

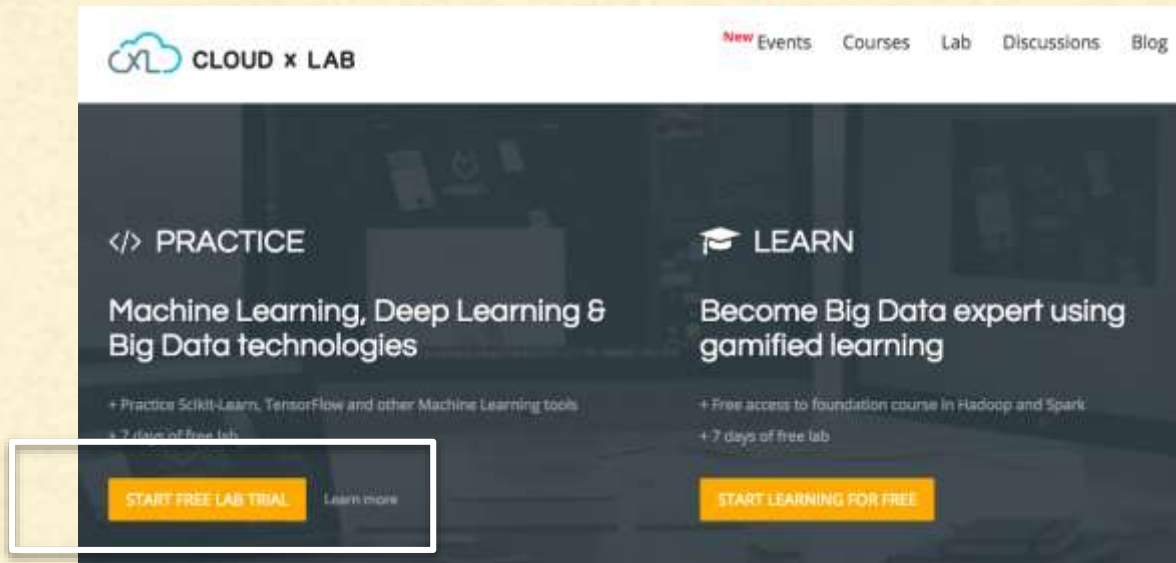


Introduction to Deep Learning

Welcome to first session on Deep Learning

While other are joining, Please enroll for the free lab. This is needed for the hands on session.

Open [CloudxLab.com](https://cloudxlab.com)



Also, please introduce yourself using the chat window and use the Q/A window for asking questions.

About CloudxLab

Making learning fun and for life



Videos



Quizzes



Hands-On



Projects



Case Studies



Real Life Use Cases



Automated Hands-on Assessments



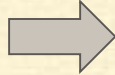
Learn by doing



Automated Hands-on Assessments



Problem Statement



Hands On



Assessment



Automated Hands-on Assessments

Last Attempt Result: 

3 / 87

Last Attempt: 1 week, 2 days ago

Getting Started With Linux Console

Please follow these steps:

1. Log into your CloudxLab Account: [Open CloudxLab](#)
2. Select the **"Credentials"** tab. You should see your login and passwords. You can copy the login and password using the icons.
3. Click on **"Web Console"** (Alternatively you could use SSH or [Putty](#))
4. Enter your login and password. You can copy-paste from **"My Lab"**
5. If you are successfully logged in, please click on "I am Done! Please Check" button below.



I am Done! Please Check

Problem Statement

Evaluation



Edit

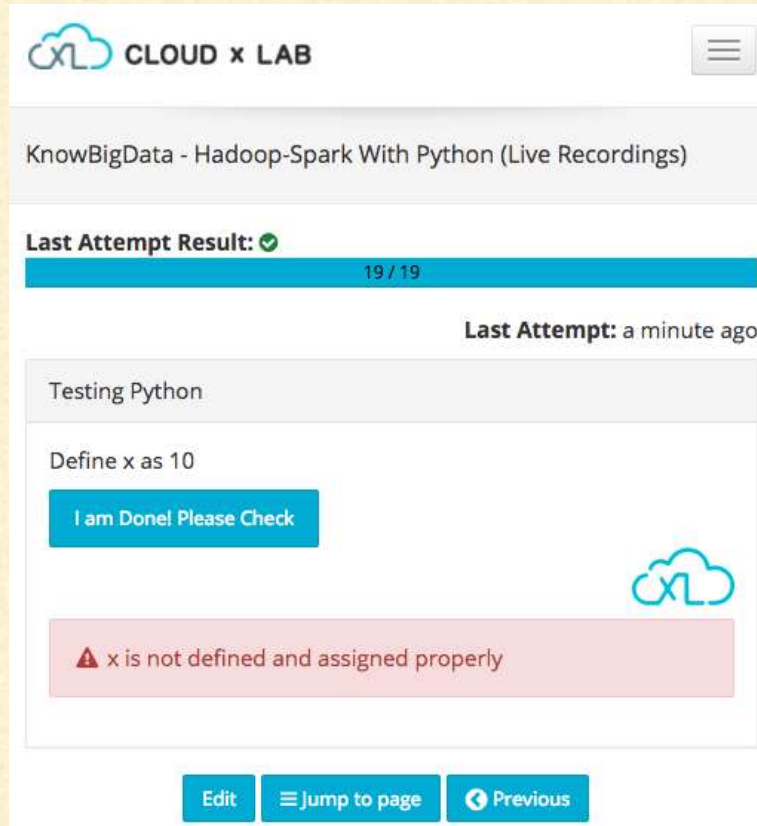
Jump to page

Previous

Next

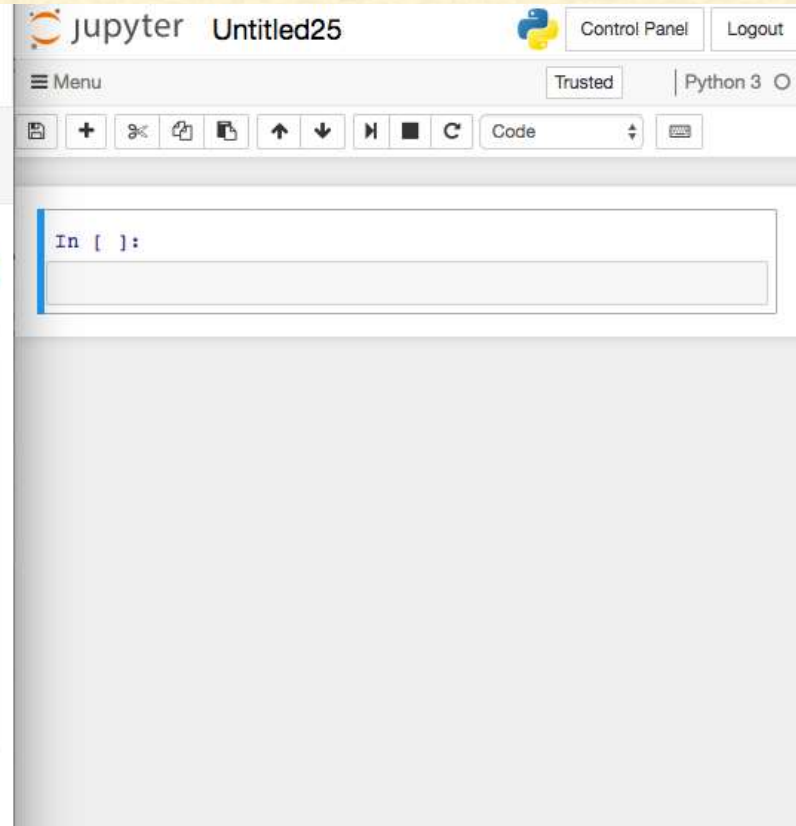


Automated Hands-on Assessments



The screenshot shows the CLOUD x LAB interface. At the top, the logo "CLOUD x LAB" is visible. Below it, the title "KnowBigData - Hadoop-Spark With Python (Live Recordings)" is displayed. A green checkmark indicates a successful "Last Attempt Result" with a score of "19 / 19". The text "Last Attempt: a minute ago" is shown. The main section is titled "Testing Python" and contains the instruction "Define x as 10". A blue button labeled "I am Done! Please Check" is present. A red error message box states "x is not defined and assigned properly". At the bottom, there are three buttons: "Edit", "Jump to page", and "Previous".

