

Introduction of Artificial Intelligence

22 July 2020

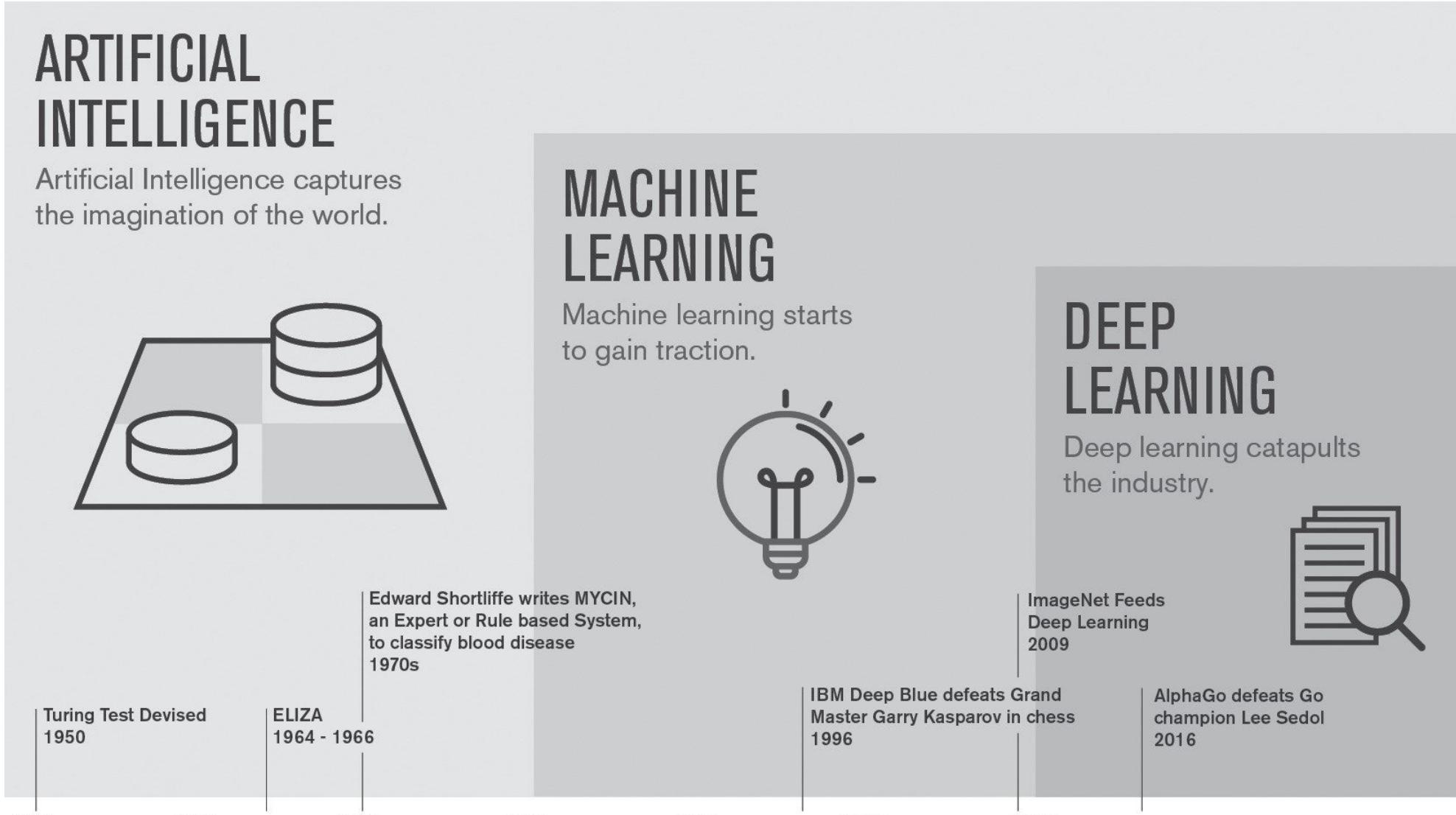
Presented by Red Hsu



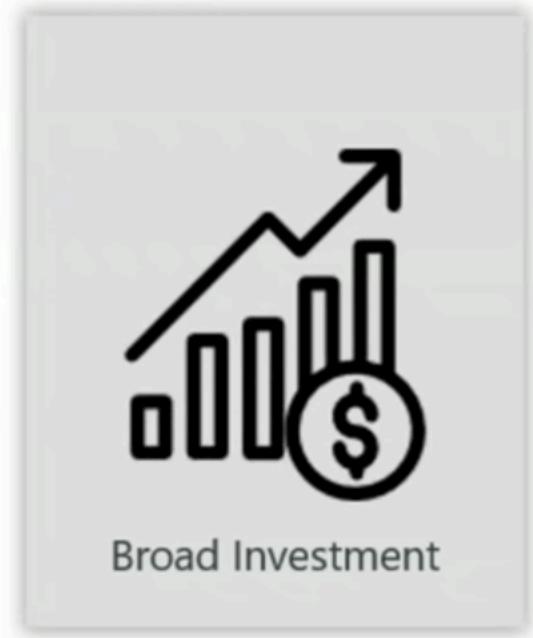
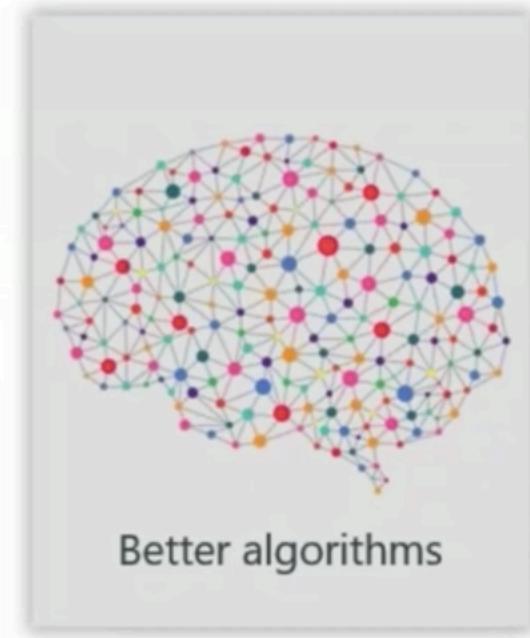
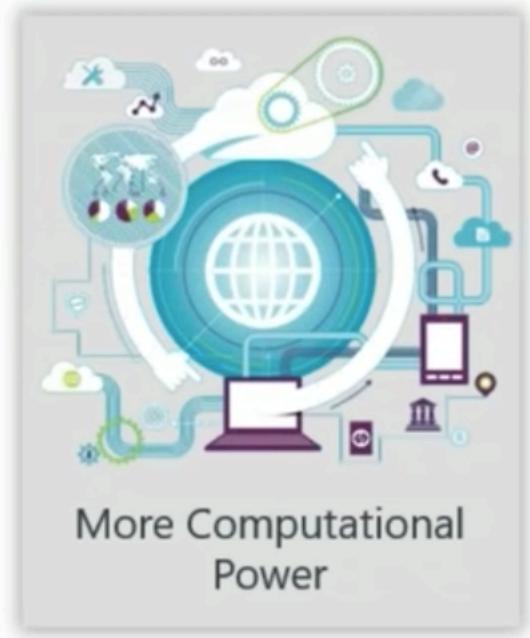
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- ▶ Introduction of AI
- ▶ What is artificial intelligence?
- ▶ AI applications
- ▶ Machine Learning
- ▶ Deep Learning
- ▶ Neural Networks
- ▶ Natural Language Processing

History of A.I.



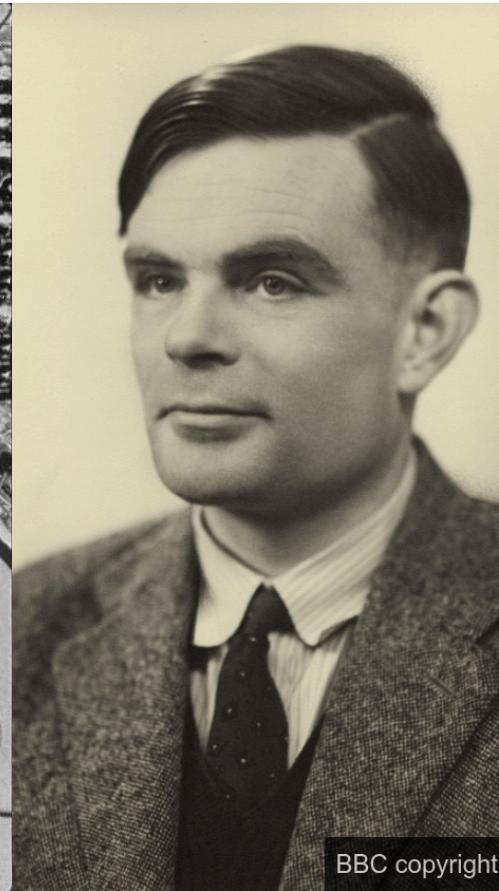
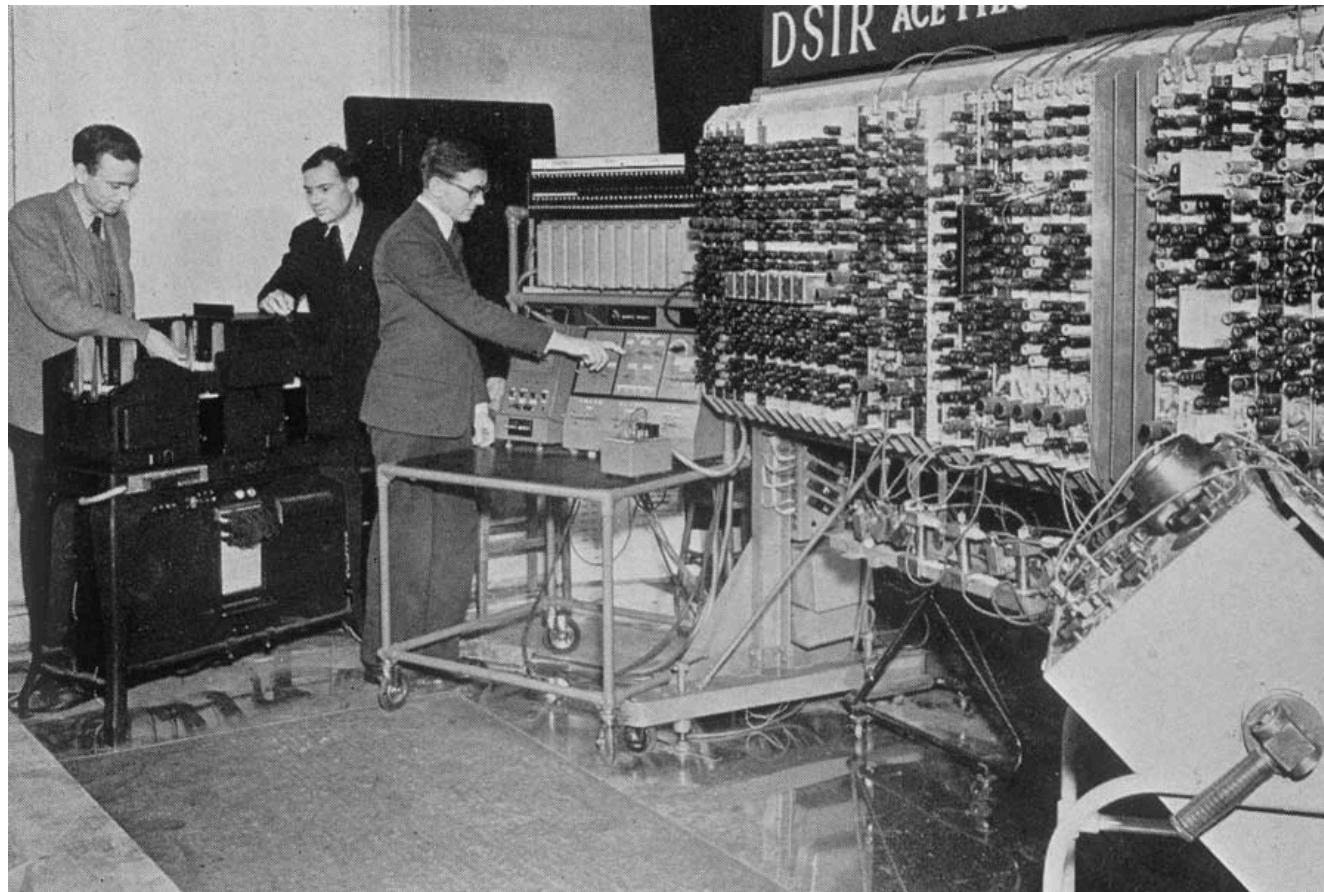
Demand for A.I.



What is Artificial Intelligent?



