



Let's Talk Artificial Intelligence

1. Capture 2. Analyze 3. Put it to work

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What do we do today?

We help companies **digitize**, **transform** and **automate** their field processes and increase efficiencies.

Traction

55,140

jobs completed using Aimsio

243,766

field tickets created by clients

\$452,088,255

amount in invoices processed by clients

Industries



Locations Served



Have you heard any of these recently?

AI? Machine Learning? Deep Learning? Artificial Neural Network?



AI is 64 years old!

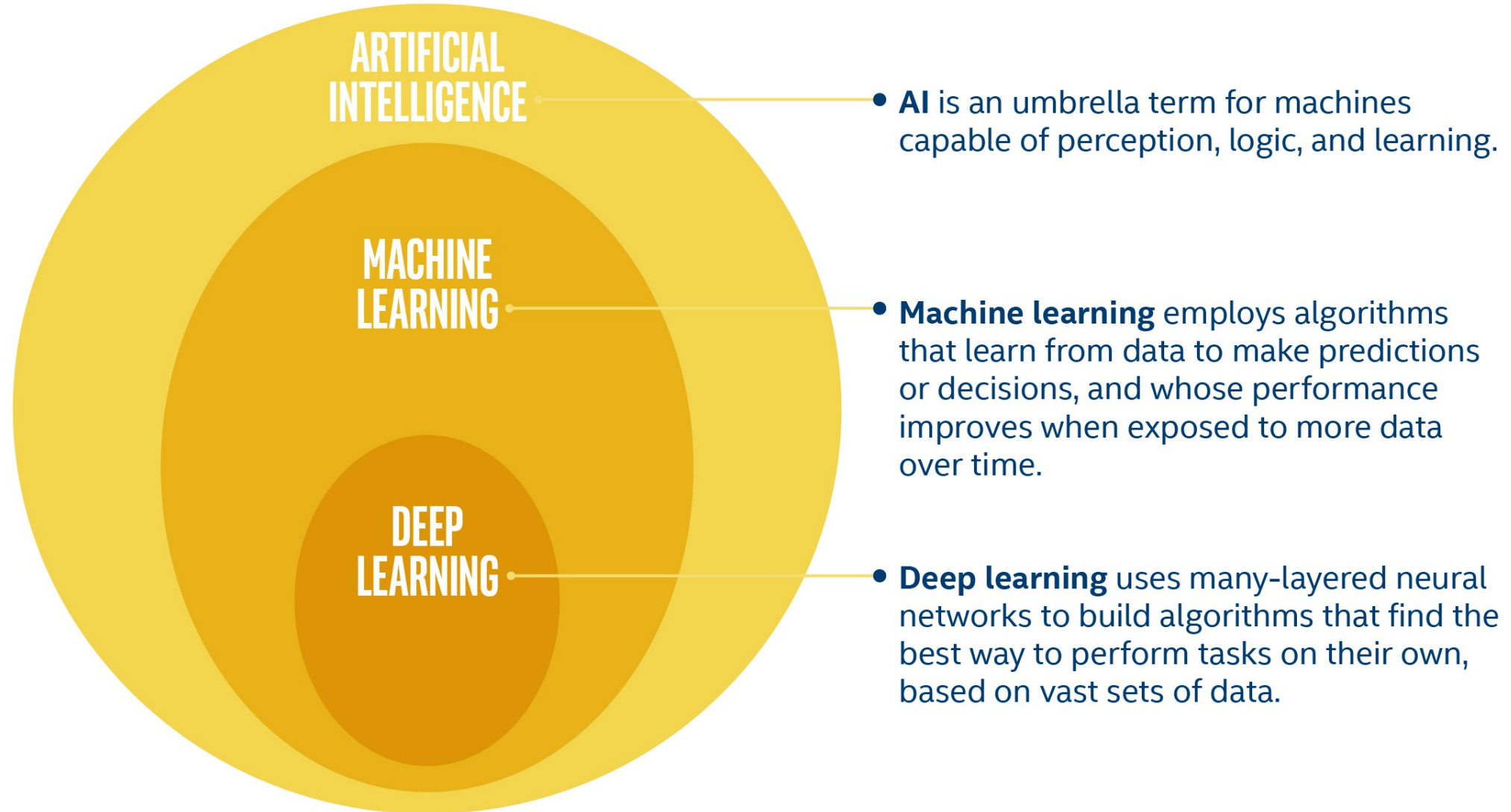


John McCarthy
coined the term AI in 1955



Arthur Samuel
coined the term Machine learning in 1959

What is it?



A computer needed to be told exactly what to do

Most programs are a series of explicit instructions

Pseudo code

```
1  if the score is 90 or above
2      grade is an "A"
3  else
4      if the score is 80 or above
5          grade is a "B"
6      else
7          if the score is 70 or above
8              grade is a "C"
9          else
10             grade is an "F"
```