[Python Assessment](#)

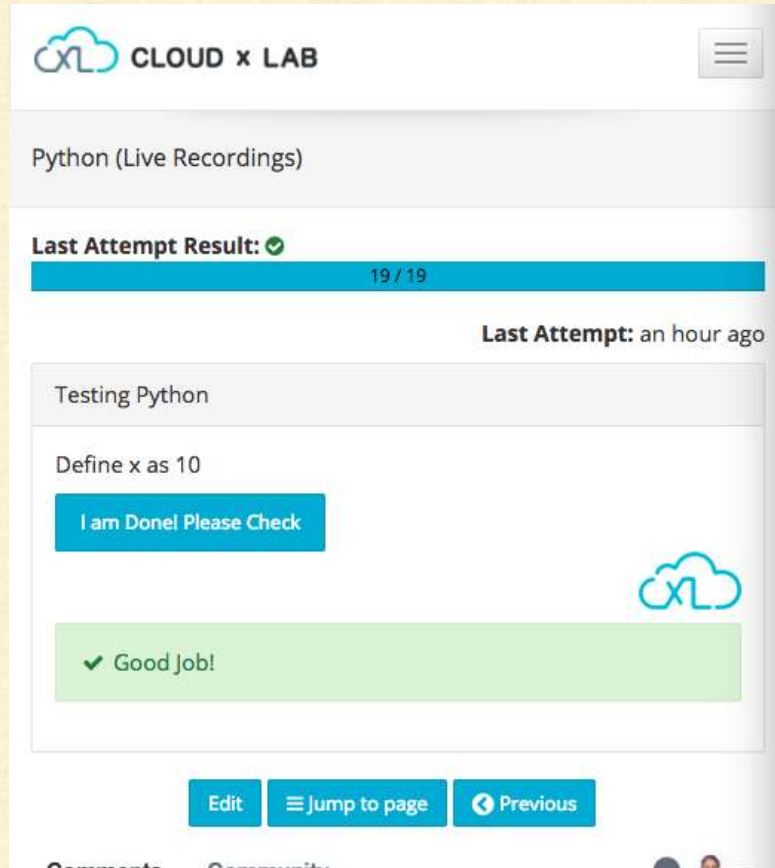


The screenshot shows the Jupyter Notebook interface. At the top, the logo "jupyter" is visible, followed by the title "Untitled25". The "Control Panel" and "Logout" buttons are in the top right. The "Menu" button is on the left. The "Trusted" status is indicated. The "Python 3" kernel is selected. The toolbar contains various icons for file operations and execution. The code editor shows a single line of code: "In []:". The output area is empty.

[Jupyter Notebook](#)

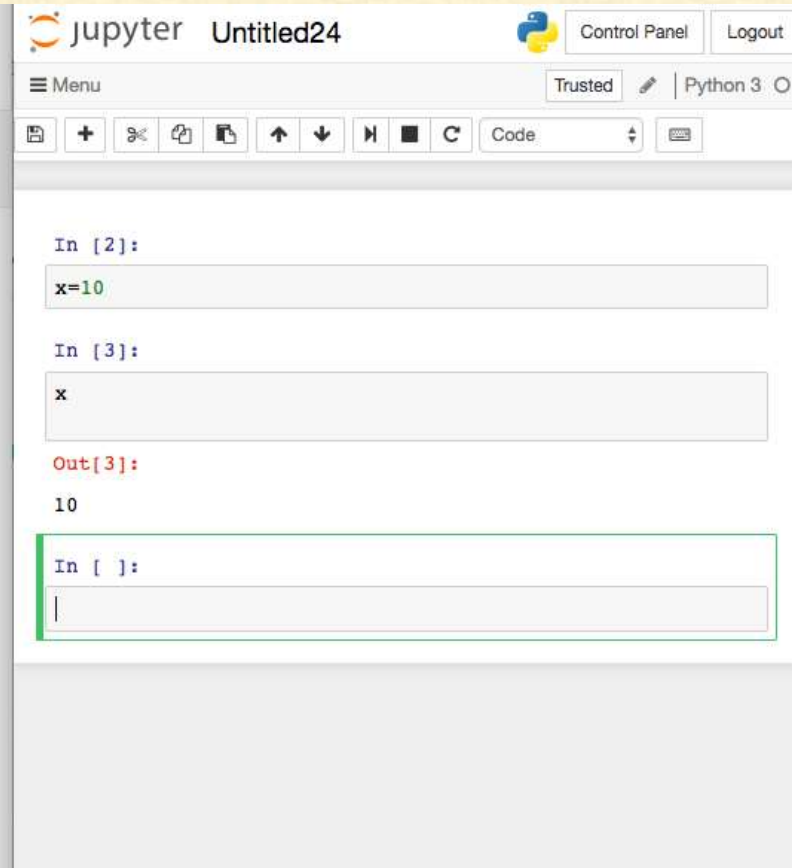


Automated Hands-on Assessments



The screenshot shows the CLOUD x LAB interface for a Python assessment. At the top, the logo "CLOUD x LAB" is visible. Below it, the text "Python (Live Recordings)" is displayed. A green bar indicates the "Last Attempt Result: ✓" with a score of "19 / 19". Below this, it says "Last Attempt: an hour ago". The main section is titled "Testing Python" and contains the instruction "Define x as 10". A blue button labeled "I am Done! Please Check" is present. A green box at the bottom of the main section says "✓ Good Job!". At the bottom of the interface, there are buttons for "Edit", "Jump to page", and "Previous".

[Python Assessment](#)



The screenshot shows the Jupyter Notebook interface. At the top, the logo "jupyter" and the title "Untitled24" are visible. On the right, there are buttons for "Control Panel" and "Logout". Below the title bar, there is a "Menu" button and a "Trusted" status indicator. The main area contains three code cells. The first cell is labeled "In [2]:" and contains the code "x=10". The second cell is labeled "In [3]:" and contains the code "x". The output of the second cell is displayed below it, labeled "Out[3]:" and shows the value "10". The third cell is labeled "In []:" and is currently empty.

