data”

May go hand in hand:

findings derived through data science may be used by machine learning, e.g. explore customer base and act upon results

Artificial Intelligence

Drilling down

Supervised Learning:

Known inputs, known outputs. Apply derived knowledge to new data.

Unsupervised Learning:

Unknown data, “make sense” of it
anomaly detection: monitoring, credit card fraud

Reinforcement Learning:

Touches both SL and UL, learning through trial and error

Supervised Learning

The simplest of the three and the most common

Regression:

Output is a numerical value, like a forecast

Classification:

Output is the probability of being part of a category (cat or dog?)

Supervised Learning classification

input: manually labelled data

output: probability of an object being a cat or a dog



96% "dog"



87% "cat"



54% "cat"

Accelerated development

Results without understanding the data behind it

Input: raw data

Index	Sample code numb	Clump Thickness	Uniformity of Cell Size	Uniformity of Cell Shape	Marginal Adhesion	Single Epithelial Cell Size	Bare Nuclei	Bland Chromatin	Normal Nucleoli	Mitoses	Class
0	1000025	5	1	1	1	2	1	3	1	1	2
1	1002945	5	4	4	5	7	10	3	2	1	2
2	1015425	3	1	1	1	2	2	3	1	1	2
3	1016277	6	8	8	1	3	4	3	7	1	2
4	1017023	4	1	1	3	2	1	3	1	1	2
5	1017122	8	10	10	8	7	10	9	7	1	4

Output: 95,6% accurate

	0	1
0	84	3
1	3	47

Unsupervised Learning

Let the algorithm make sense of all the data

Clustering:

Input is data that has no labels, no classification and no category

Output is “some kind of structure”

Association:

Output is the discovery of rules between data point.

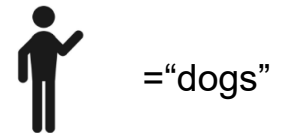
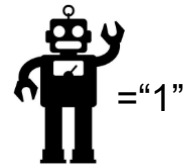
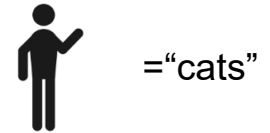
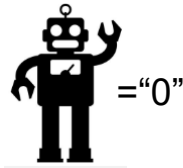
“People who bought A also bought B”