Actual Python code

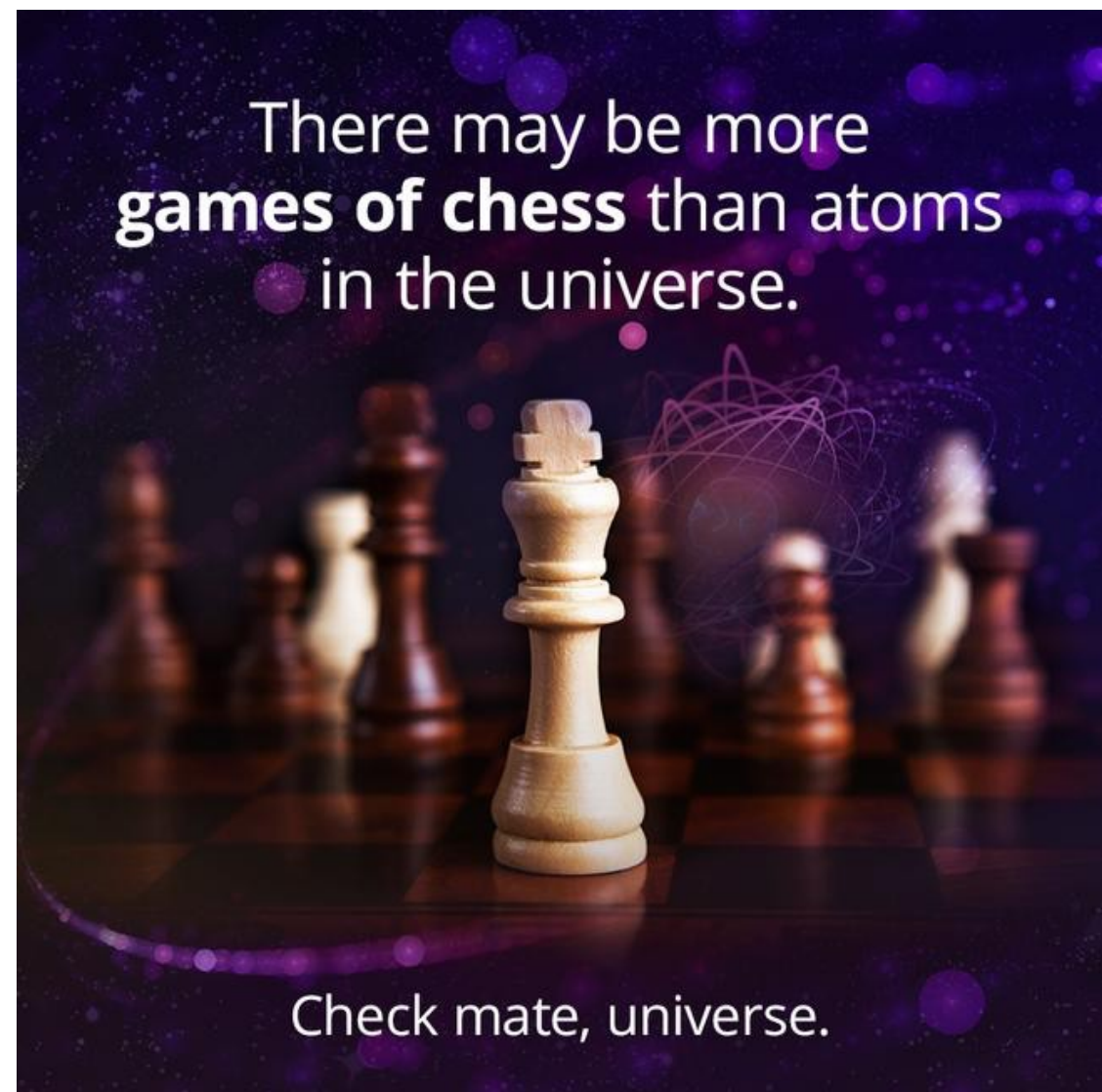
```
1  ▼ if score >= 90:
2  └   grade = "A"
3  ▼ else:
4  ▼     if score >= 80:
5  └       grade = "B"
6  ▼     else:
7  ▼         if score >= 70:
8  └           grade = "C"
9  ▼         else:
10 └           grade = "F"
```


Programing A Chess Computer Player

You could never program every possible move

The total amount of atoms in the universe 10^{81}

The total possible chess games 10^{120}



How does learning happen?

Chess learning analogy

- Get a tutor (supervised learning)
 - To show you the rules of the game
 - Play against your tutor and the tutor would supervise your moves
 - You go play against others
- You can't find a tutor (unsupervised learning)
 - Go to parks and watch others play



Supervised Learning

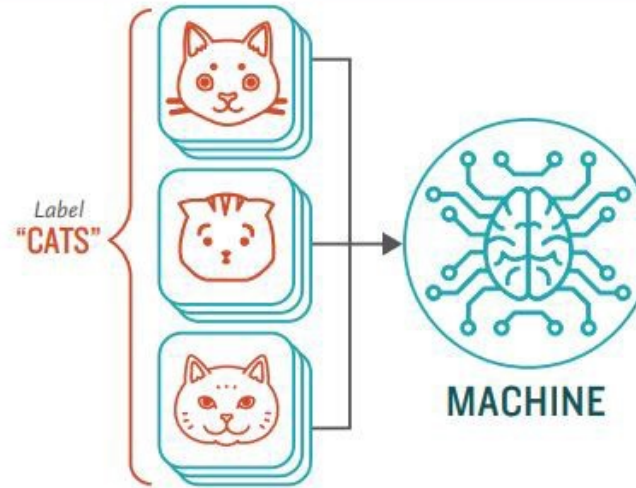
Inventing the best model

- Got some training data
 - Lots of labeled data
- Classifying your data

How **Supervised** Machine Learning Works

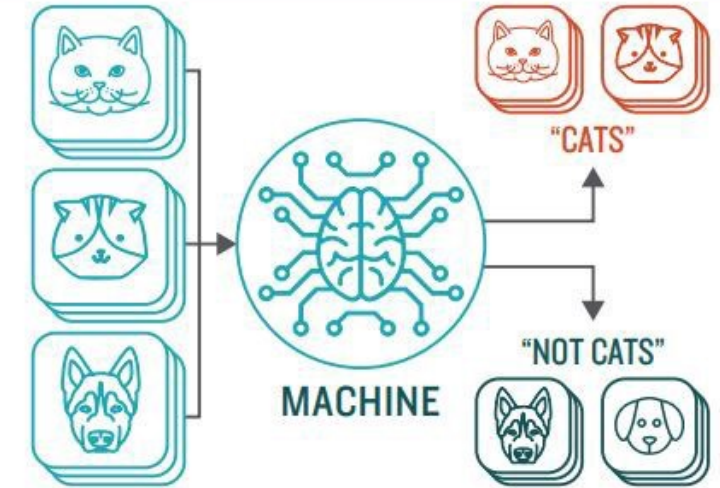
STEP 1

Provide the machine learning algorithm categorized or "labeled" input and output data from to learn