[Jupyter Notebook](#)



Course Objective



**Deep Learning
with
TensorFlow**



Course Instructor



Sandeep Giri

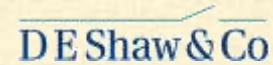
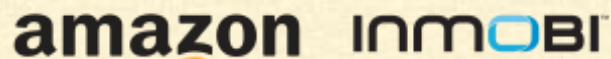
Founder



CLOUD x LAB

Loves Explaining Technologies

Software Engineer



Worked On Large Scale Computing

Graduated from IIT Roorkee



Getting Started with free Lab

1. Open CloudxLab
2. If already Enrolled, go to step 5
3. Else Click on "Start Free Lab"
 - a. And Complete the process of enrollment
 - b. You might have sign using credit card or college id
4. Go to MyLab
5. Open Jupyter

What is Deep Learning?

Let us understand it with real use case...

Have You Played Mario?



How much time did it take you to learn & win the princess?

Have You Played Mario?



Did Anyone teach you?

How About Automating it?



How About Automating it?

- Program Learns to Play Mario



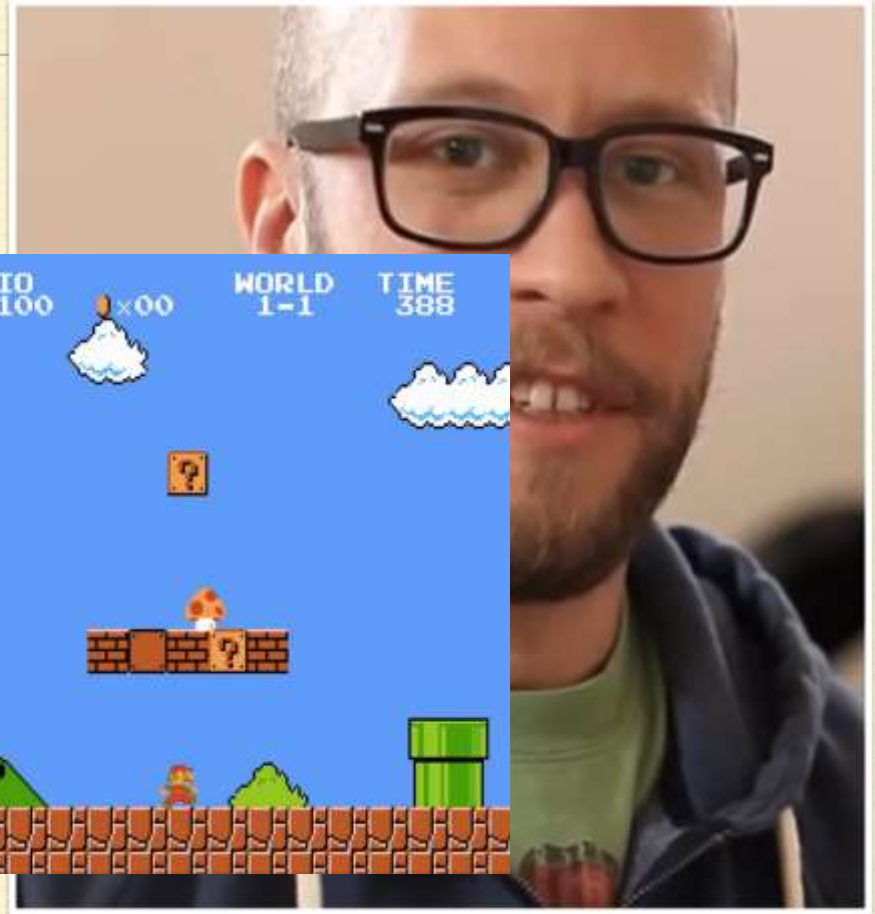
How About Automating it?

- Program Learns to Play Mario
- Observes the game & pressed keys



How About Automating it?

- Program Learns to Play Mario
- Observes the game & pressed keys
- Maximises Score



How About Automating it?



How About Automating it?

- So, the program learnt to play
 - Mario
 - And Other games
 - Without any programming