Unsupervised Learning

Same thing, but different

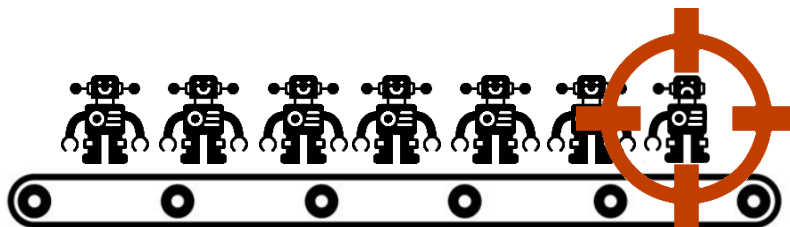
input: unlabeled data

output: grouped images based on visual similarity

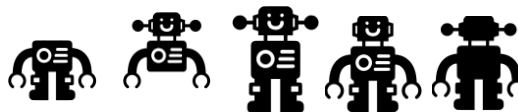


Anomaly detection

Supervised versus Unsupervised Learning



Supervised Learning
is pre-trained

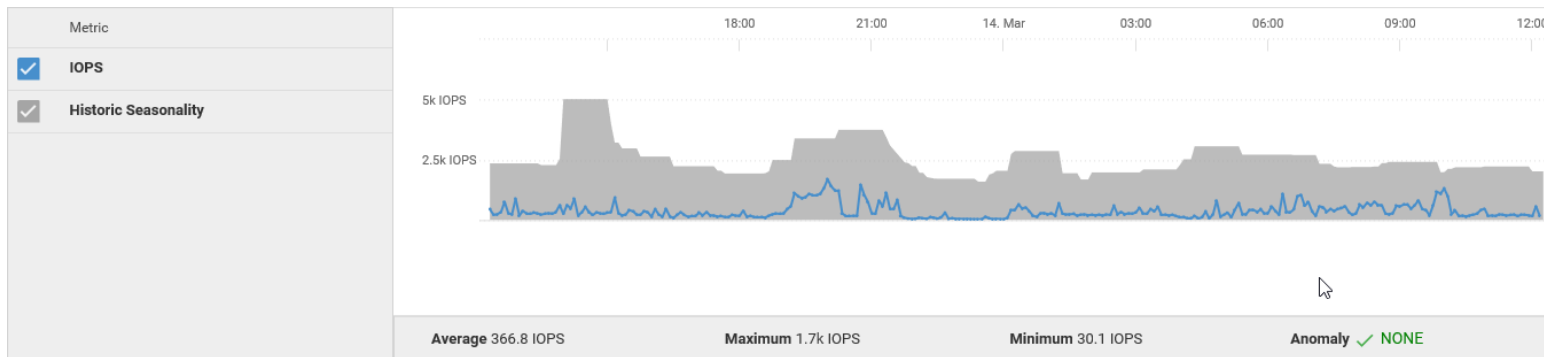


Unsupervised Learning
Algorithms detects exceptions. Anything but this:



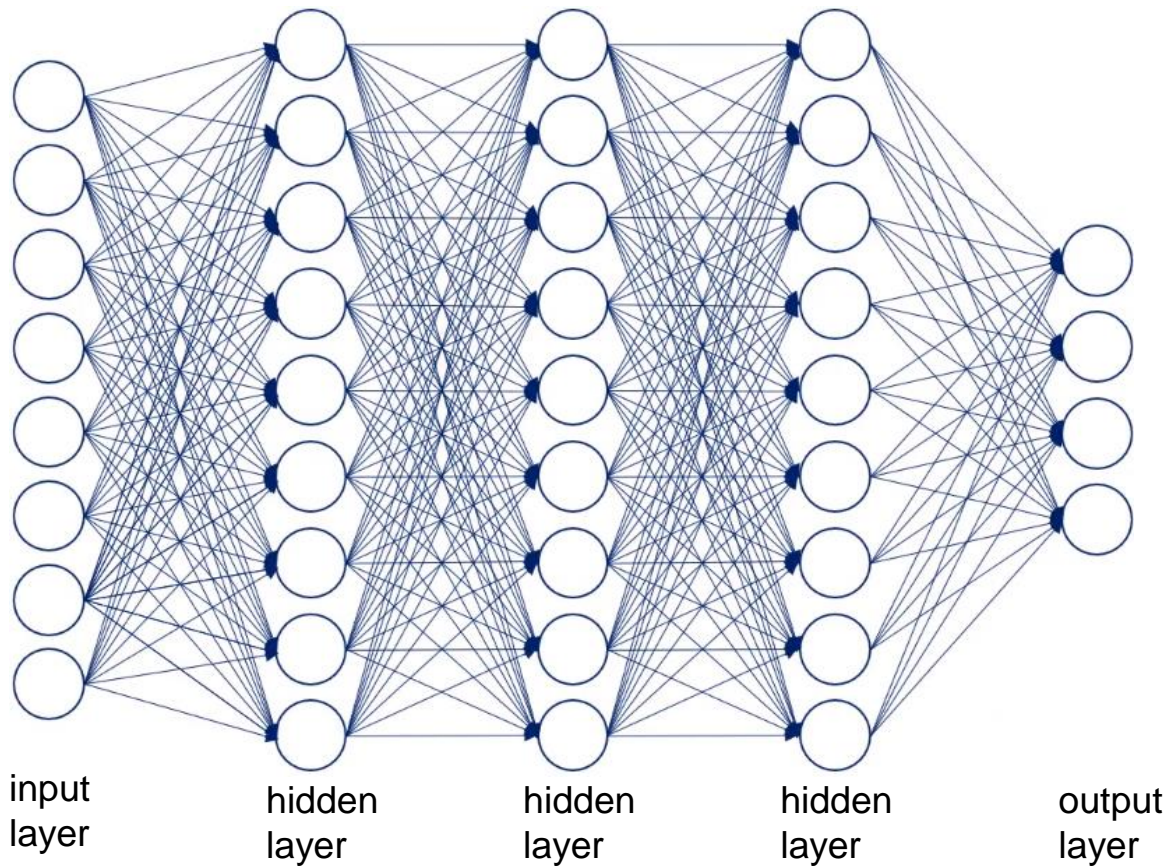
Anomaly detection

CloudIQ: Dell EMC's fitness tracker



Deep Learning

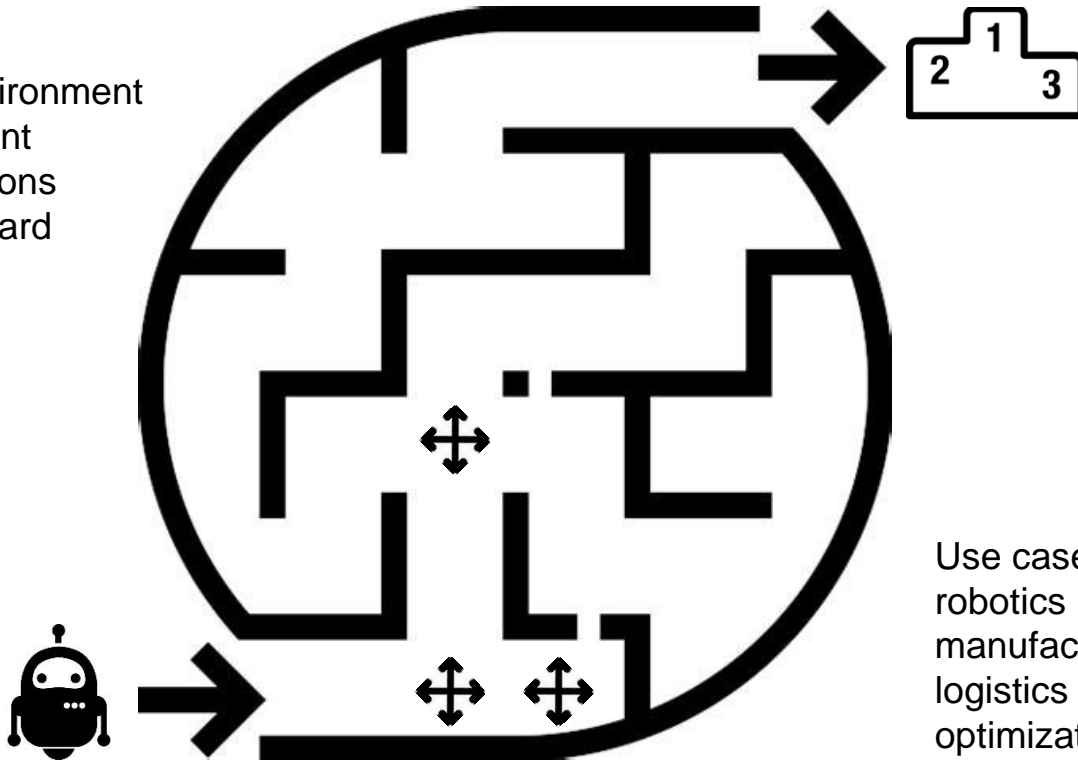
avg. temperature
min. temperature
max. temperature
humidity
precipitation
atmospheric pressure
cloud cover
visibility