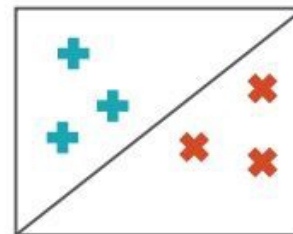


STEP 2

Feed the machine new, unlabeled information to see if it tags new data appropriately. If not, continue refining the algorithm



TYPES OF PROBLEMS TO WHICH IT'S SUITED



CLASSIFICATION

Sorting items into categories



REGRESSION

Identifying real values (dollars, weight, etc.)

Artificial Neural Network (the machine)

Determine if a bid is going to be profitable

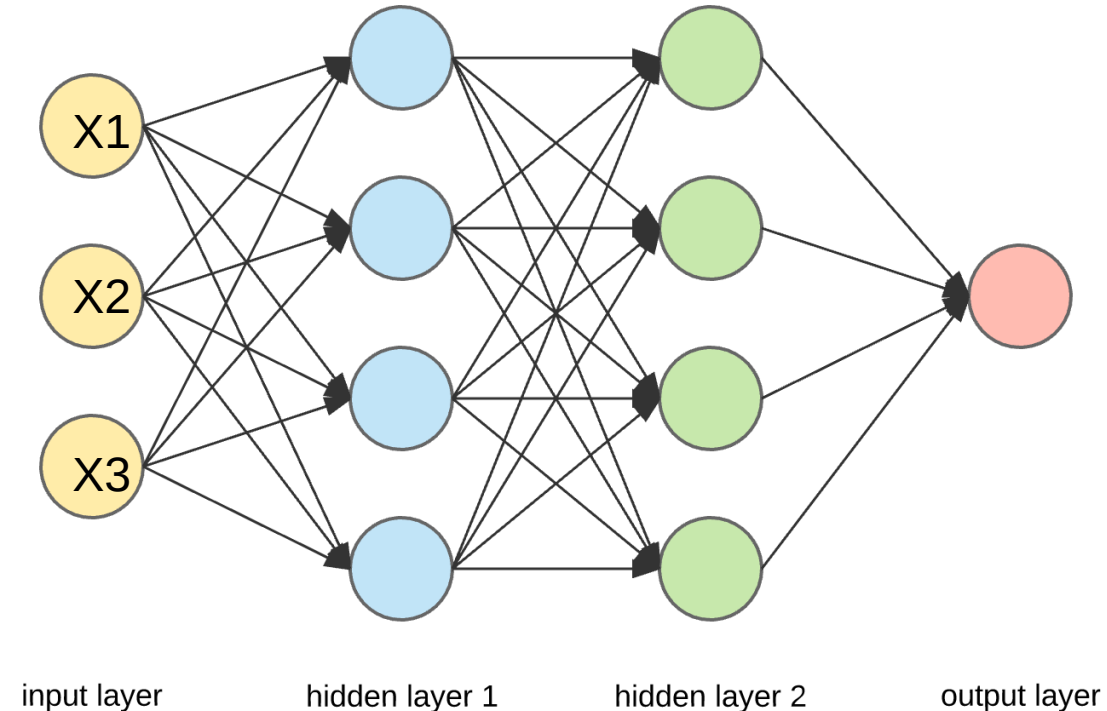
Input 1 (X1): Whether or not the job is from top 3 customers

Input 2 (X2): Is it in Alberta or not?

Input 3 (X3): Is it over \$1M or not?

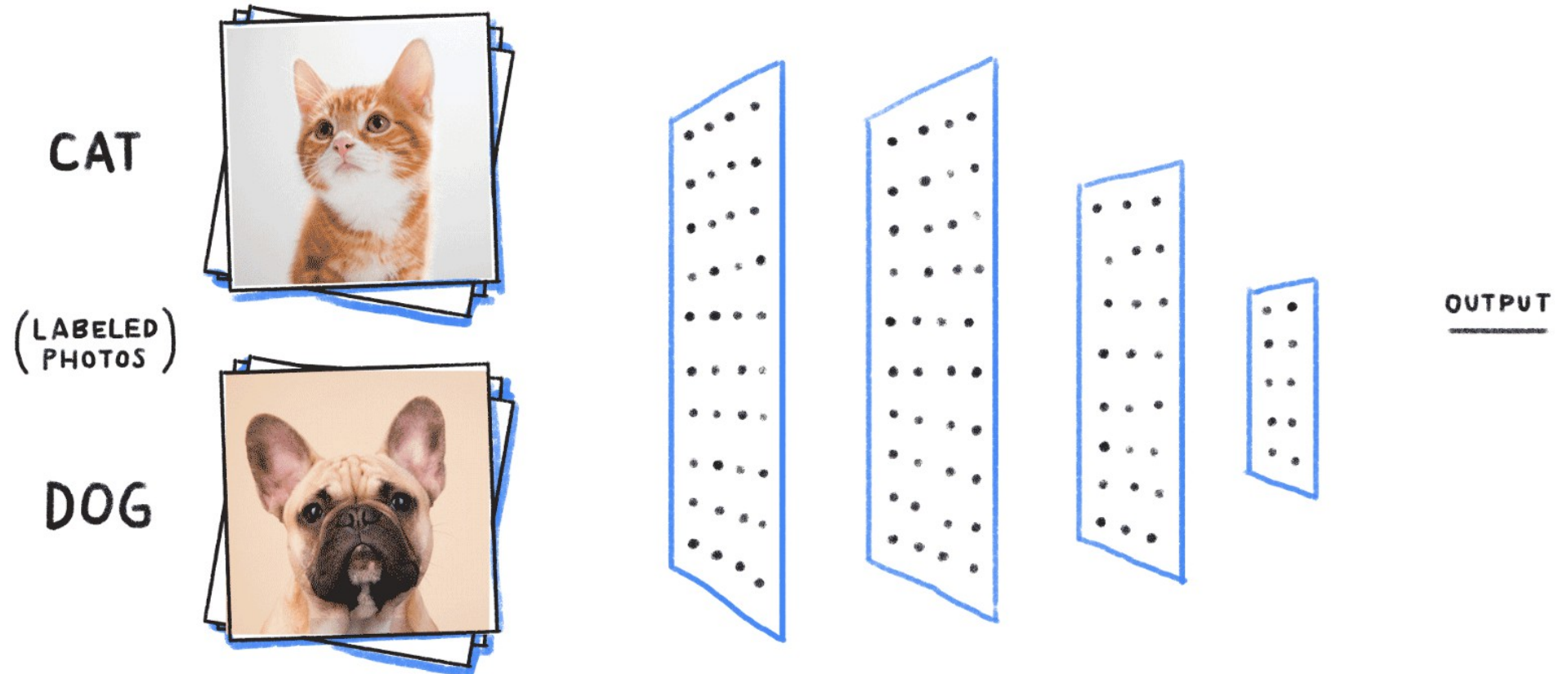
Training data:

- Feed the last 10 years data on my jobs
- Labeled as profitable or not



Artificial Neural Network

Image Clas



Train a digit recognizer on 100 examples from the MNIST database of handwritten digits.

Handwriting Detection

Supervised Learning

```
In[1]:= digit = Classify[
```

```
{2 → 2, 5 → 5, 4 → 8, 0 → 0, 2 → 2, 7 → 7, 5 → 5, 1 → 1,  
3 → 3, 0 → 0, 3 → 3, 9 → 9, 6 → 6, 2 → 2, 8 → 8, 2 → 2,  
0 → 0, 6 → 6, 6 → 6, 1 → 1, 1 → 1, 7 → 7, 8 → 8, 5 → 5,  
0 → 0, 4 → 4, 7 → 7, 6 → 6, 0 → 0, 2 → 2, 5 → 5,  
3 → 3, 1 → 1, 5 → 5, 6 → 6, 7 → 7, 5 → 5, 4 → 4, 1 → 1,  
9 → 9, 3 → 3, 6 → 6, 8 → 8, 0 → 0, 9 → 9, 3 → 3,  
0 → 0, 3 → 3, 7 → 7, 4 → 4, 4 → 4, 3 → 3, 8 → 8, 0 → 0,  
4 → 4, 1 → 1, 3 → 3, 7 → 7, 6 → 6, 4 → 4, 7 → 7, 2 → 2,  
7 → 7, 2 → 2, 5 → 5, 2 → 2, 0 → 0, 9 → 9, 8 → 8,  
9 → 9, 8 → 8, 1 → 1, 6 → 6, 4 → 4, 8 → 8, 5 → 5,  
8 → 8, 0 → 0, 6 → 6, 7 → 7, 4 → 4, 5 → 5, 8 → 8,  
4 → 4, 3 → 3, 1 → 1, 5 → 5, 1 → 1, 9 → 9, 9 → 9, 9 → 9,  
2 → 2, 4 → 4, 7 → 7, 3 → 3, 1 → 1, 9 → 9, 2 → 2, 9 → 9, 6 → 6}]
```

```
Out[1]= ClassifierFunction[ Method: LogisticRegression  
Number of classes: 10]
```

Use the classifier to recognize unseen digits.

```
In[2]:= digit[{0, 1, 2, 3, 4, 5, 6, 7, 8, 9}]
```

```
Out[2]= {0, 1, 2, 3, 4, 1, 4, 7, 8, 9}
```

Analyze the probabilities of a misclassified example.

```
In[3]:= digit[6, "TopProbabilities"]
```

```
Out[3]= {4 → 0.451554, 6 → 0.255324, 0 → 0.242137}
```


Artificial Neural Network

Tweaking hyper-parameters & Deep Learning

Basically we are inventing a best model that will give us the right output based on training data