Alan Turing & BOMBE



Alan Turing
1912 – 1954

1912 Alan Mathison
Turing was born in West London

1936 Produced “On Computable Numbers”, aged 24

1952 Convicted of gross indecency for his relationship with a man

2013 Received royal pardon for the conviction

Source: BBC

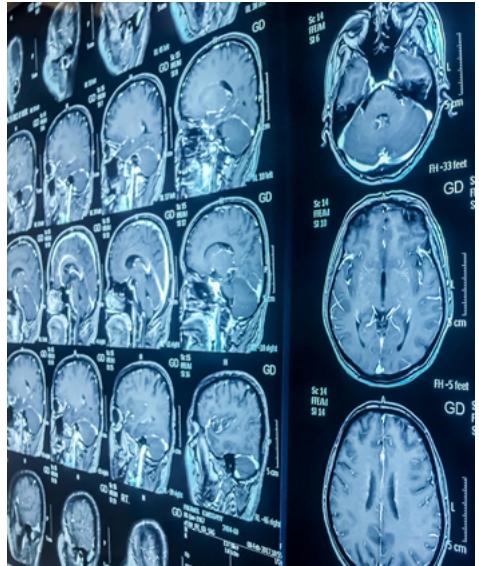
The Turing test



Chinese Room Argument



A.I. Application – Healthy Care



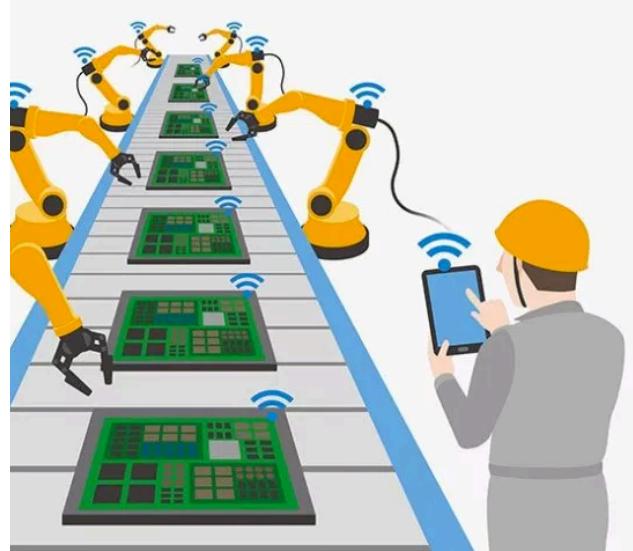
Radiology



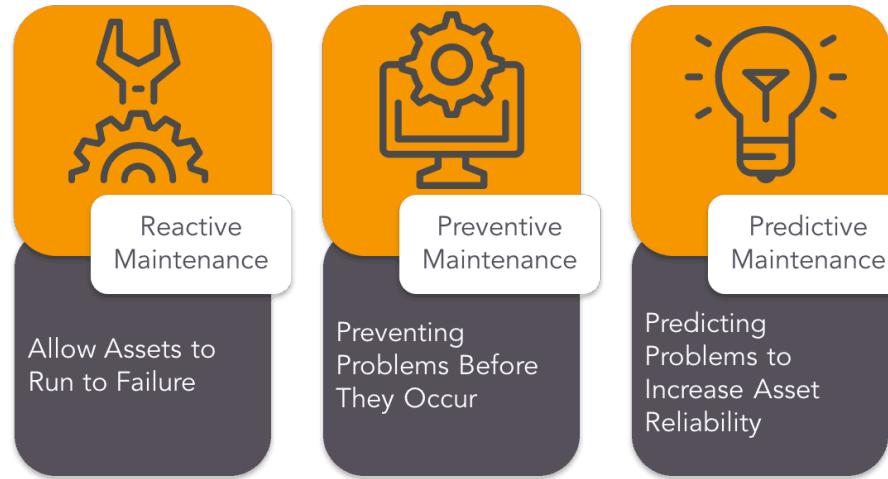
Pathology



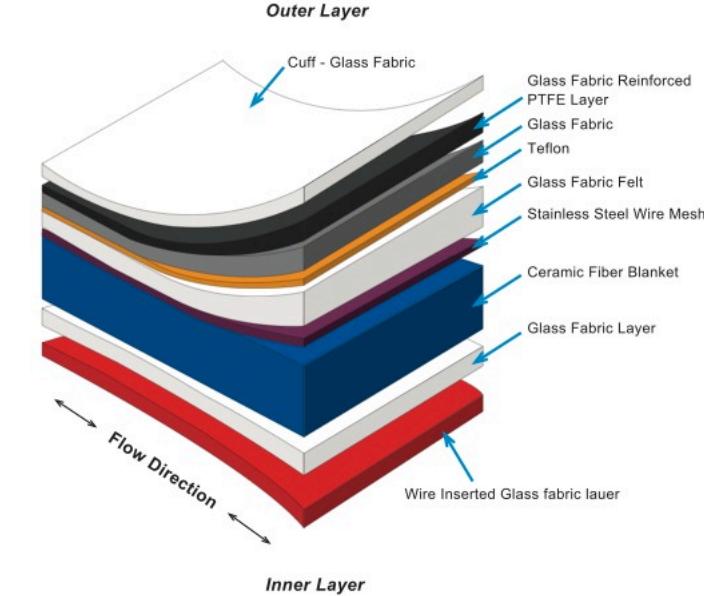
**Genetic
Engineering**



Automation

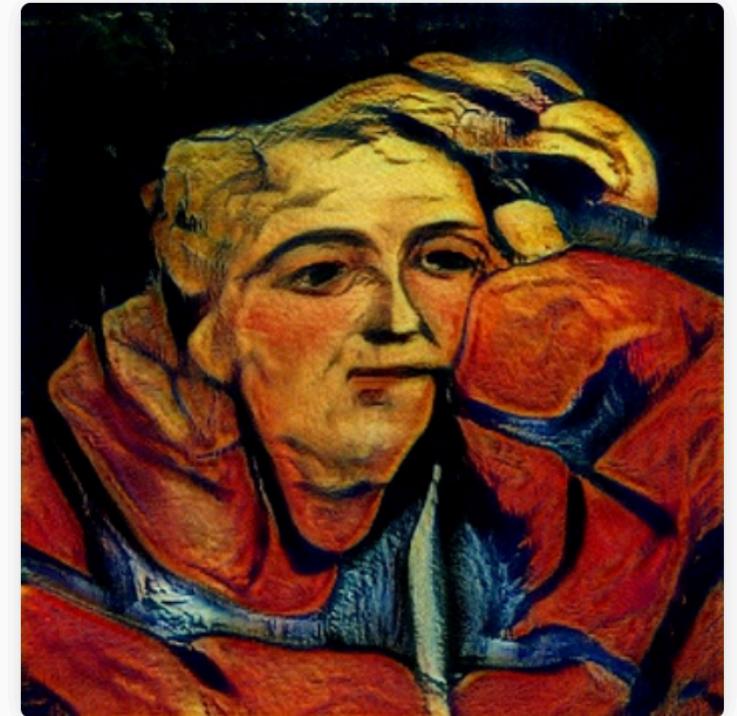


Preventive Maintenance

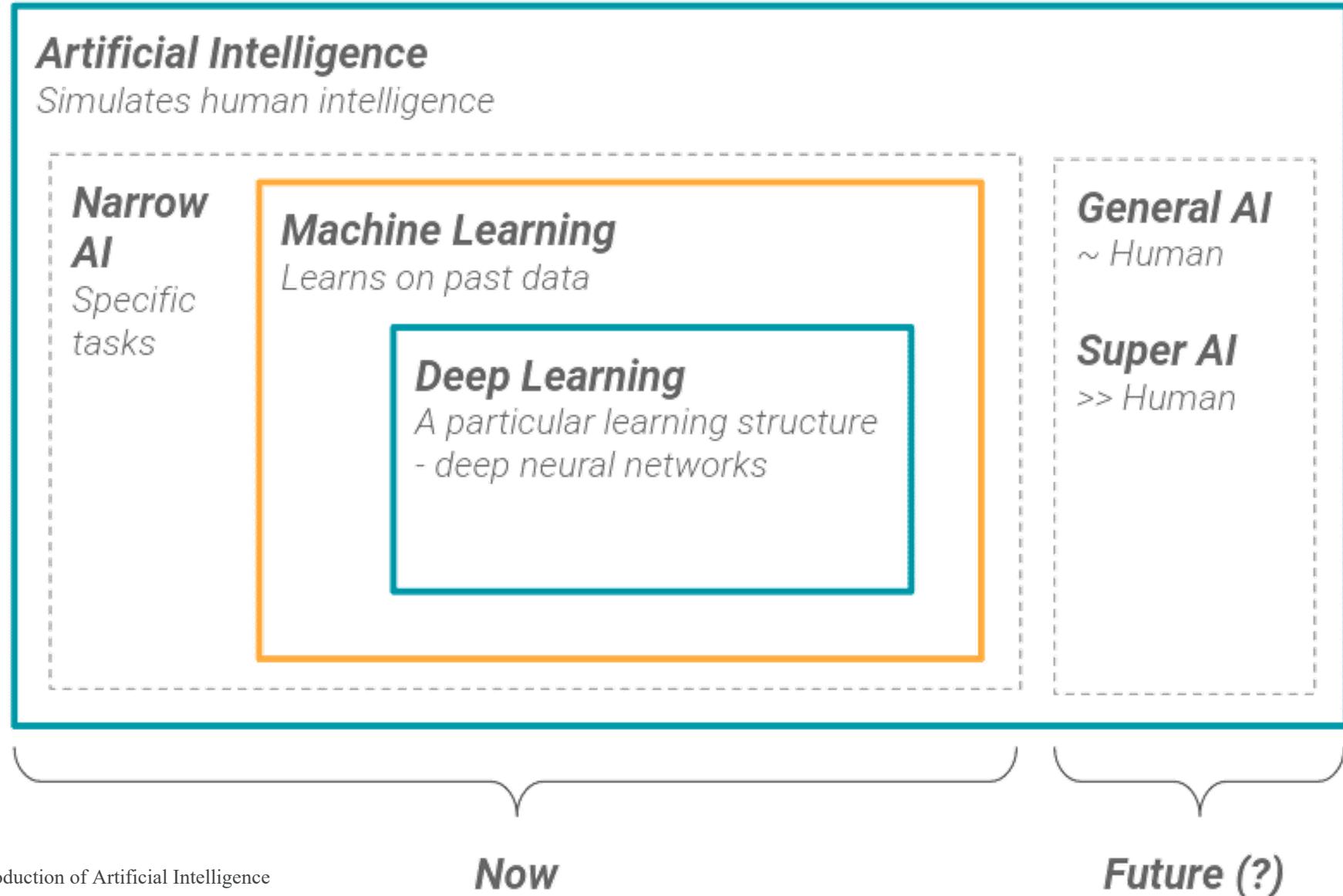


Material Composition

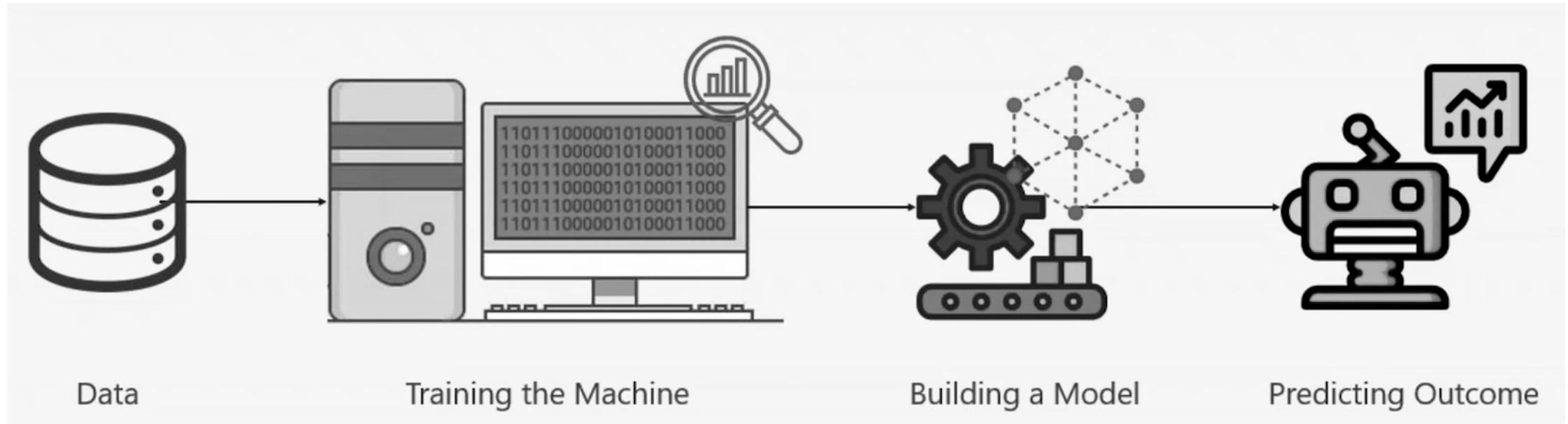
A.I. Application - Creation



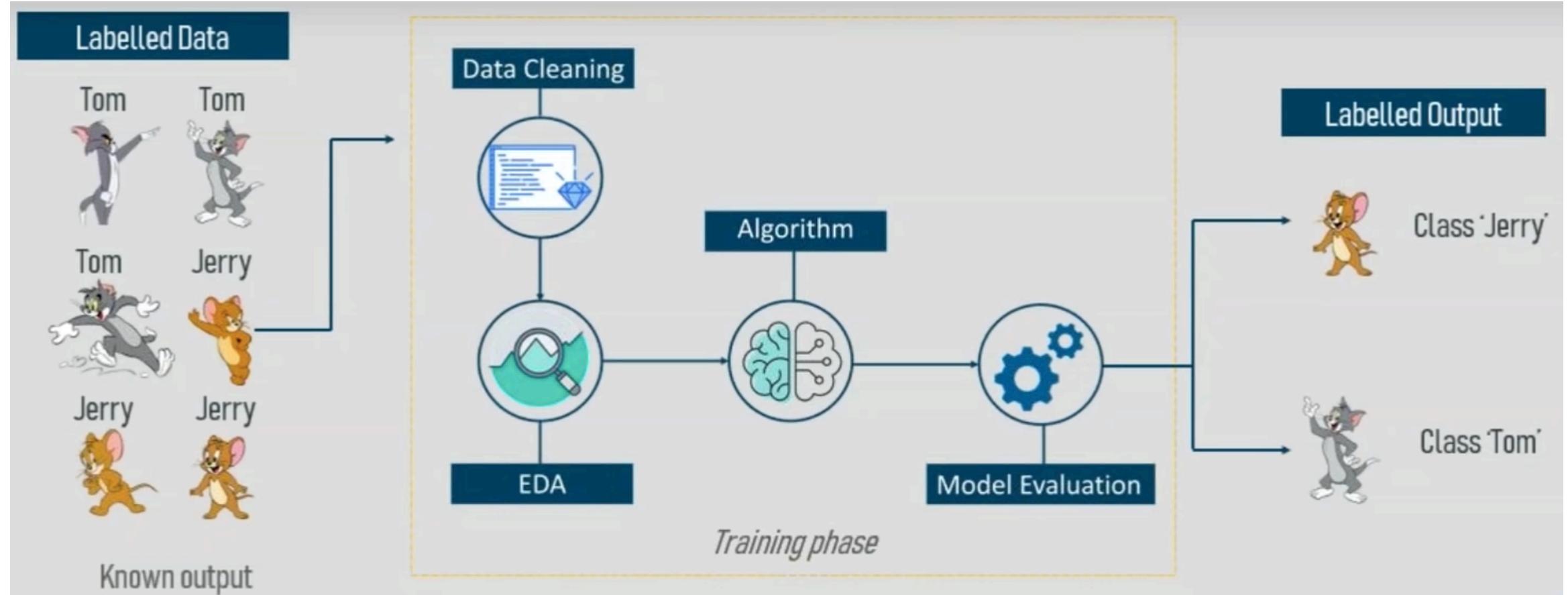
Progression of A.I.