Reinforcement Learning

Roomba

environment
agent
actions
reward



Use cases:
robotics
manufacturing
logistics
optimization



Dell EMC and Nvidia

Architecture for AI

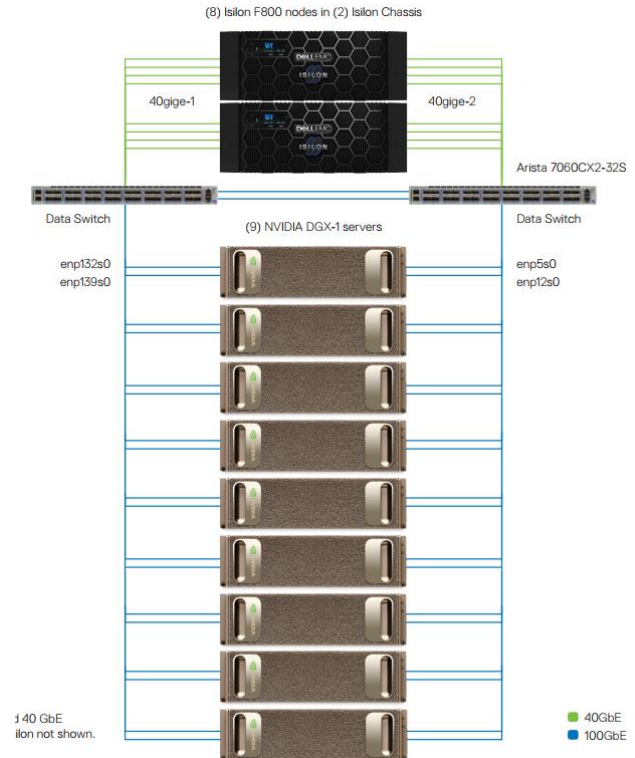
DELL EMC Deep Learning with NVIDIA

From AI-possible to AI-ready. Built to use GPUs for parallel processing for deep learning

NVIDIA Tesla GPUs + Dell EMC VxRAIL HCI Appliance



DELL EMC



Ready solutions for AI

Validated stack built to handle most demanding AI workloads

Deep Learning with



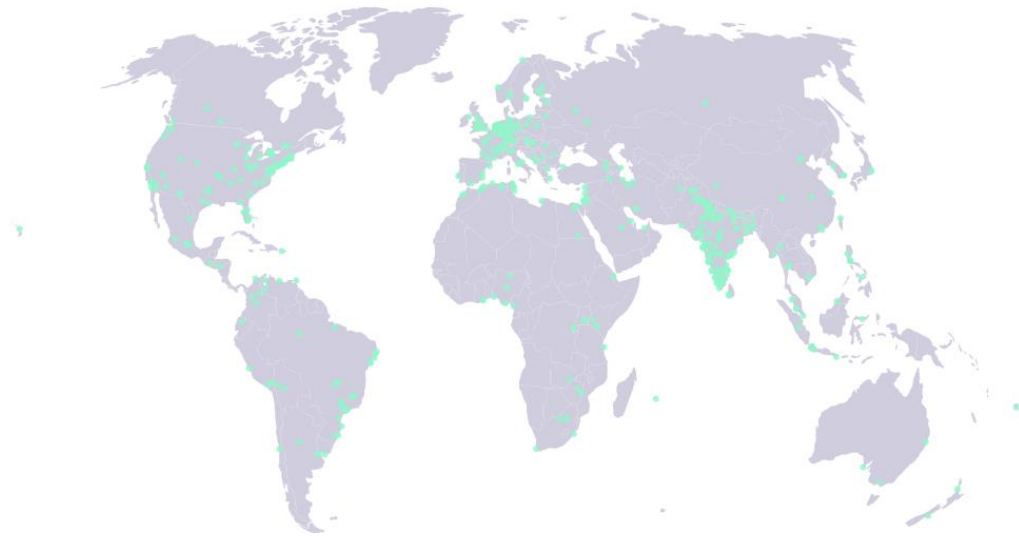
Machine Learning with



- Self-service for data scientists
- Selection of AI frameworks & libraries
- Industry-leading, scale-out architecture
- Single point of support

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