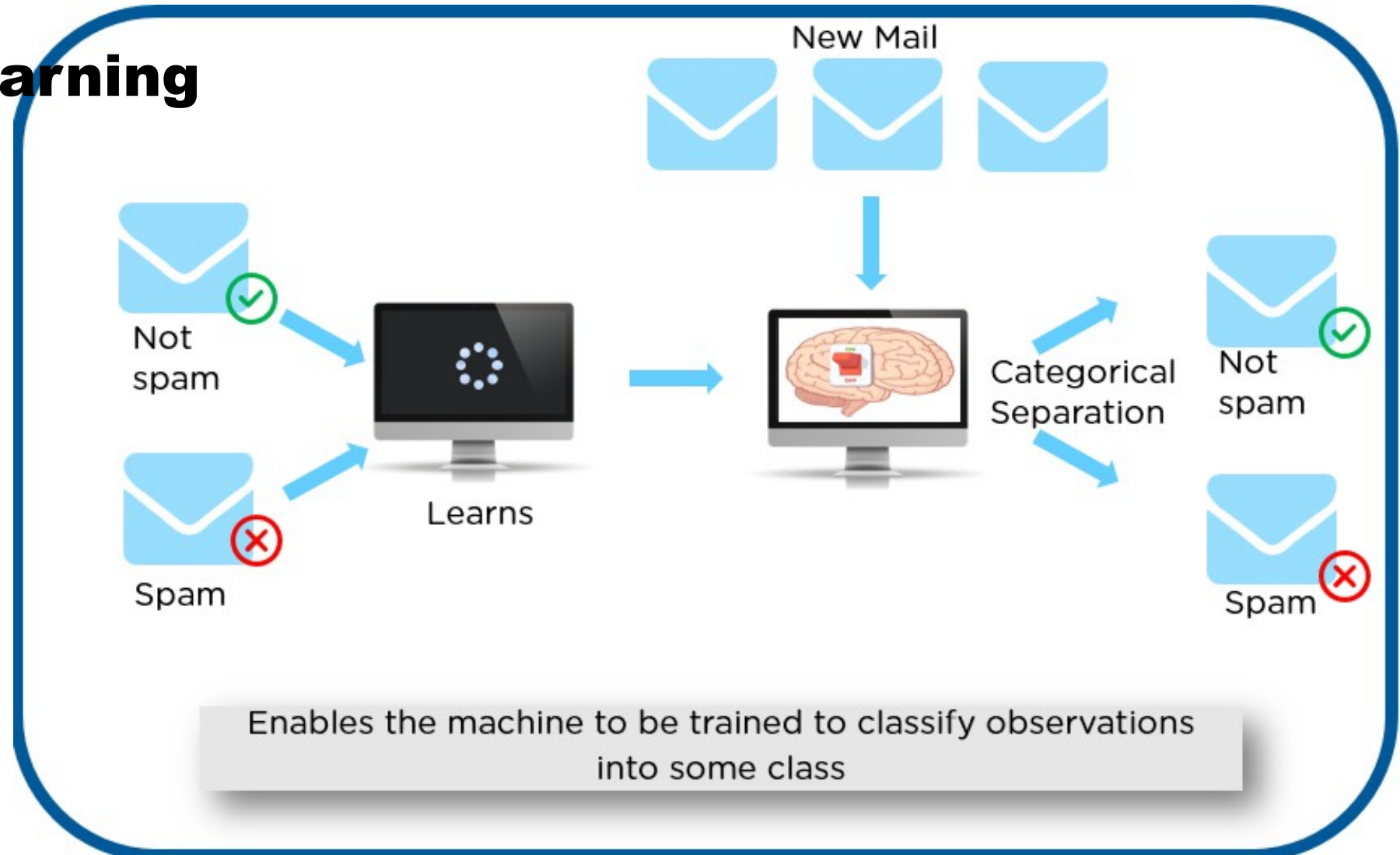


Video – Neural Network – Digit Recognizer



Spam Detection

Supervised Learning

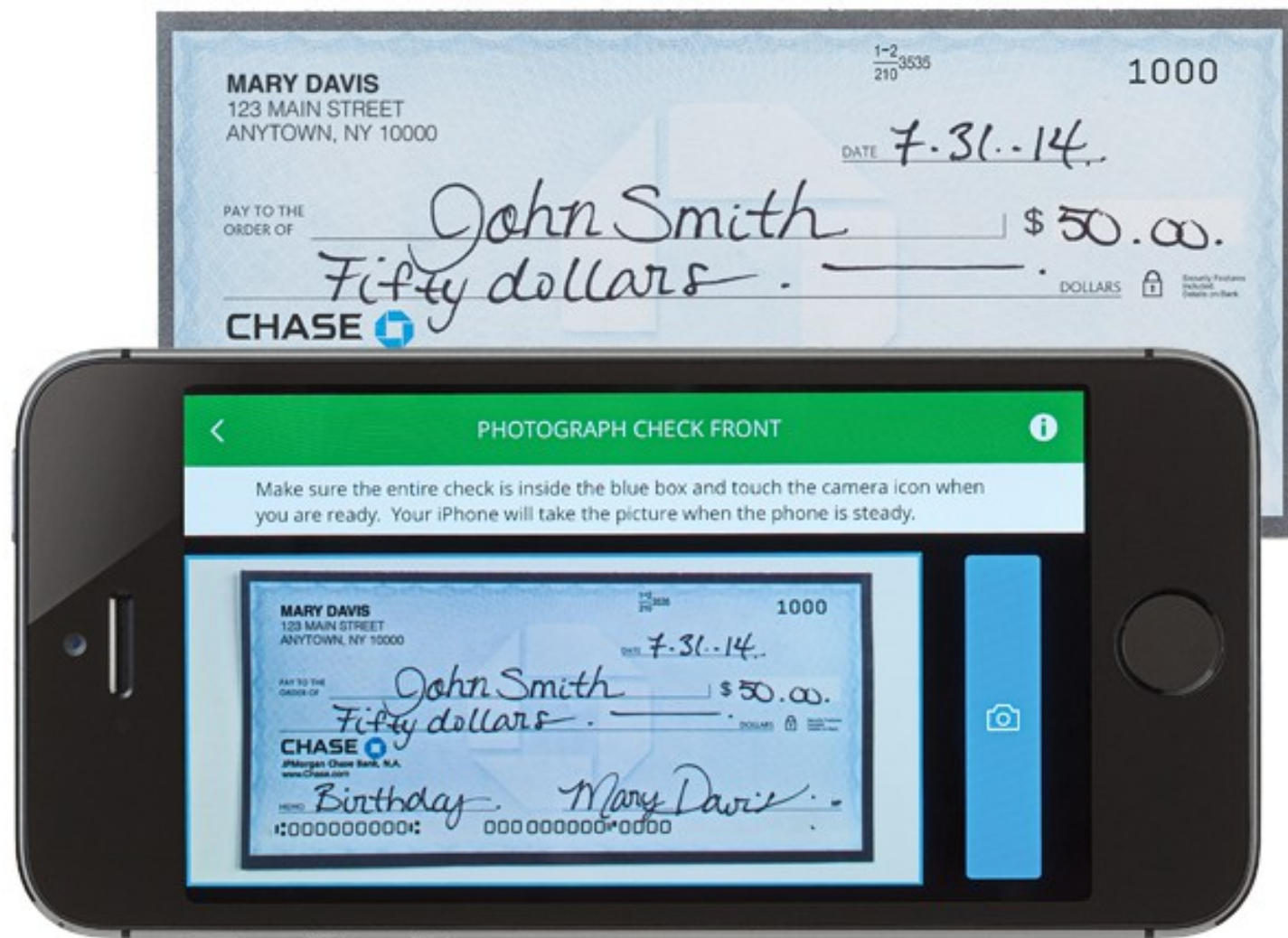


Depositing a check

Supervised Learning

Banks classify writing text on the cheque that you deposit.