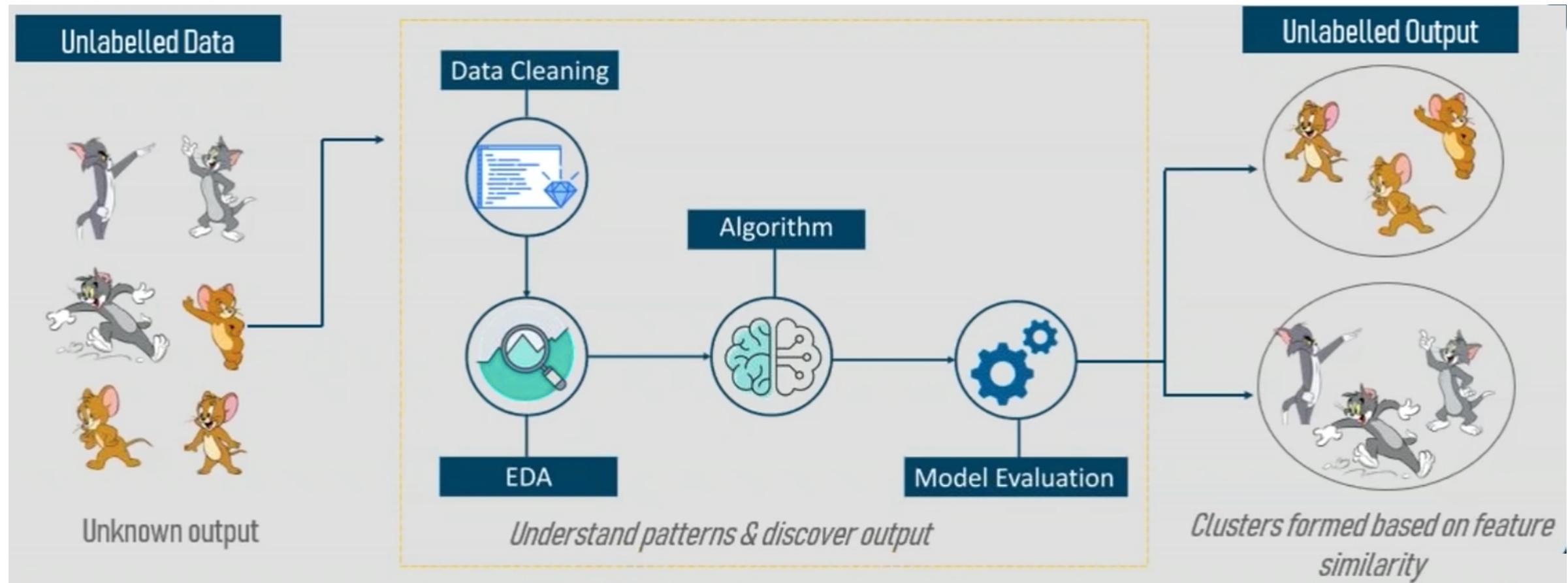
Definition of Machine Learning



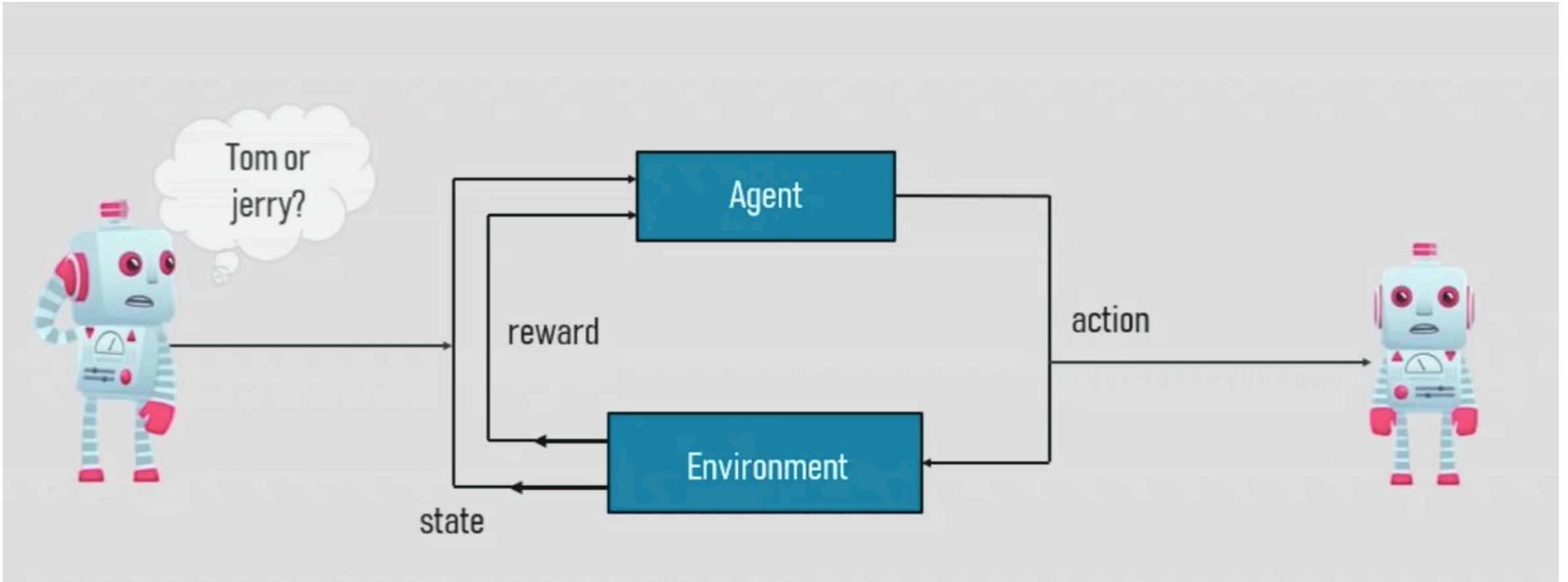
Supervised Learning



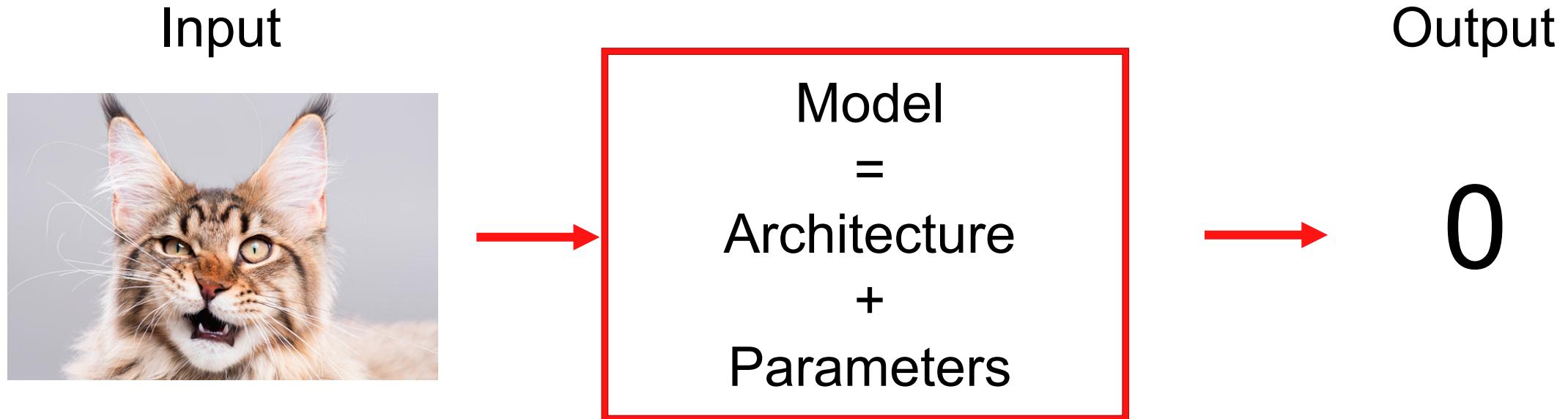
Unsupervised Learning



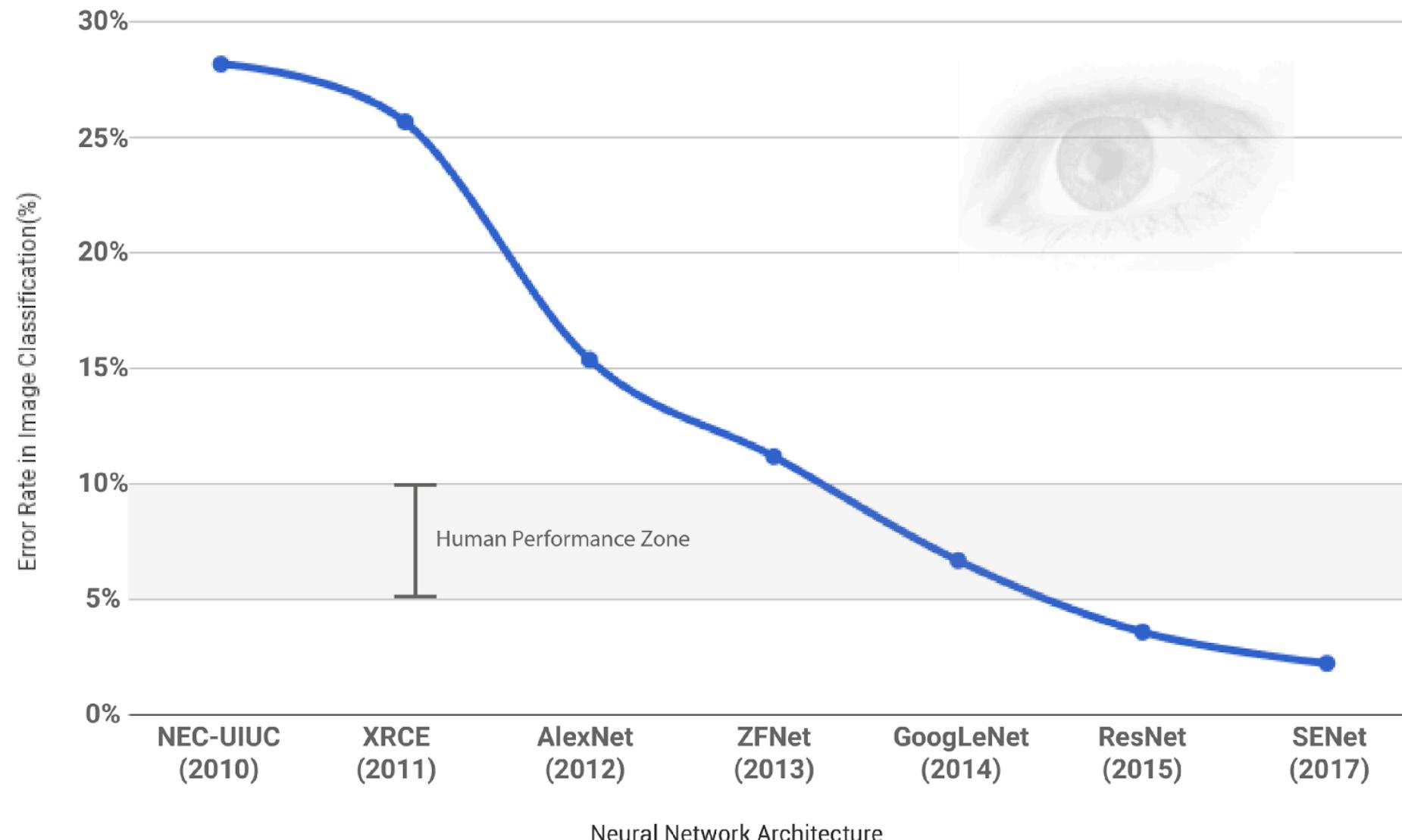
Reinforcement Learning



What is Deep Learning?



Why Deep Learning?



How we can do it?