Question


To make this program learn any other games such as PacMan we will have to

1. Write new rules as per the game
2. Just hook it to new game and let it play for a while

Question

To make this program learn any other games such as PacMan we will have to

1. Write new rules as per the game

 2. **Just hook it to new game and let it play for a while**

Imagine Doing The Same For Life



Gather data and automatically solve problems

The Deep Learning Tsunami - I

- Self driving cars on the roads



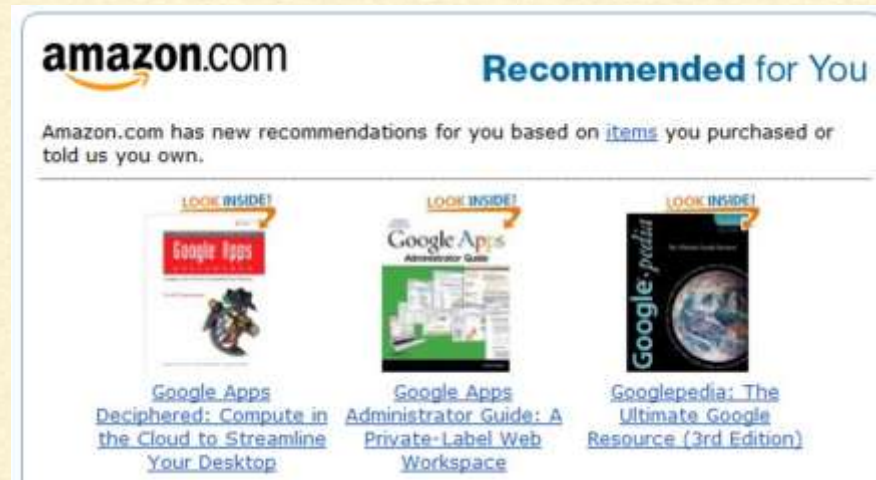
The Deep Learning Tsunami - 2

- Netflix movies recommendations



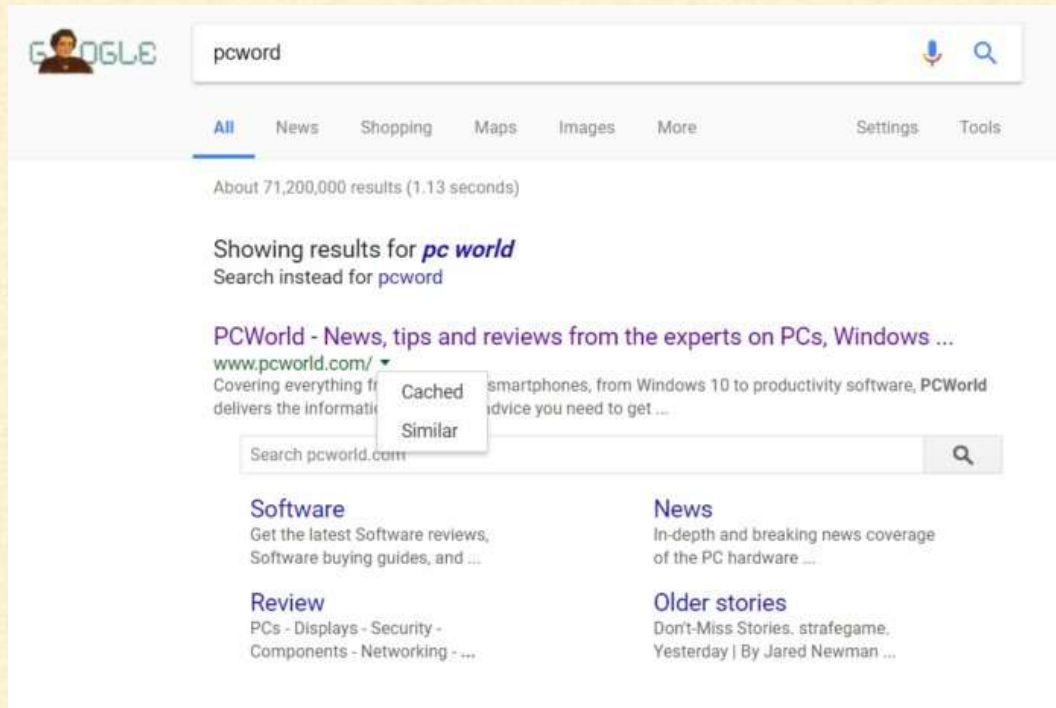
The Deep Learning Tsunami - 3

- Amazon product recommendations



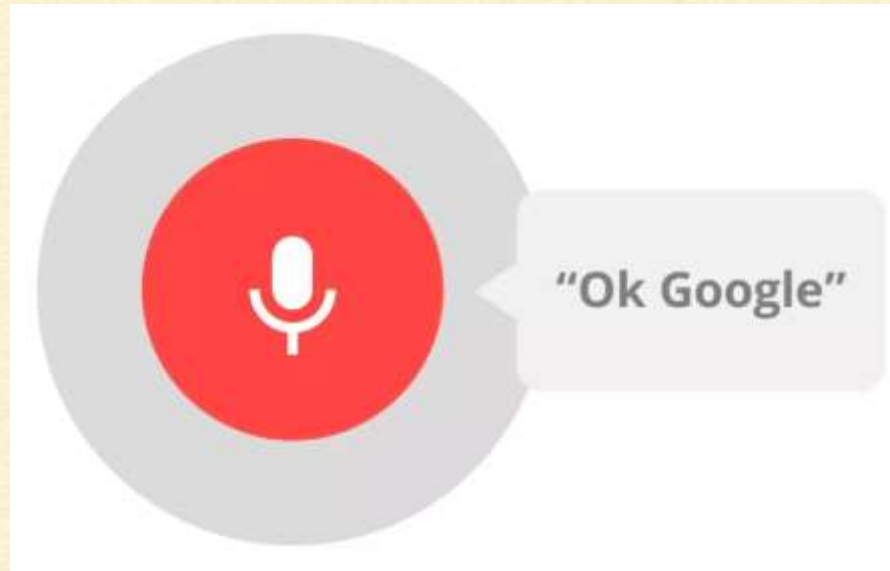
The Deep Learning Tsunami - 4

- Accurate results in Google Search



The Deep Learning Tsunami - 5

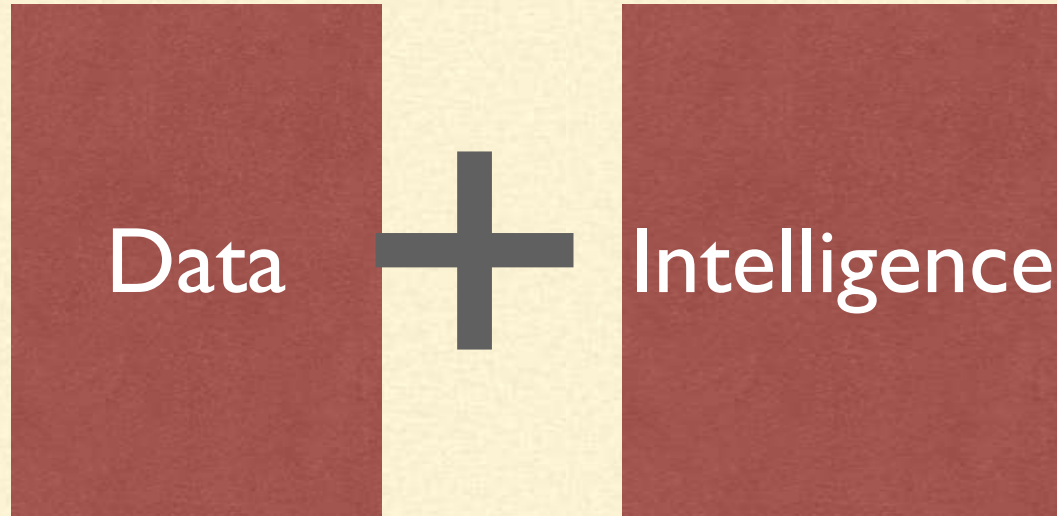
- Speech recognition in your smartphone



Question

What do we need to

- Gather Data
- And automatically solving the problem?



Gather Data



Collect Data - IOT



Phone & Devices

Cheaper, faster and smaller



Connectivity

Wifi, 4G, NFC, GPS

Process Data - Parallel Computing

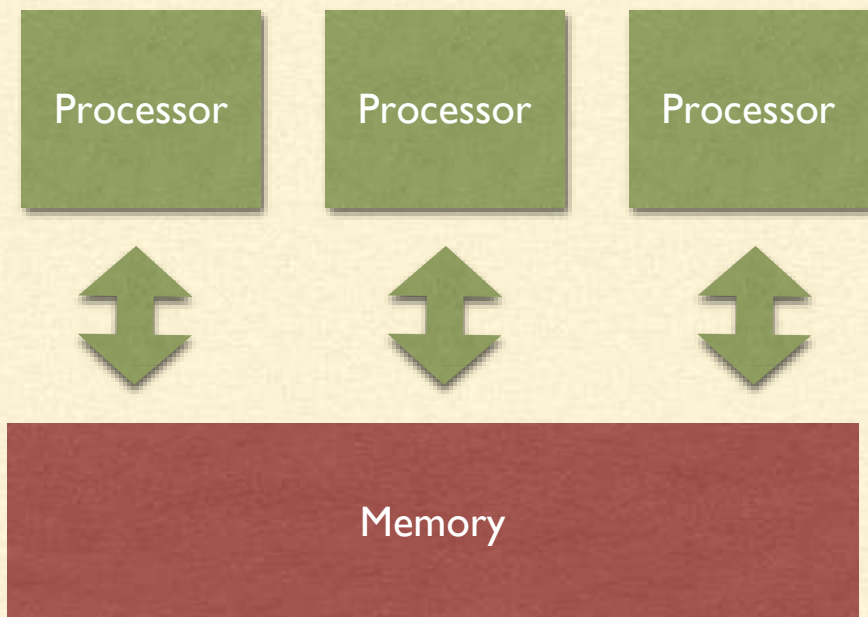
Distributed



- Groups of networked computers
- Interact with each other
- To achieve a common goal










Process Data - Parallel Computing

Multi Core + GPGPU (General Purpose Graphics Processing Units)