Training data: Lots of hand writing data (letters and numbers)



Game Changing Questions

Leveraging AI

- Classifying charges as fraudulent or not
- Will the job complete on time?
- Is the project going to be on budget upon completion?
- Probability of an incident happening on site given specific vendor?
- What is the highest I can charge for this job and yet win the bid?
- And more!

How does learning happen?

Chess learning analogy

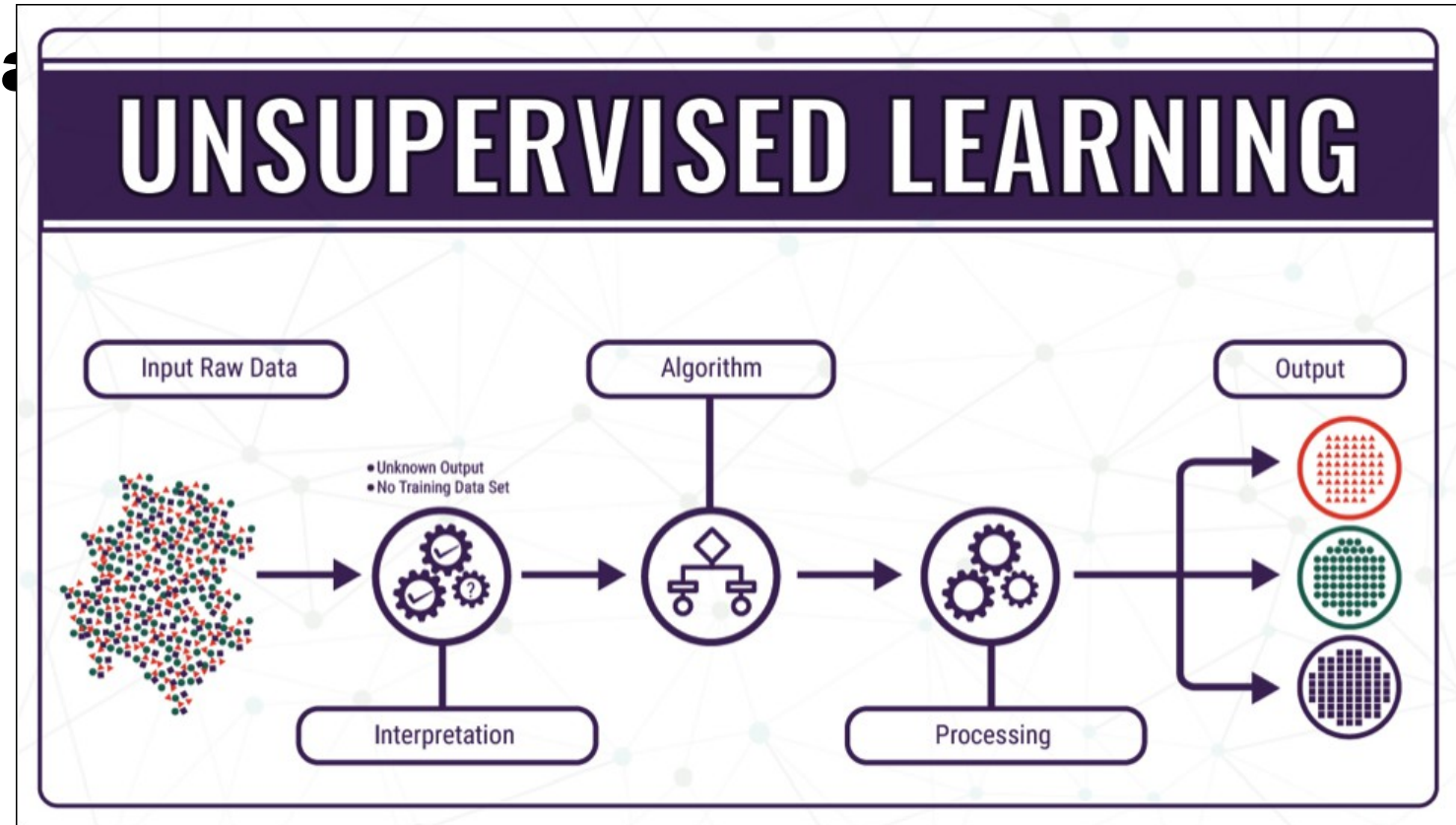
- Get a tutor (supervised learning)
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Unsupervised Learning

When you don't know enough about your data

- The machine learns through observation & find patterns in data
- Output: Clustering your data