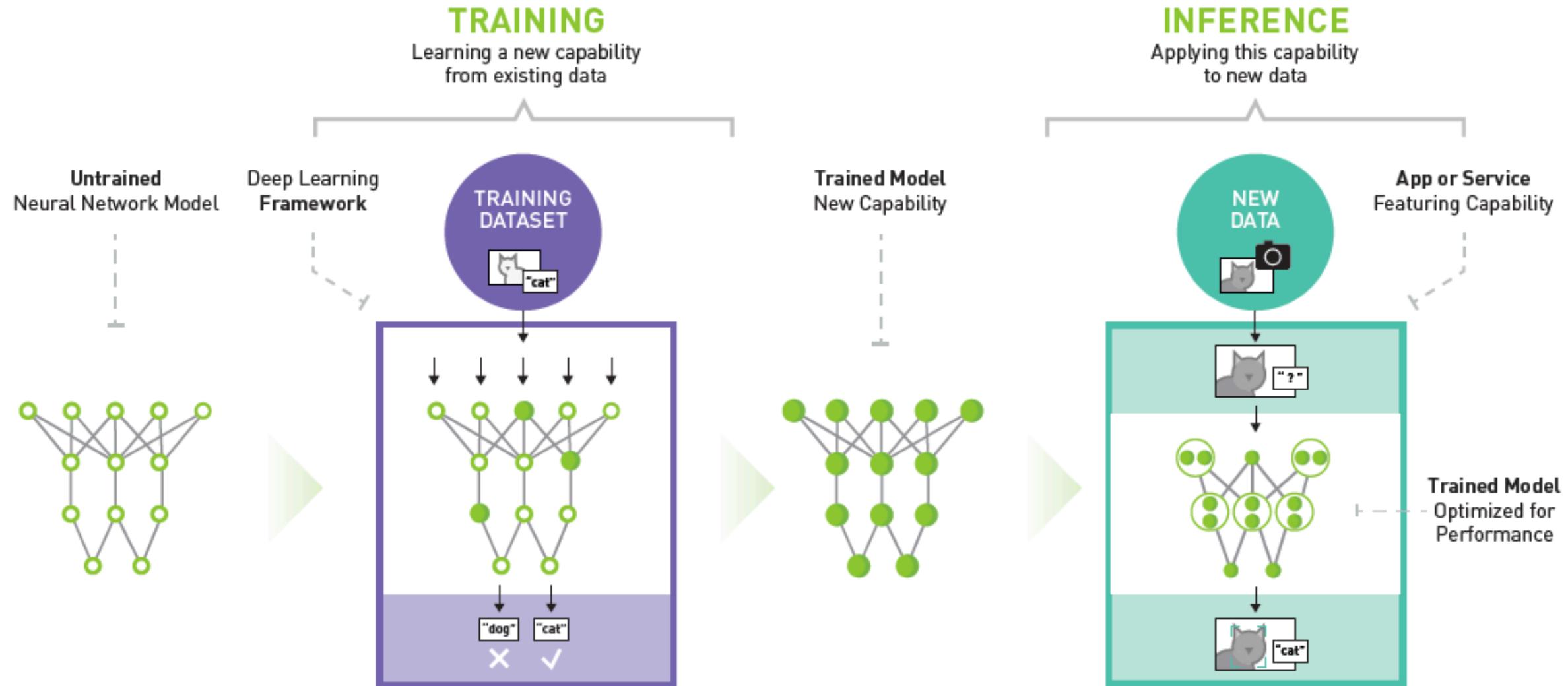
How we can do it?



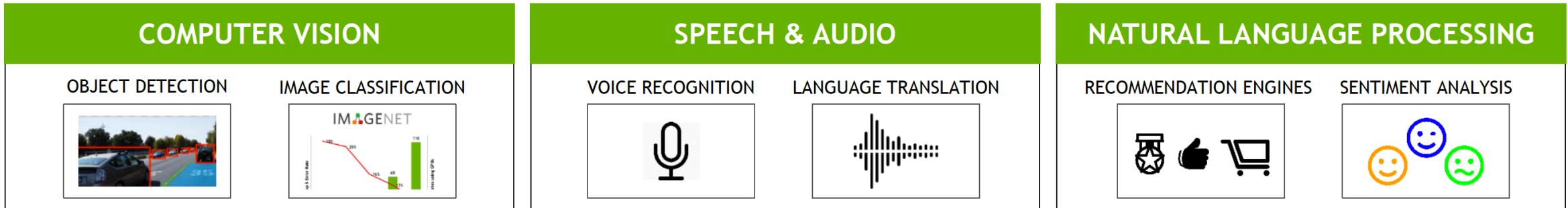
How we can do it?



Progress of deep learning



Architecture of deep learning



DEEP LEARNING FRAMEWORKS



NVIDIA DEEP LEARNING SDK



Deep Learning Frameworks

Caffe
(UC Berkeley)



Caffe2
(Facebook)

Paddle
(Baidu)

Torch
(NYU / Facebook)



PyTorch
(Facebook)

MXNet
(Amazon)

Developed by U Washington, CMU, MIT,
Hong Kong U, etc
But main framework of choice at AWS

Theano
(U Montreal)



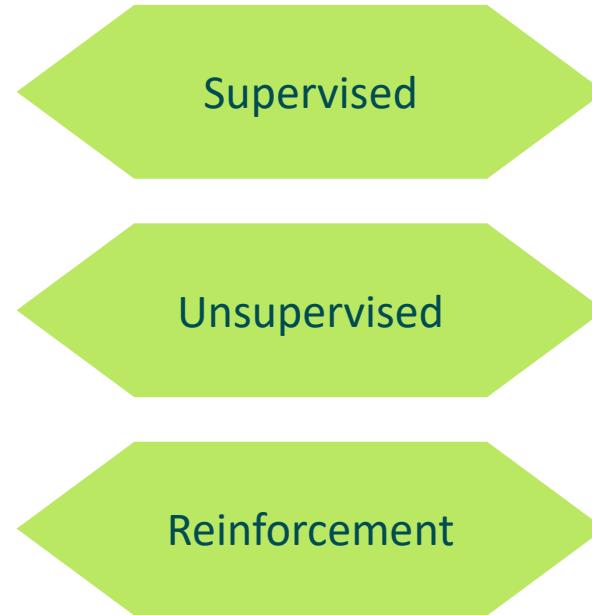
TensorFlow
(Google)

And others...

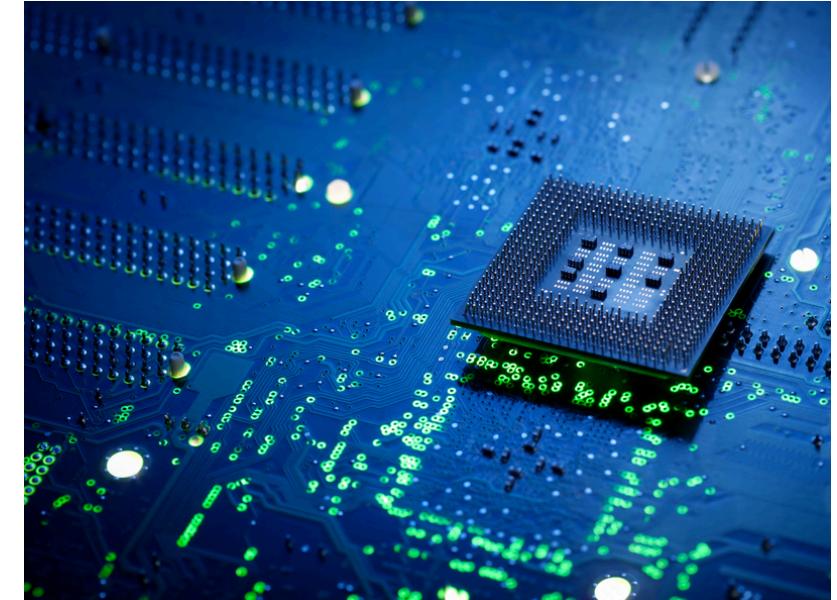
Recipe of deep learning



Dataset

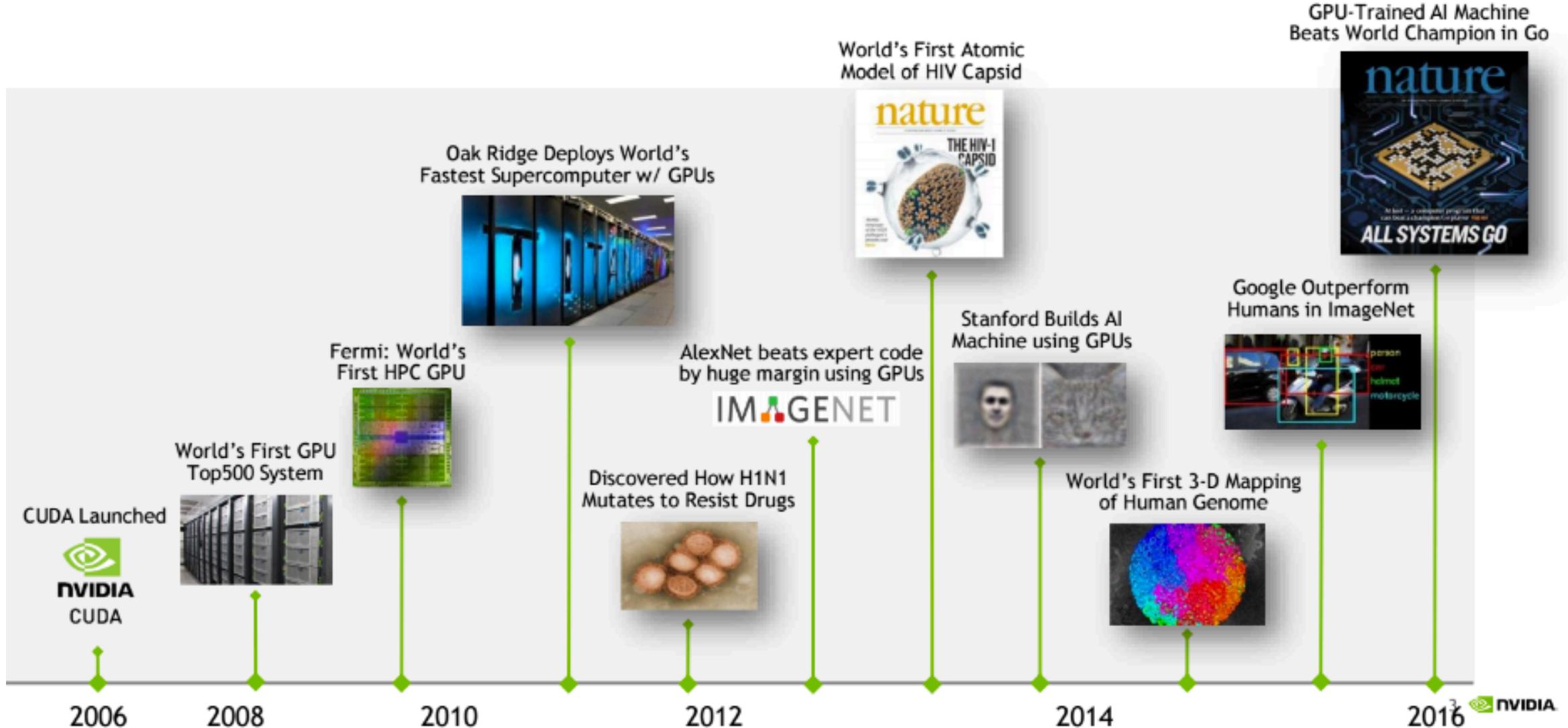


Algorithms



Computing Power

Decade of GPU development



Supercomputer with GPU-Acc.