- Many processors or Cores
- Perform tasks and interact using
- Memory or bus

Process Data - Parallel Computing

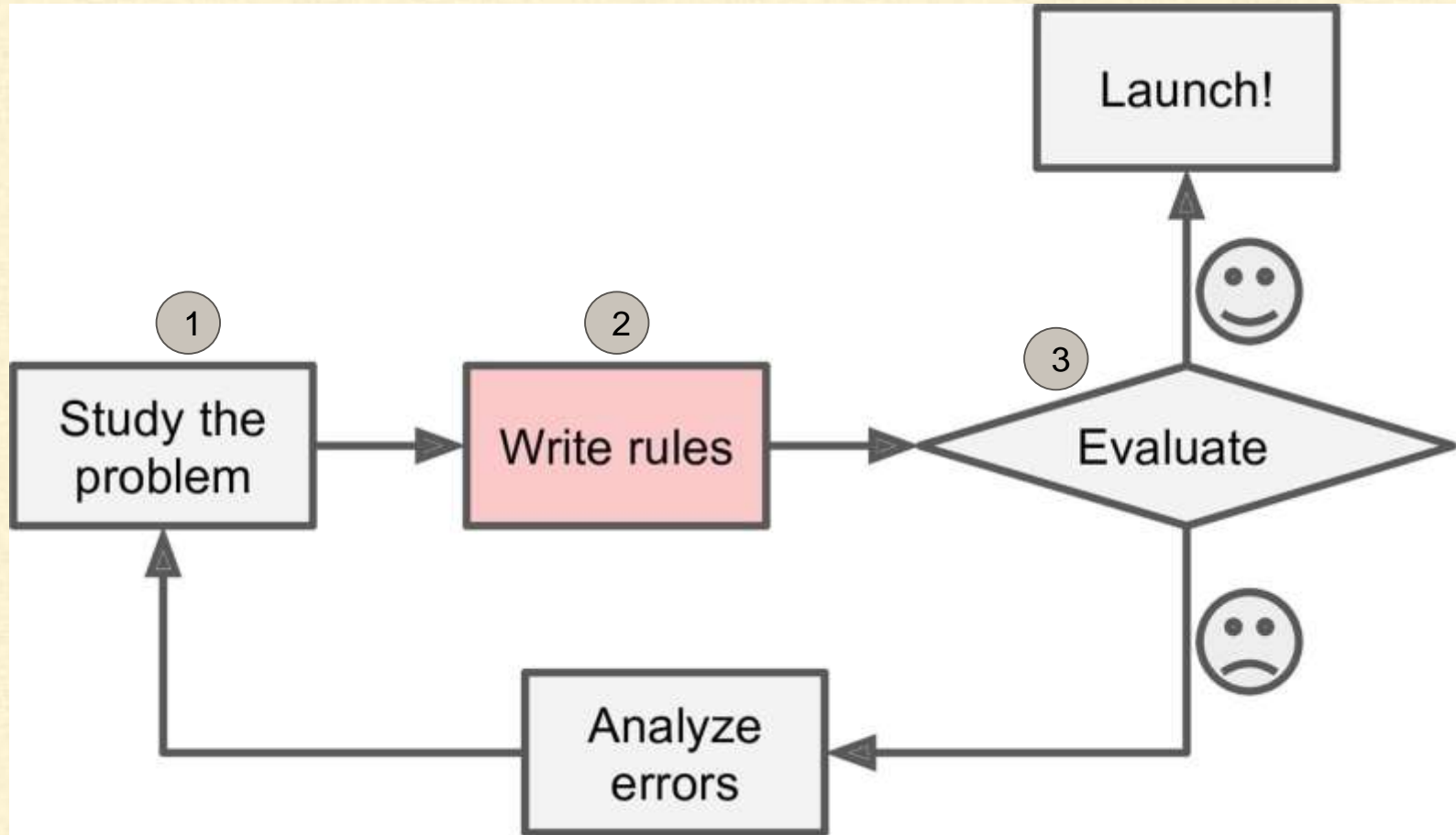
	MULTI CORE	GPGPU	DISTRIBUTED
CAN HANDLE HUGE DATA? (DISK READ INTENSIVE)			
REALLY FAST COMMUNICATION BETWEEN CPUS			
GREAT FOR MATHS/GRAPHICS?			
TOOLS	Hadoop MR, Apache Spark	Keras, TensorFlow, Caffe, Spark (Exp)	Hadoop MR, Apache Spark

Intelligence - Traditional vs Deep Learning.



How you would write a spam filter?

Intelligence - Spam Filter - Traditional Approach



Intelligence - Spam Filter - Traditional Approach

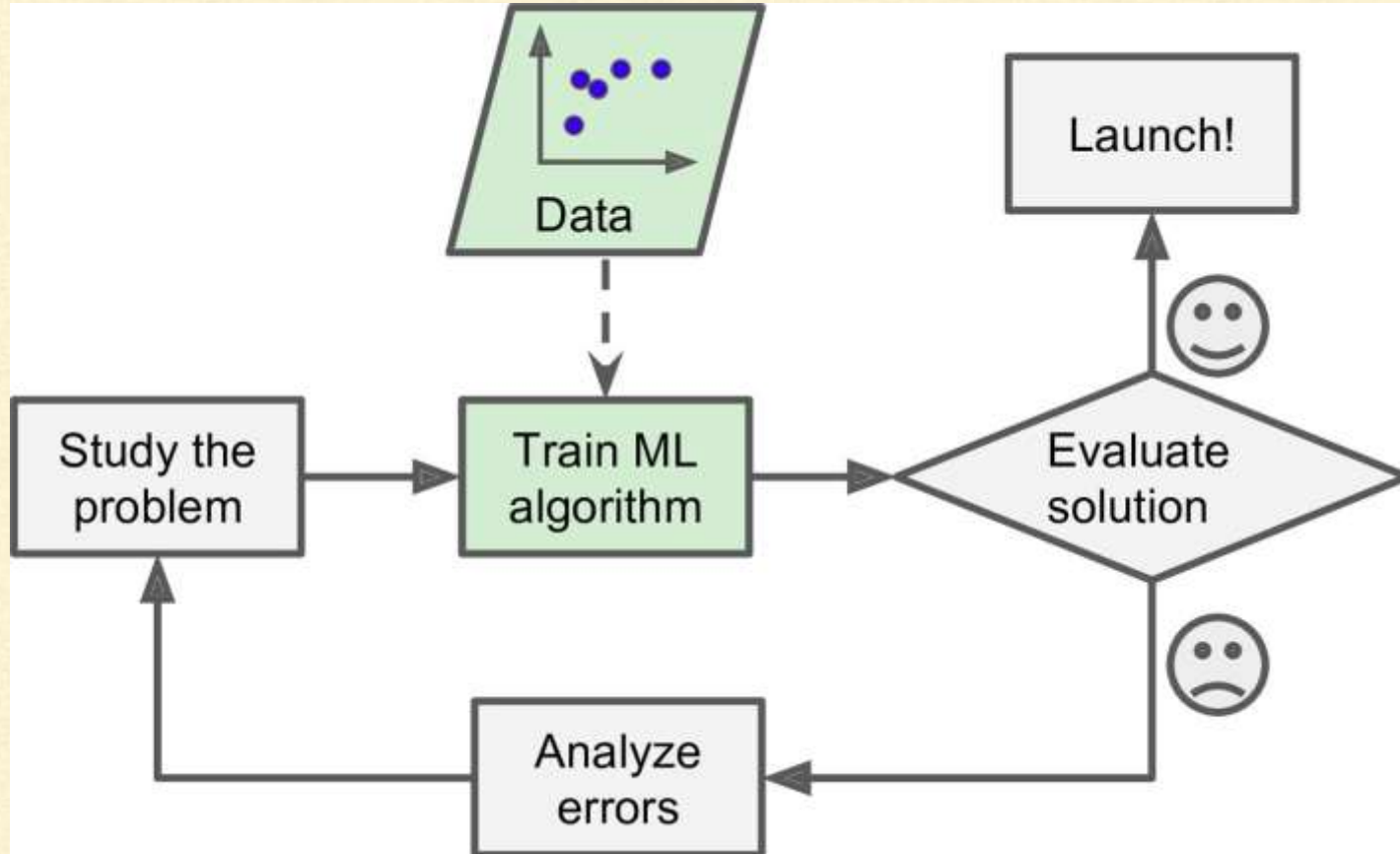
Problems?