Unsupervised Learning

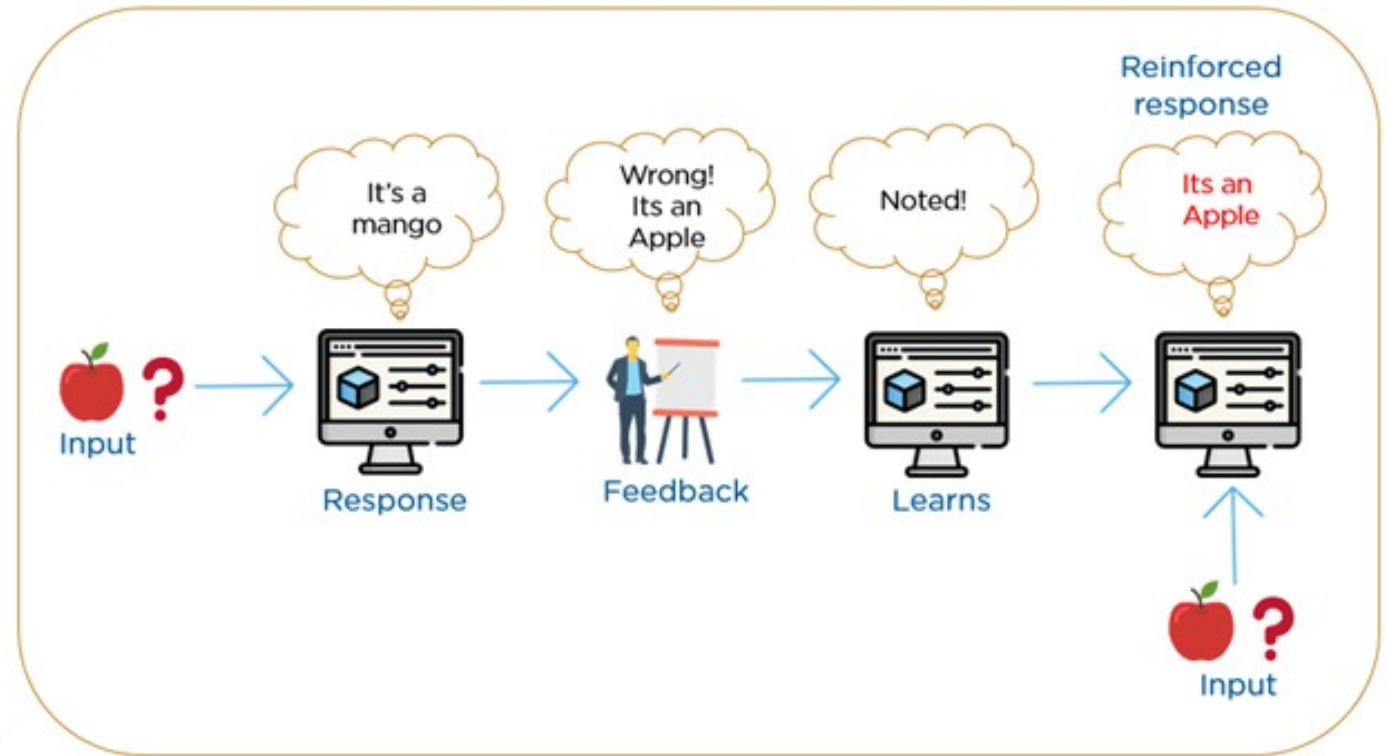
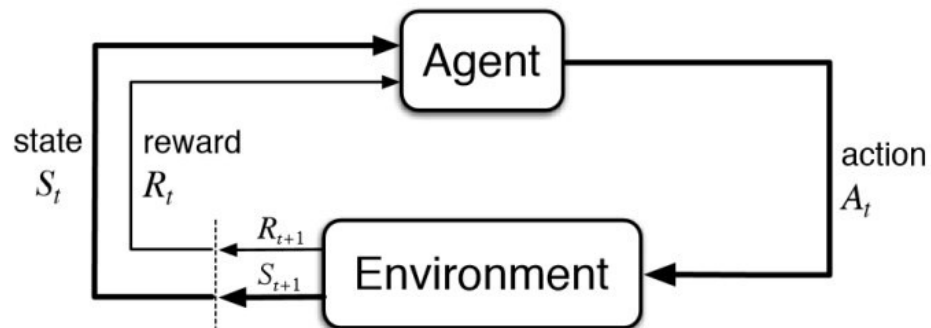
Lots of unlabeled data



- Google news uses unsupervised learning to cluster related news about a topic together
- Grouping of wells: Assuming you have lots of data about individual wells and you have lots of wells and you want to group the wells into specific categories
- Market segmentation: Think about segmenting your customer base so that you can better sell or market to them