SIMULATION



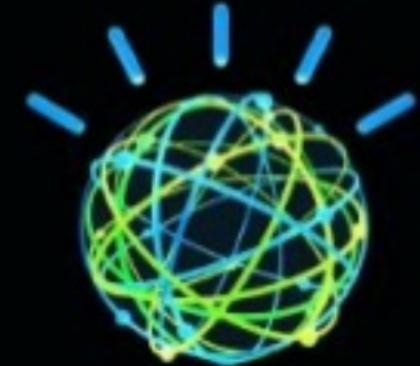
SUMMIT
150-300 PFLOPS
Peak Performance

IBM POWER CPU + NVIDIA Volta GPU
NVLink High Speed Interconnect
>40 TFLOPS per Node, >3,400 Nodes
2017



SIERRA
> 100 PFLOPS
Peak Performance

MACHINE LEARNING

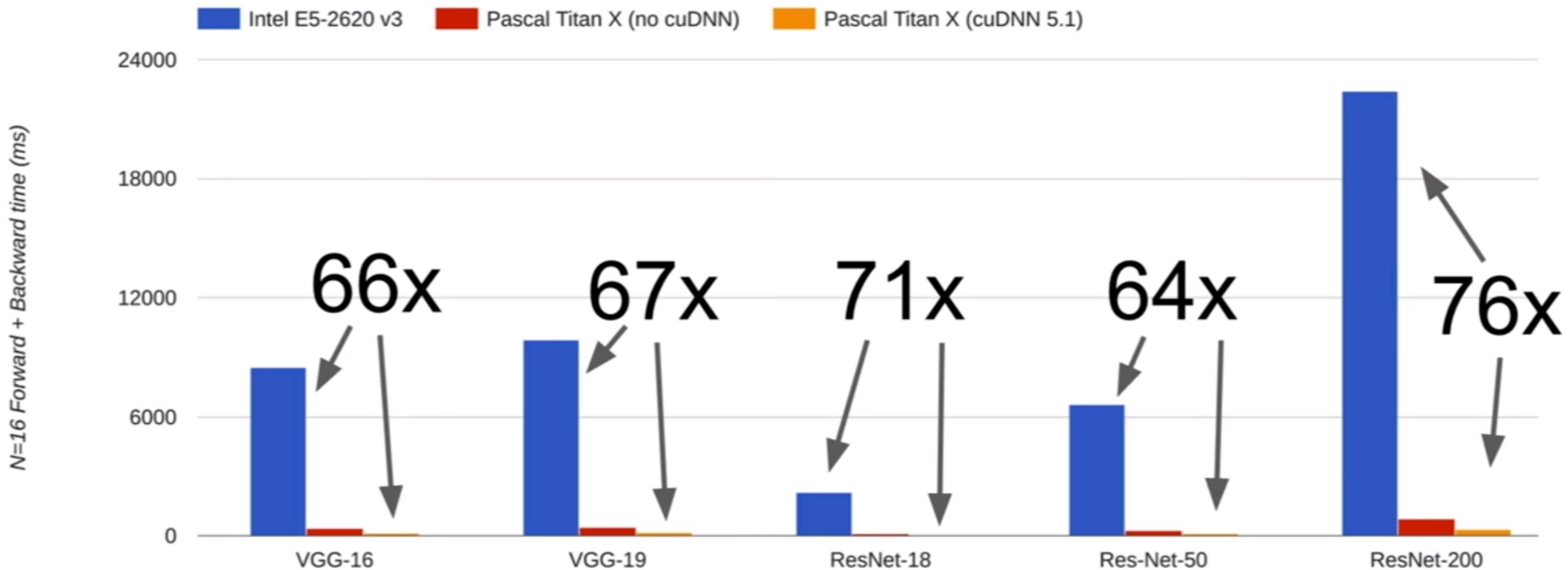


IBM Watson
Breakthrough Natural Language Processing
for Cognitive Computing

VISUALIZATION

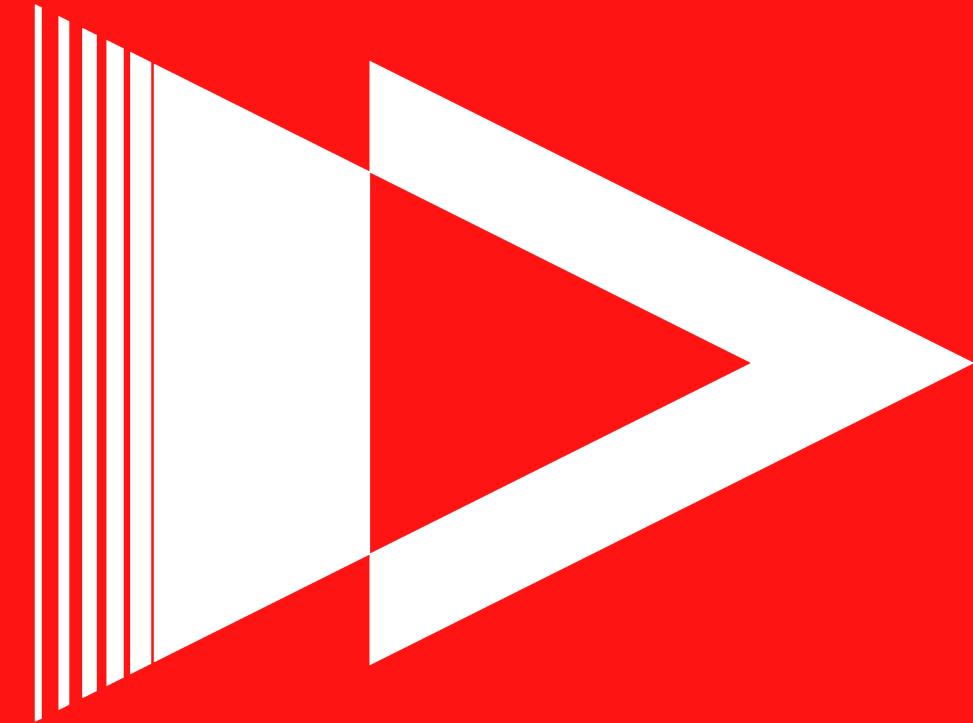


With or Without Accelerator

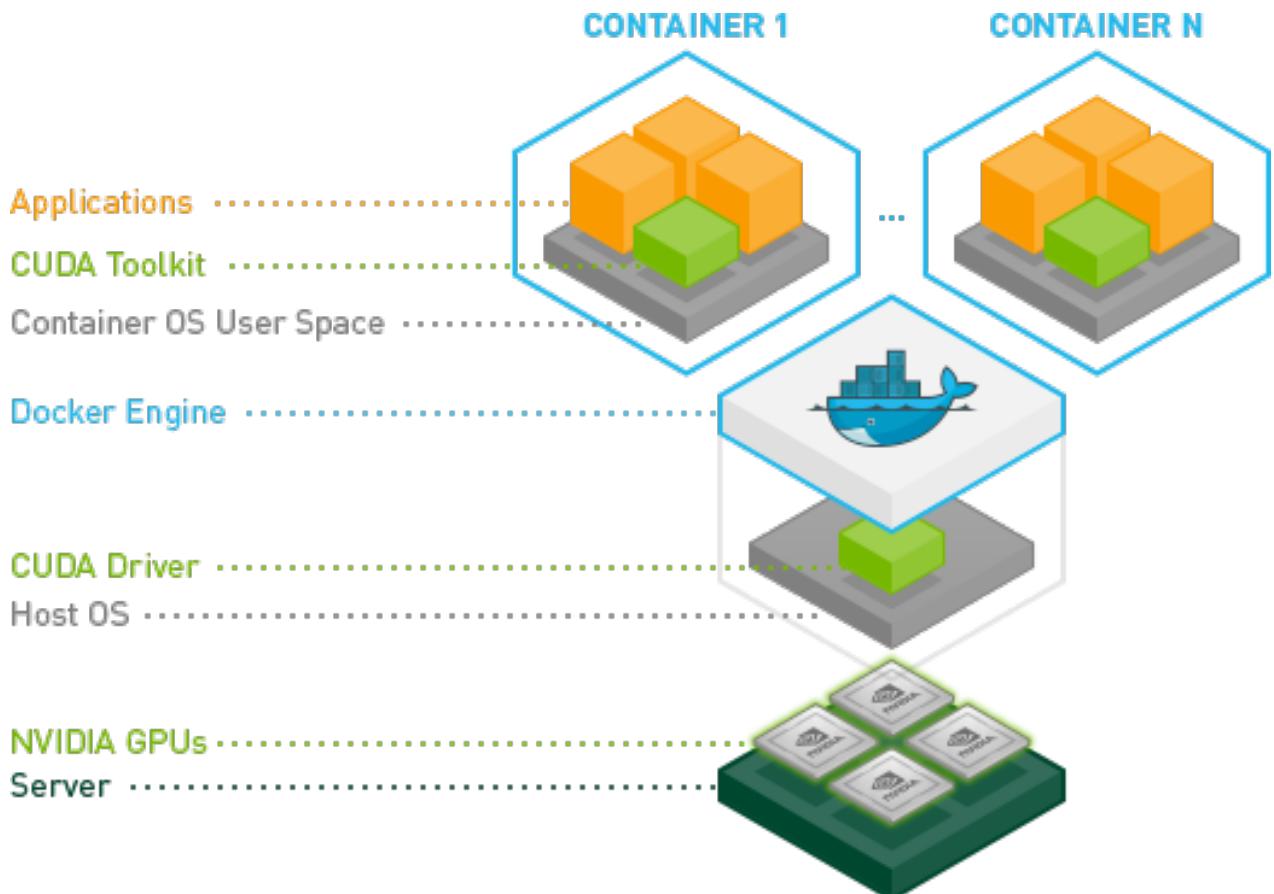
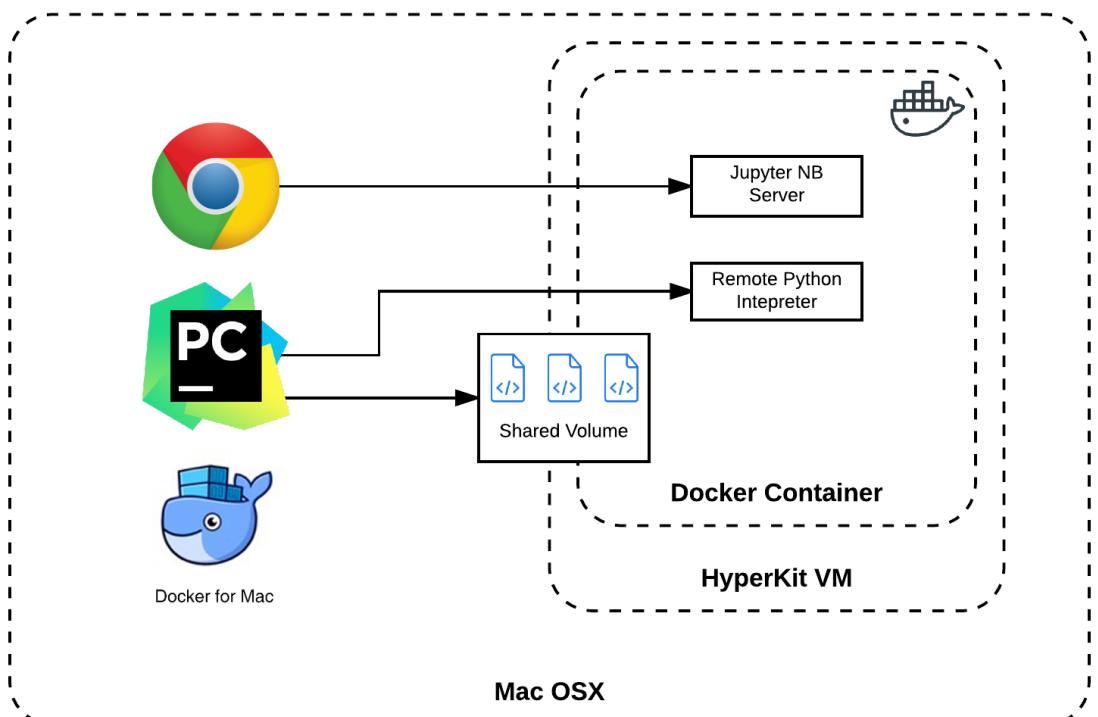