Intelligence - Spam Filter - Traditional Approach

Problems?

- Problem is not trivial
 - Program will likely become a long list of complex rules
 - Pretty hard to maintain
- If spammers notice that
 - All their emails containing **“4U”** are blocked
 - They might start writing **“For U”** instead
 - If spammers keep working around spam filter, we will need to keep writing new rules forever

Intelligence - Spam Filter - ML Approach

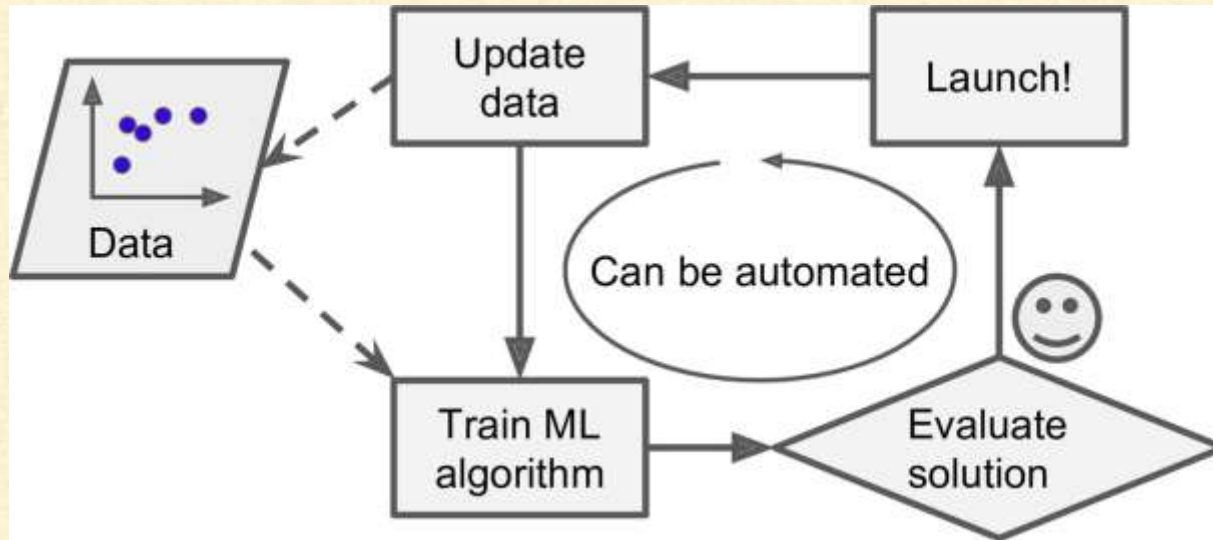


Intelligence - Spam Filter - Deep Learning Approach

- A spam filter based on Machine Learning techniques automatically learns
 - Which words and phrases are good predictors of spam
 - By detecting unusually frequent patterns of words
- The program will be
 - Much shorter
 - Easier to maintain
 - Most likely more accurate than traditional approach

Intelligence - Spam Filter - Deep Learning Approach

- Unlike traditional approach, Deep Learning techniques automatically notice that
 - **“For U”** has become unusually frequent in spam flagged by users and
 - It starts flagging them without our intervention



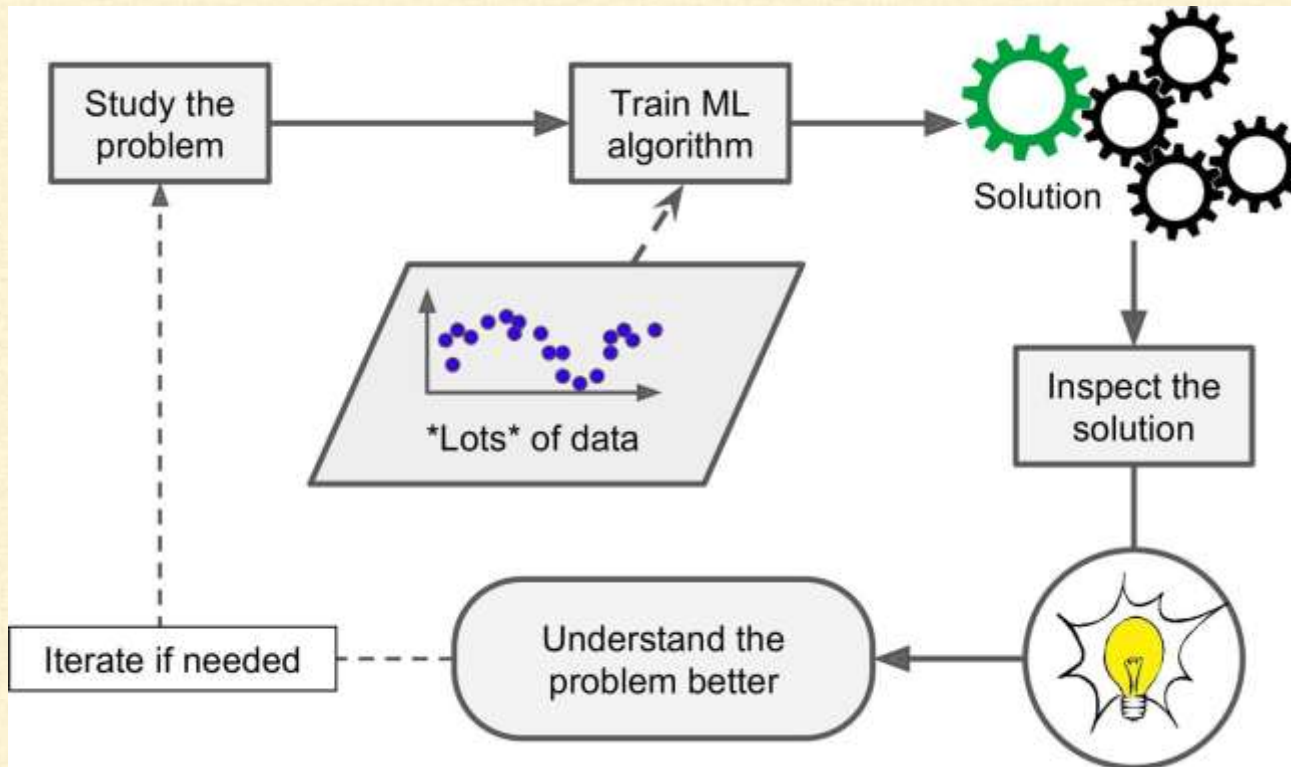
Intelligence - Spam Filter - Deep Learning Approach