Reinforcement Learning

Real-time decisions

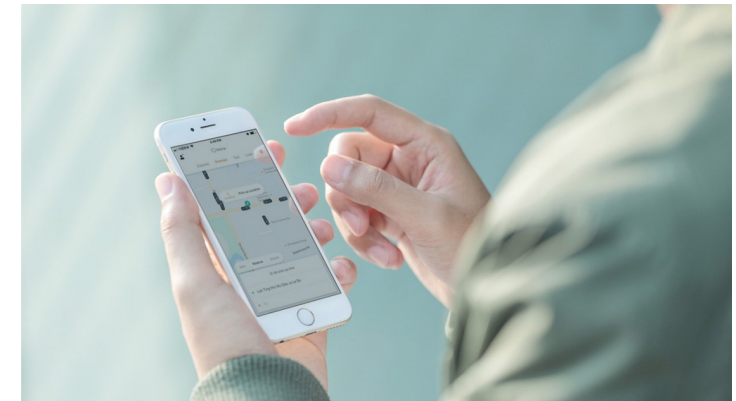


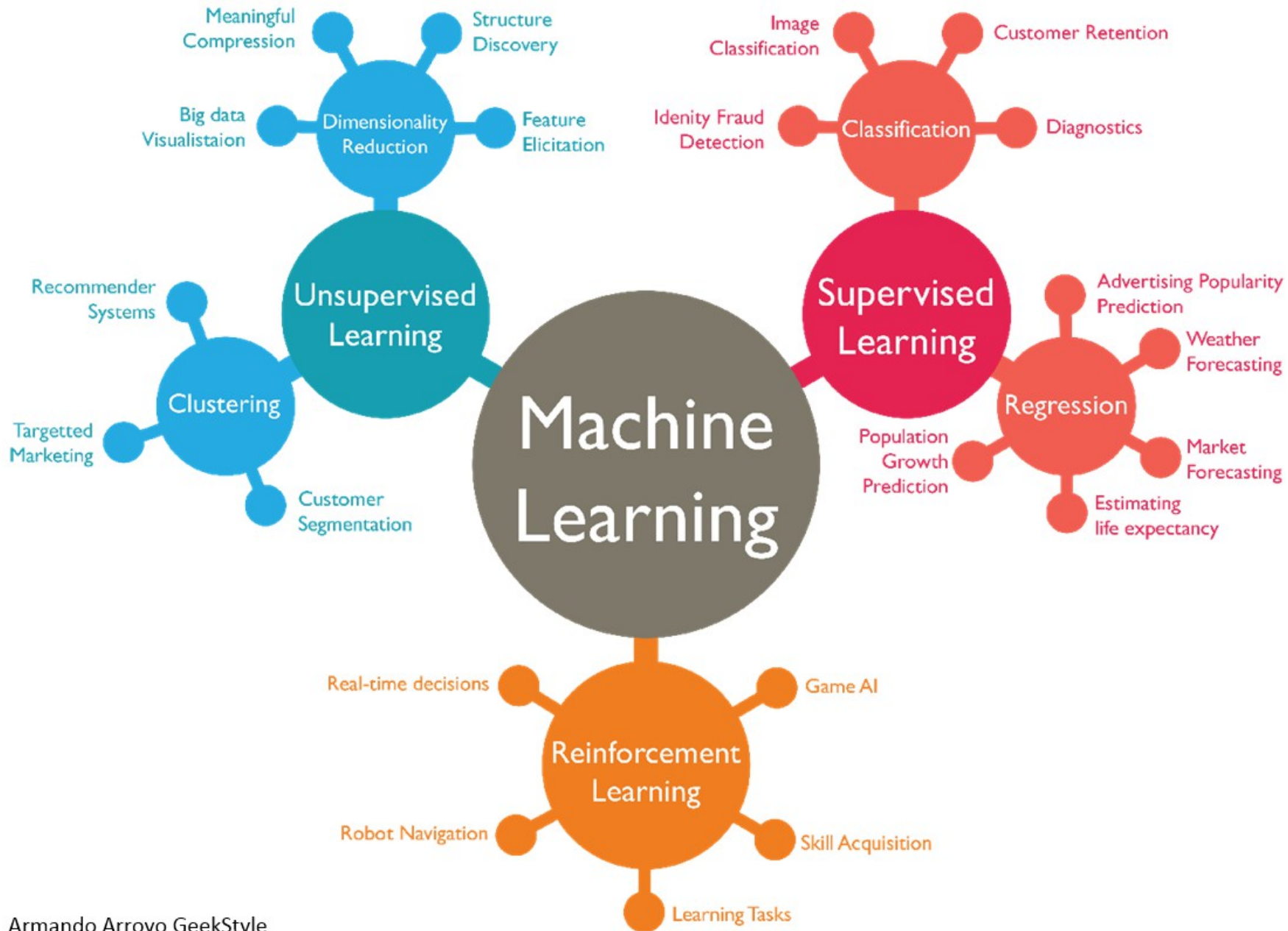
Reinforcement Learning

Car-hailing firm Didi has a new dispatching algorithm that adapts to rider demand

The dispatching system uses reinforcement learning (RL), a subset of machine learning that relies on penalties and rewards to get “agents” to achieve a clear objective.

In this case, the agents are the drivers and the rewards are their payments for completing a ride.





Data as the new currency

Where to start?

Start with data you have

- Pick the one you are most comfortable with
 - Look at your estimates
 - Won bids
 - Progress report for projects (compare and contrast)



Leverage the great tools out there

Data Analytics

Here are few examples:

- PowerBI
- Tableau
- Domo
- Looker



Machine Learning Libraries



There are many open source libraries such as

TensorFlow

Developed by researchers and engineers working on the Google Brain Team within Google's Machine Intelligence research organization

Companies using TensorFlow



Good, the bad and the ugly

Algorithms generated through machine learning can sort through observations of children's behavior in short home videos to determine if the children have autism, a Stanford study has shown.



Home videos of children can be scored to diagnose autism

med.stanford.edu



Good, the bad and the ugly

A face recognition system in China mistook a bus ad for a real person. Top CEO Dong Mingzhu was charged with jaywalking, but it was just a bus-side advert with her face on it.

[...see more](#)



AI Mistakes Bus-Side Ad for Famous CEO, Charges Her With Jaywalking
caixinglobal.com



Good, the bad and the ugly

UK police want to use AI to predict violent crime before it happens
It's the first project of its kind in the world, but pre-empting crime raises ethical concerns.



Exclusive: UK police wants AI to stop violent crime before it happens
newscientist.com



Good, the bad and the ugly

Low-wage workers now tag data that are fed into machine learning algorithms.
This is driving China's AI ambitions.

[...see more](#)



How Cheap Labor Drives China's A.I. Ambitions
nytimes.com



Our Vision At Aimsio



Creating **efficiencies** that are (almost) unimaginable today.

We will **overhaul** industries in need of a digital transformation by leveraging powerful tools like artificial intelligence.

Thank You!



Winner of Canadian Technology
Accelerator Silicon Valley



Winner of highest growth startup -
Prairie region



Winner of Metabridge - Canada's
top 15 tech companies



Runner-up for Innovation in
Technologies - Digital 2018



Canada's top 20 most promising
tech companies at Silicon Valley



UNIVERSITY OF
CALGARY

Department of Computer Science
industry advisory board

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