Data from <https://github.com/jcjohnson/cnn-benchmarks>

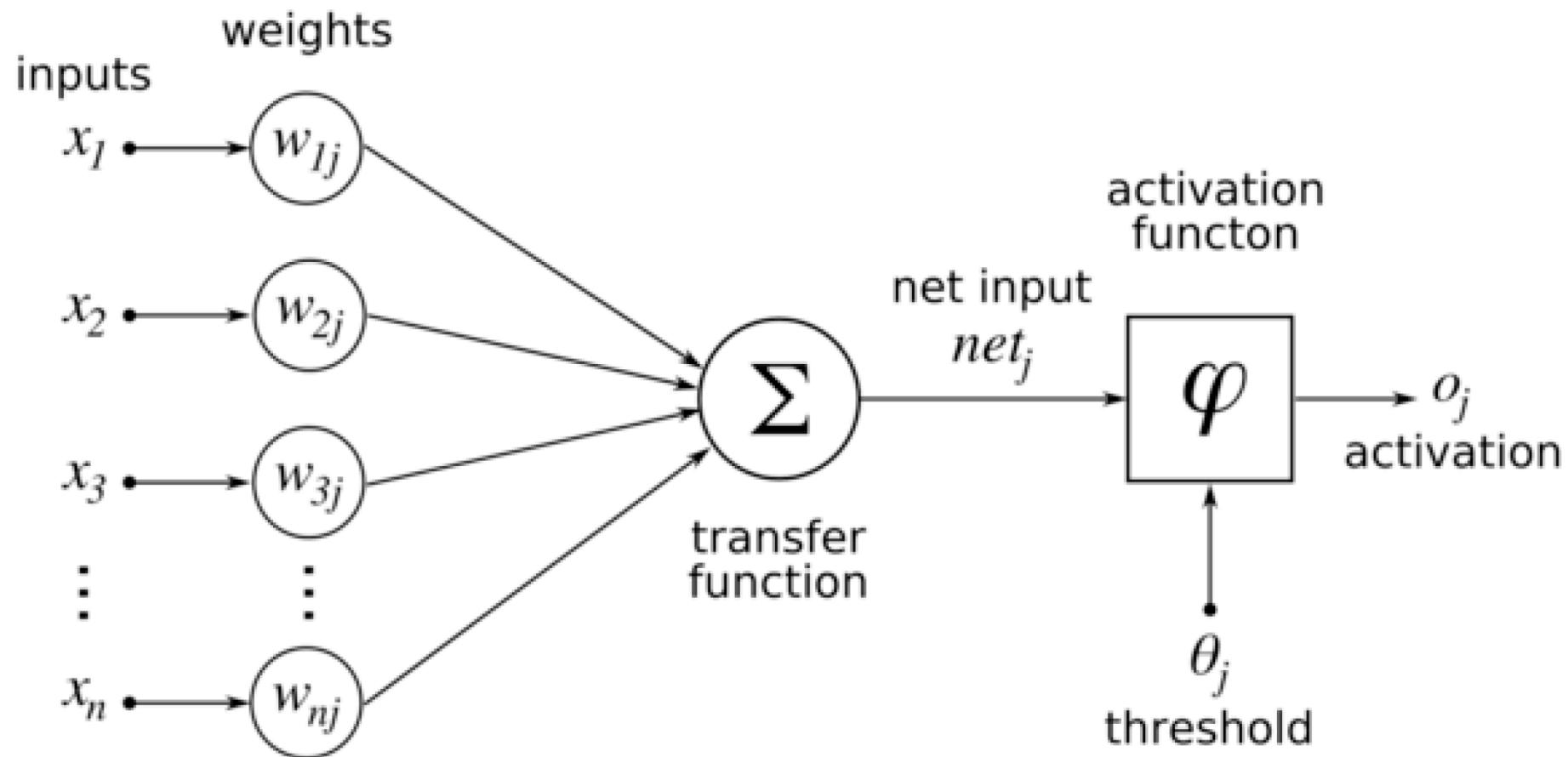
Let's LAB



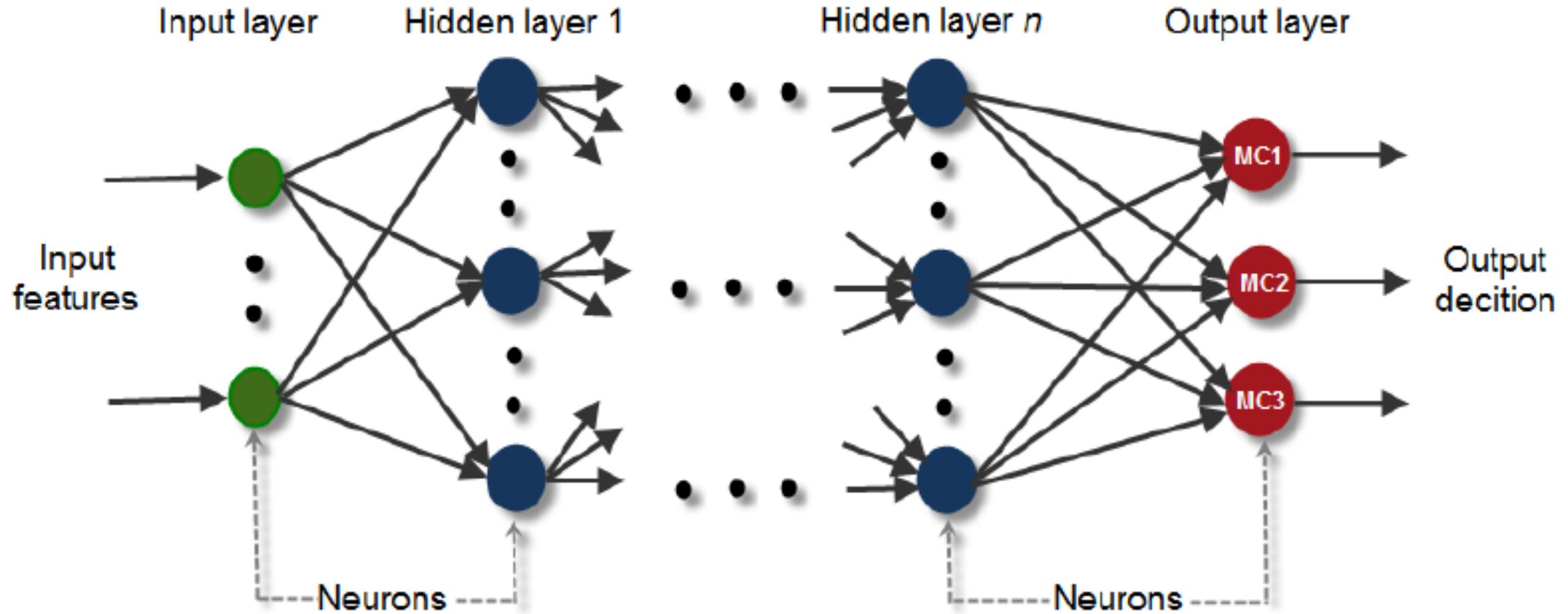
Containerized Architecture



Artificial Nural Network

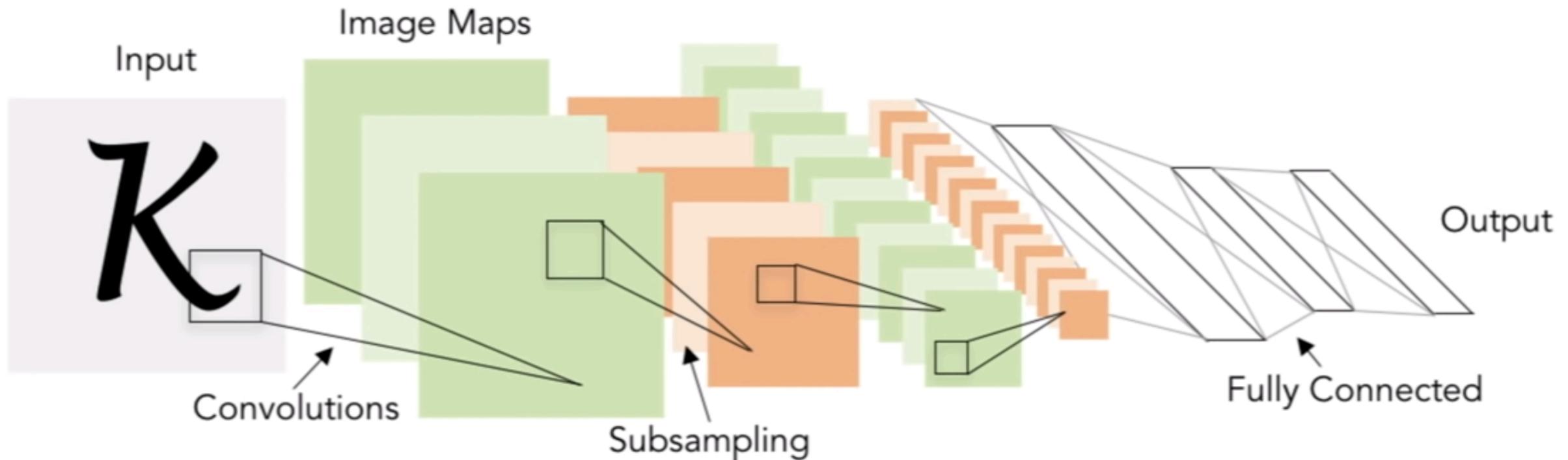


Multilayer Perceptron (MLP)

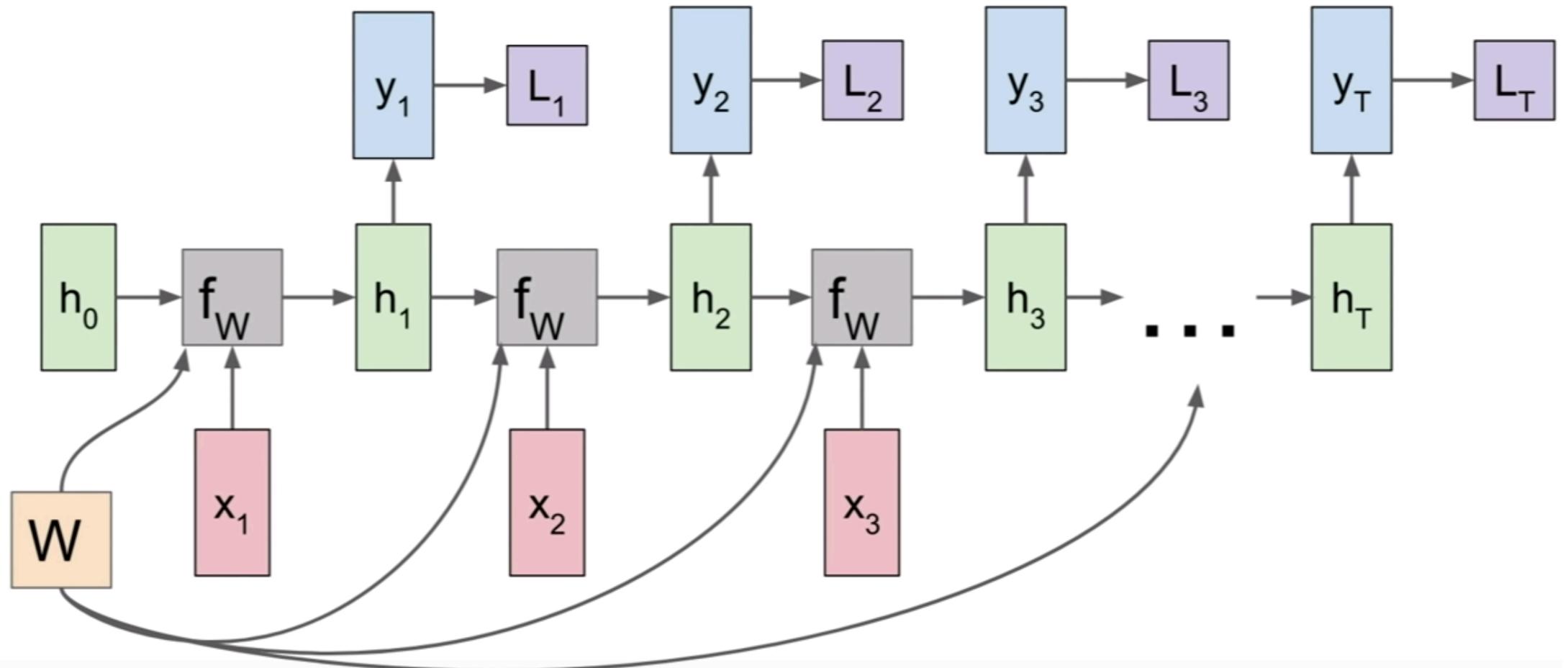


Convolutional Neural Networks (CNN)

[LeCun et al., 1998]

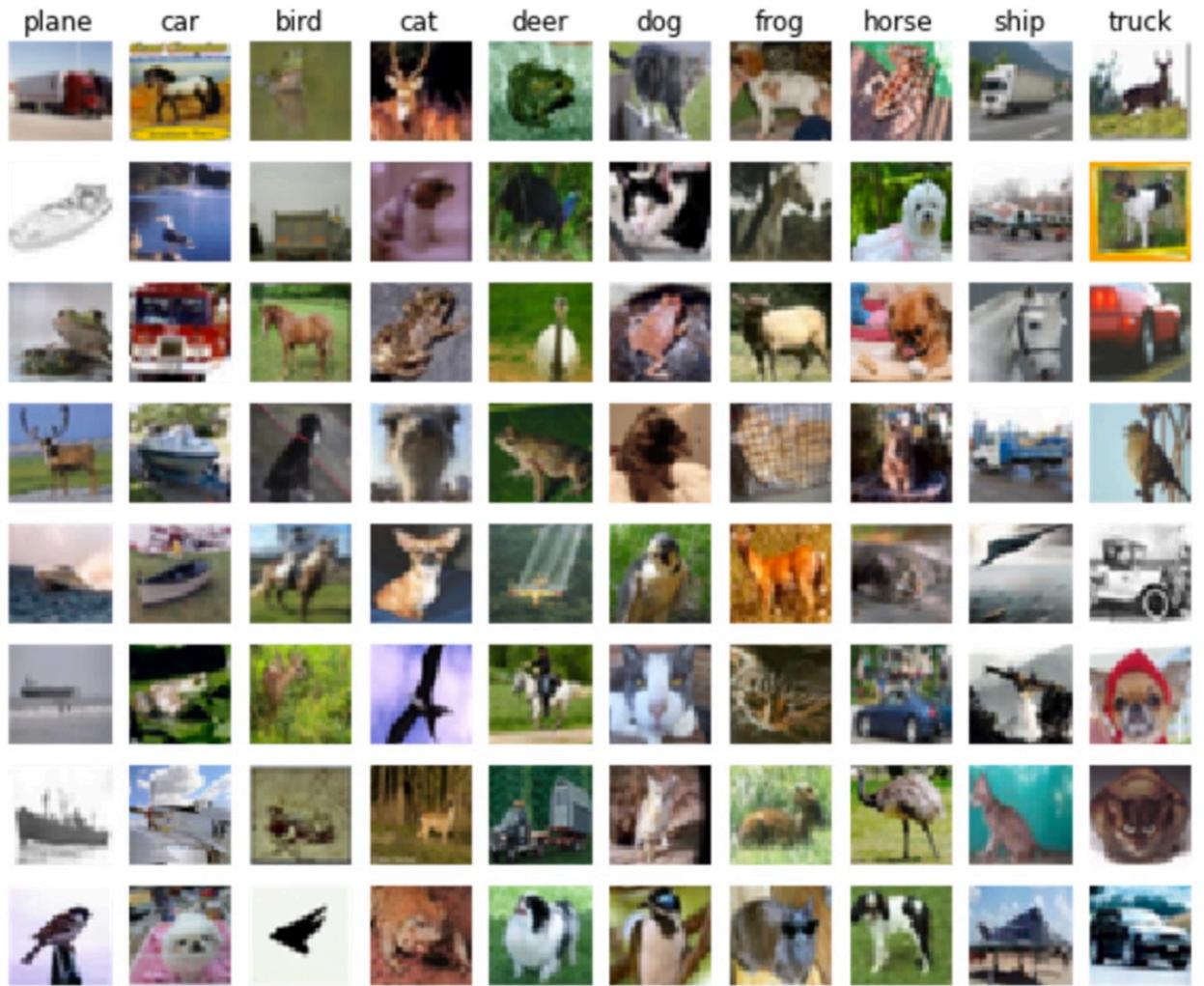


Recurrent Neural Networks (CNN)