Can help humans learn

- Deep Learning algorithms can be inspected to see what they have learned
- Spam filter after enough training
 - Reveals combinations of words that it believes are best predictors of spam
 - May reveal unsuspected correlations or new trend and
 - Lead to a better understanding of the problem for humans

Intelligence - Spam Filter - Deep Learning Approach

Can help humans learn

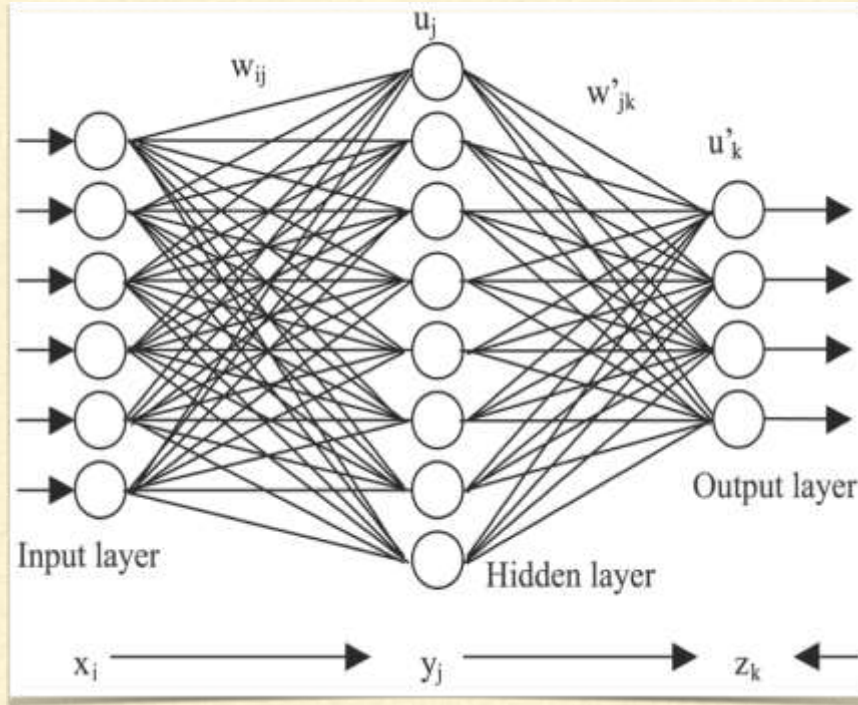


Deep Learning - Artificial Neural Network(ANN)



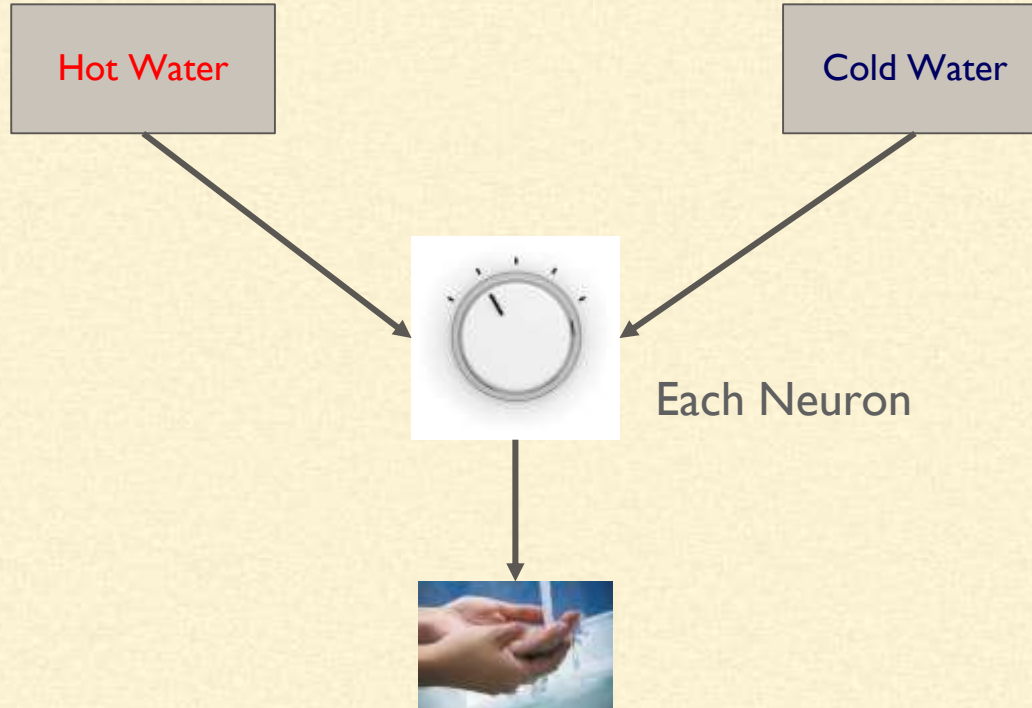
Computing systems inspired by the biological neural networks that constitute animal brains.

Deep Learning - Artificial Neural Network(ANN)



- Learn (progressively improve performance)
- To do tasks by considering examples
- Generally without task-specific programming
- Example: Based on image - cat or no cat?

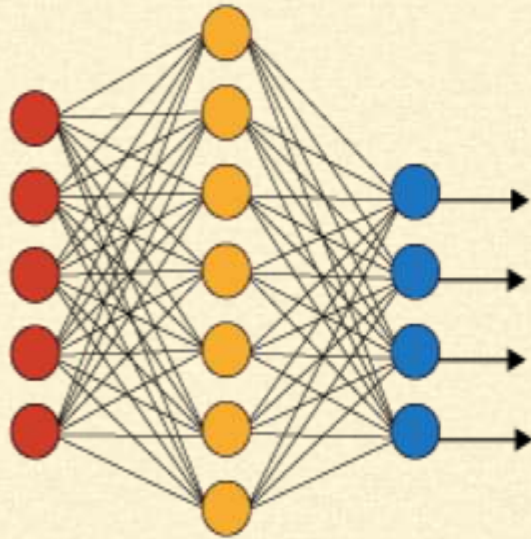
Deep Learning



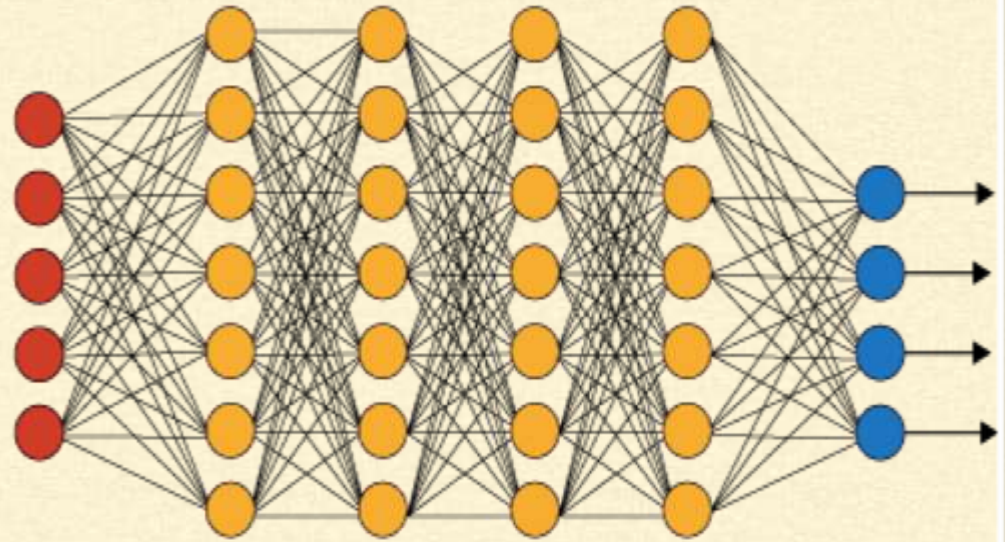
Each Neuron is like the knob.