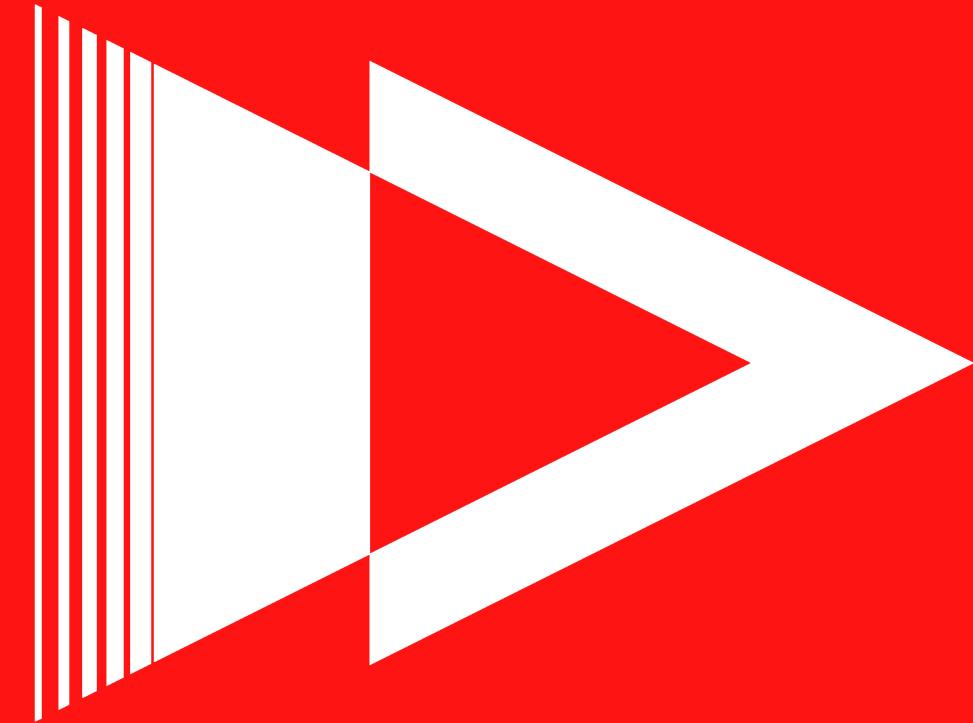


Datasets

0 0 0 0 0 0 0 0 0
1 1 1 1 1 1 1 1 1
2 2 2 2 2 2 2 2 2
3 3 3 3 3 3 3 3 3
4 4 4 4 4 4 4 4 4
5 5 5 5 5 5 5 5 5
6 6 6 6 6 6 6 6 6
7 7 7 7 7 7 7 7 7
8 8 8 8 8 8 8 8 8
9 9 9 9 9 9 9 9 9



And Let's LAB



What is Tensorflow

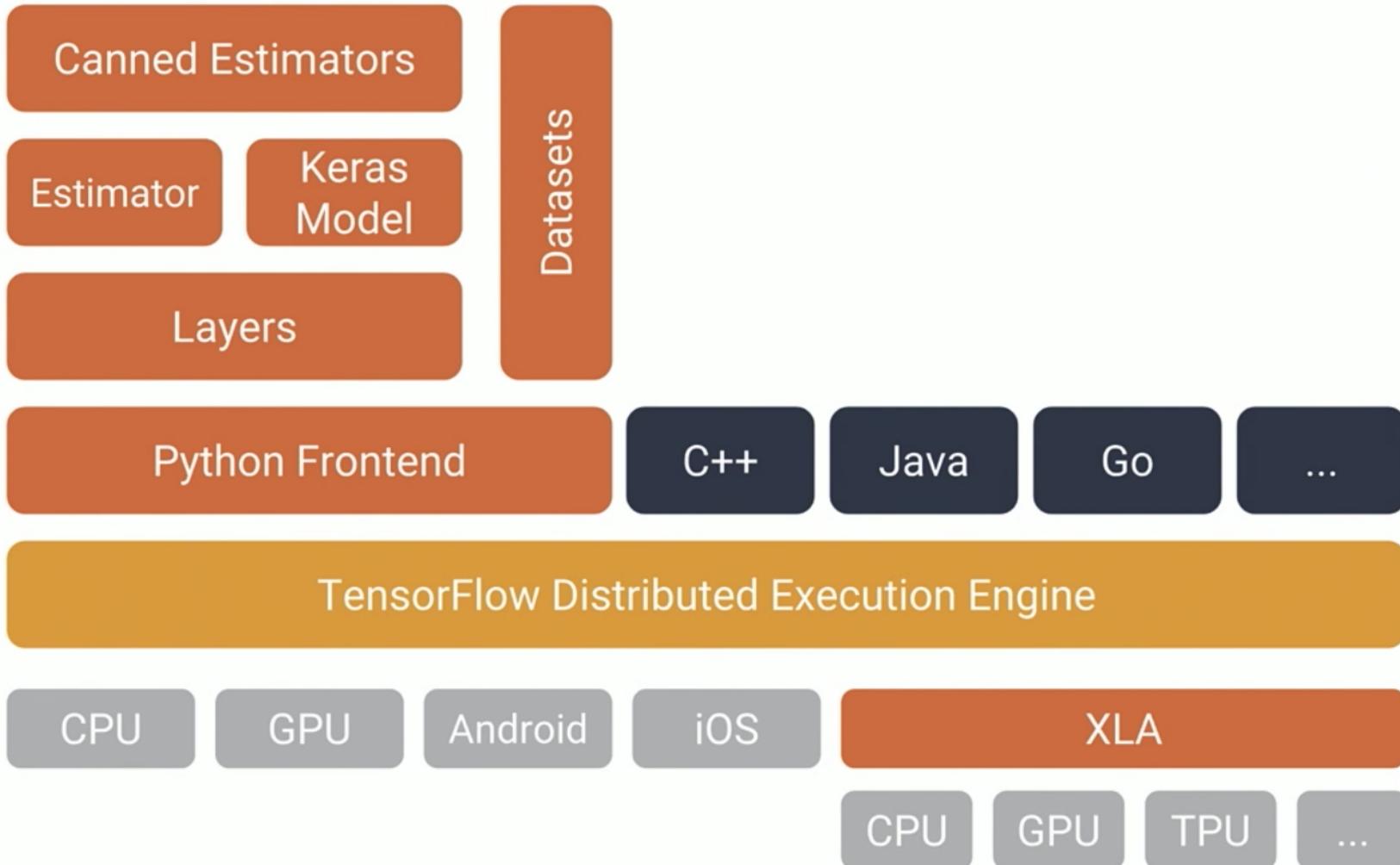
A multi-dimensional array

A directed graph

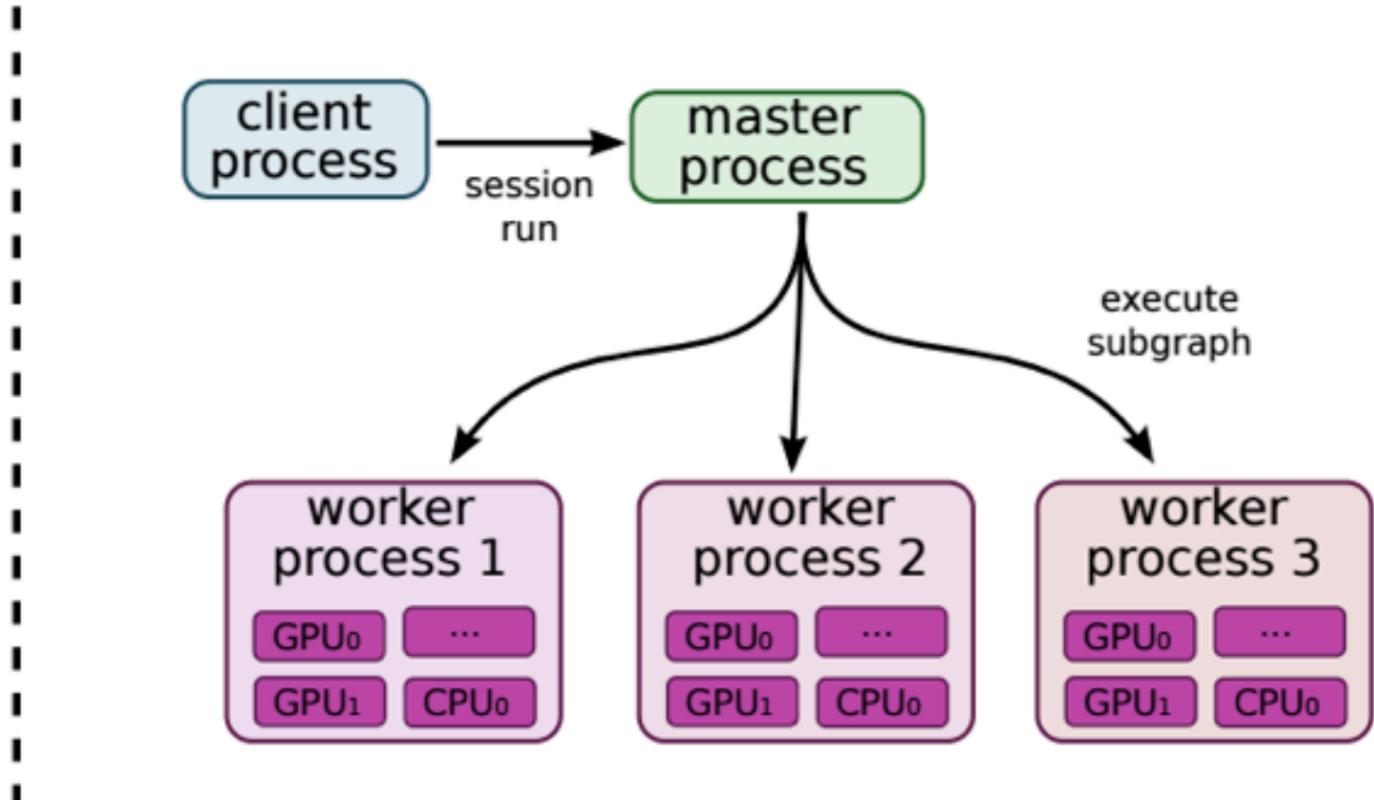
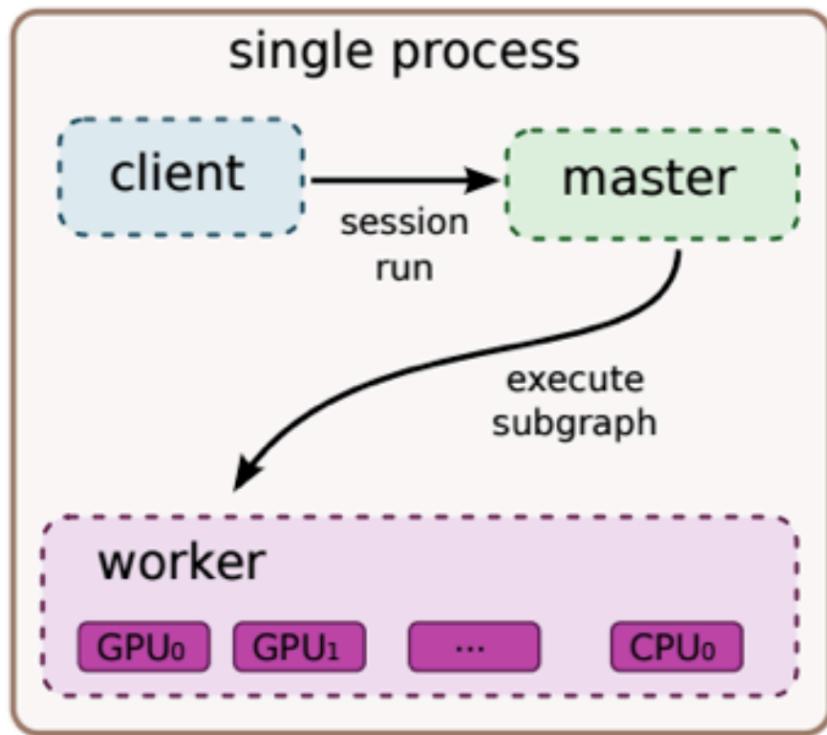


A directed graph of operations that process multi-dimensional arrays.

Tensorflow Architecture



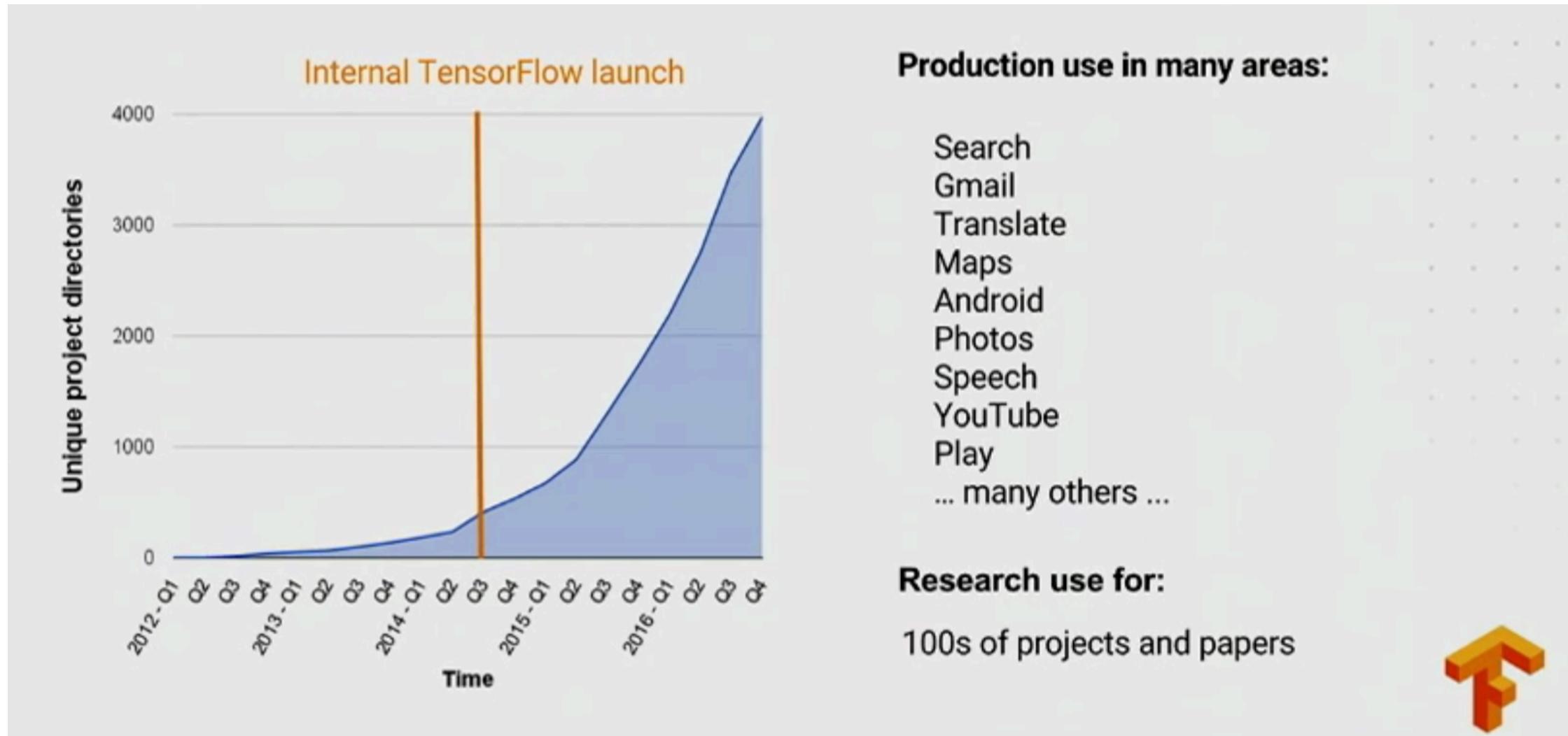
Single or Distributed Computing



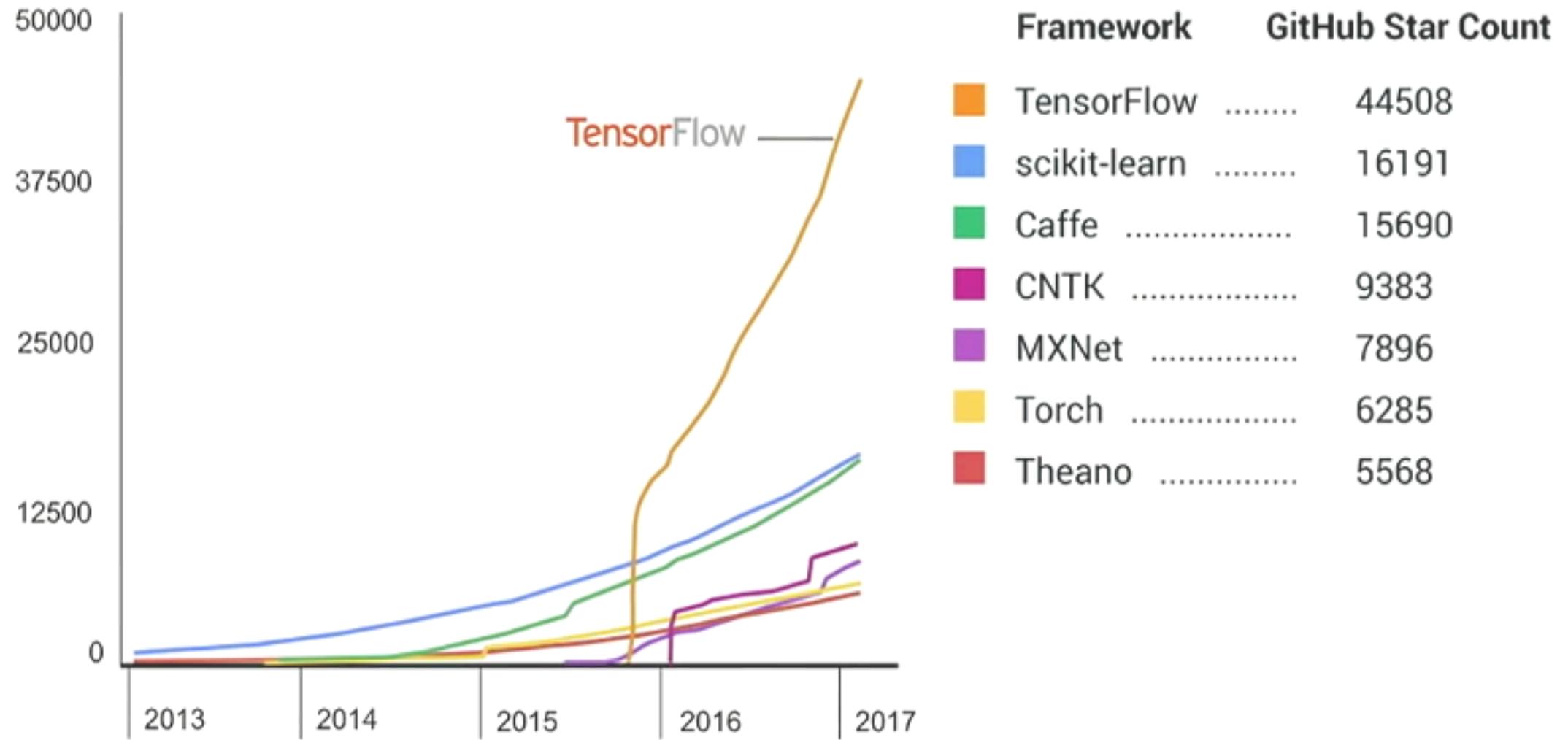
Build-in Operations

Category	Examples
Element-wise math ops	Add, Sub, Mul, Div, Exp, Log, Greater, Less...
Matrix ops	Concat, Slice, Split, Constant, Rank, Shape...
Matrix ops	MatMul, MatrixInverse, MatrixDeterminant...
Stateful ops	Variable, Assign, AssignAdd...
NN building blocks	SoftMax, Sigmoid, ReLU, Convolution2D...
Checkpointing ops	Save, Restore
Queue & synch ops	Enqueue, Dequeue, MutexAcquire...
Control flow ops	Merge, Switch, Enter, Leave...

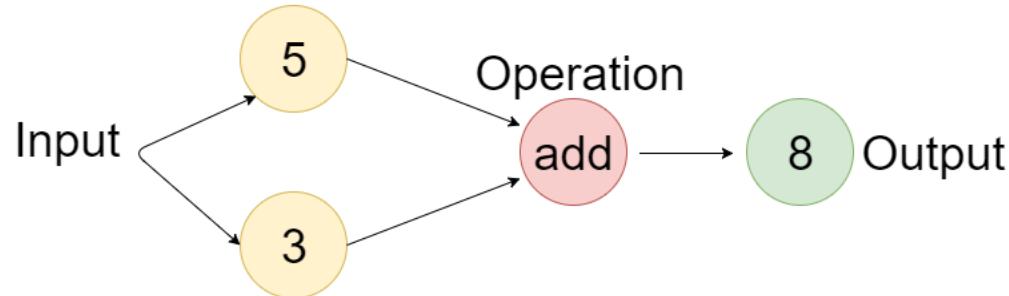
Tensorflow Use Trade



Tensorflow Use Trade



Tensorflow 程式使用



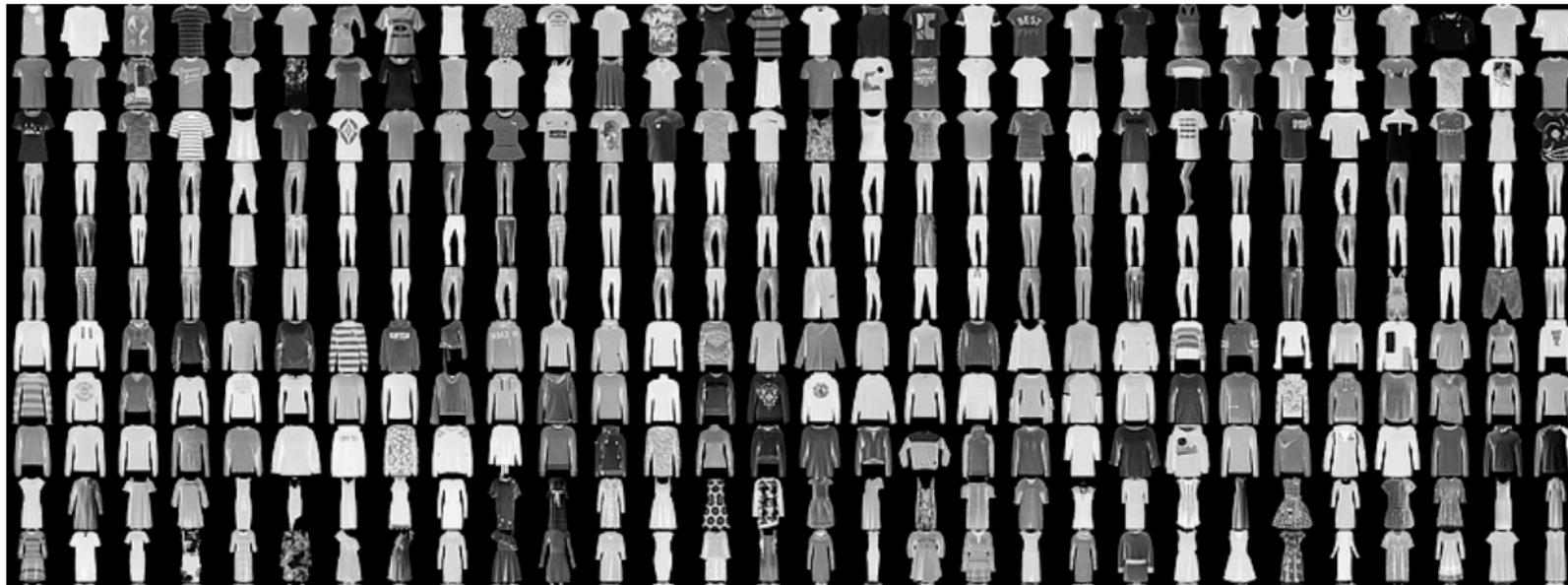
```
import tensorflow as tf  
print(tf.__version__)
```

```
a = tf.constant(5,name = "a")  
b = tf.constant(3, name = "b")  
result = tf.add(a,b,name='add_a_b')  
result  
# Output  
  
<tf.Tensor 'add_a_b:0' shape=() dtype=int32>
```

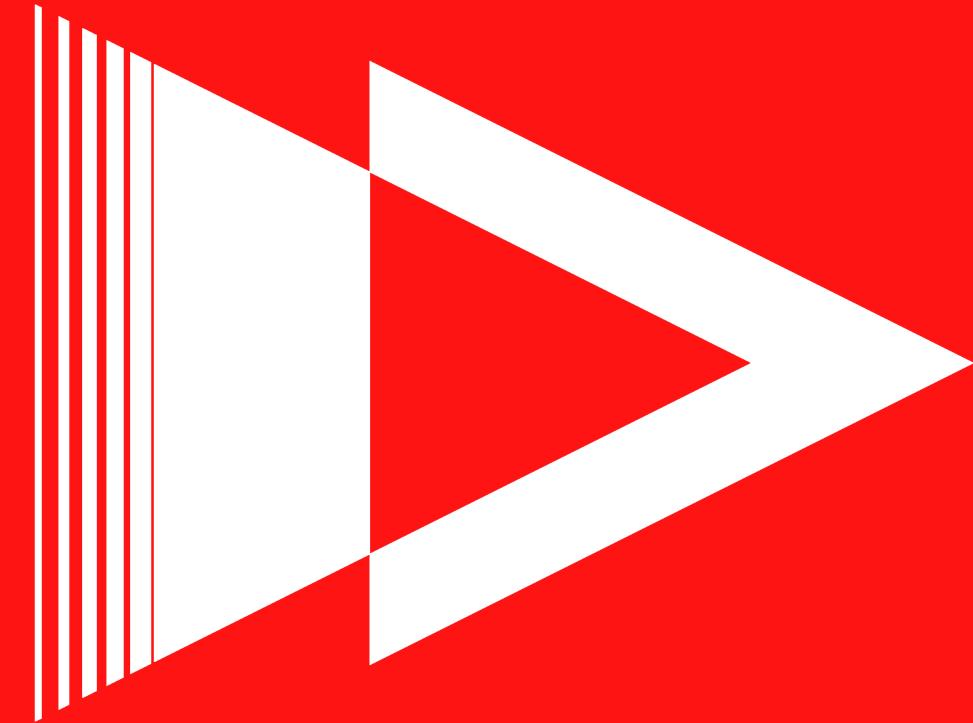
```
sess = tf.Session()  
sess.run(result)  
  
# Output  
8
```

Import the Fashion MNIST dataset

This guide uses the [Fashion MNIST](#) dataset which contains 70,000 grayscale images in 10 categories. The images show individual articles of clothing at low resolution (28 by 28 pixels), as seen here:



And More LAB



- Tensorflow的官方網址：www.tensorflow.org
- TensorFlow原始碼：
github.com/tensorflow/tensorflow
- TensorFlow學習模型：
github.com/tensorflow/models

Thank you

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