Deep Learning

Simple Neural Network



Deep Learning Neural Network



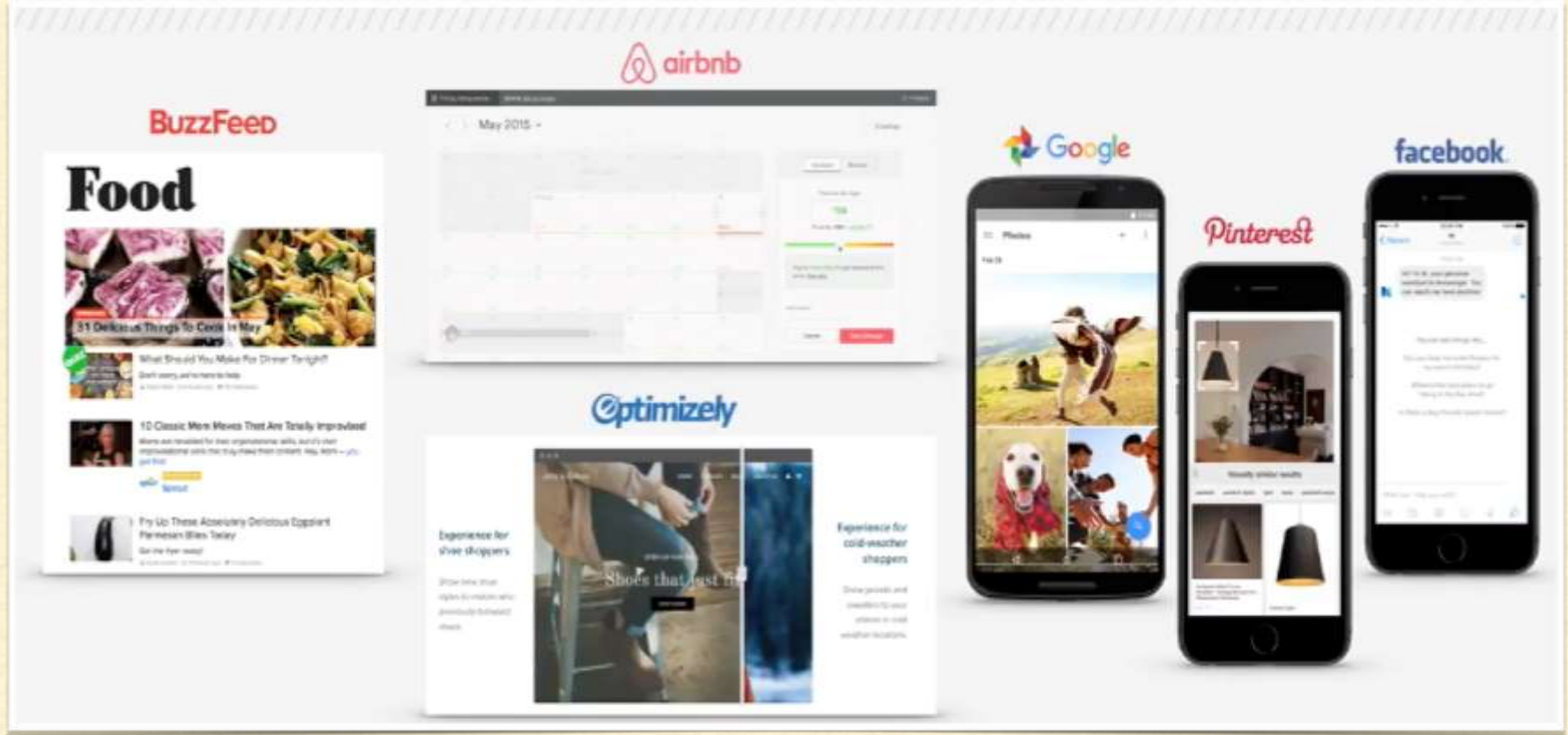
● Input Layer

● Hidden Layer

● Output Layer

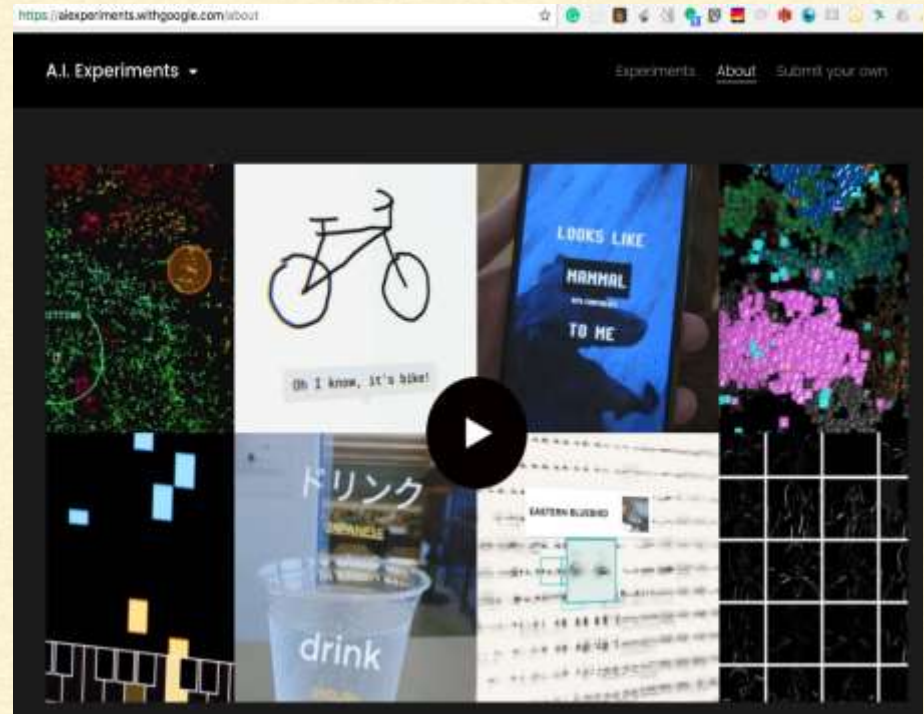
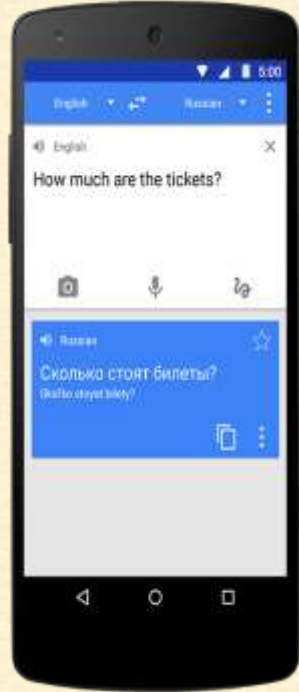
Multiple layers of neurons

Deep Learning - Who is Using?



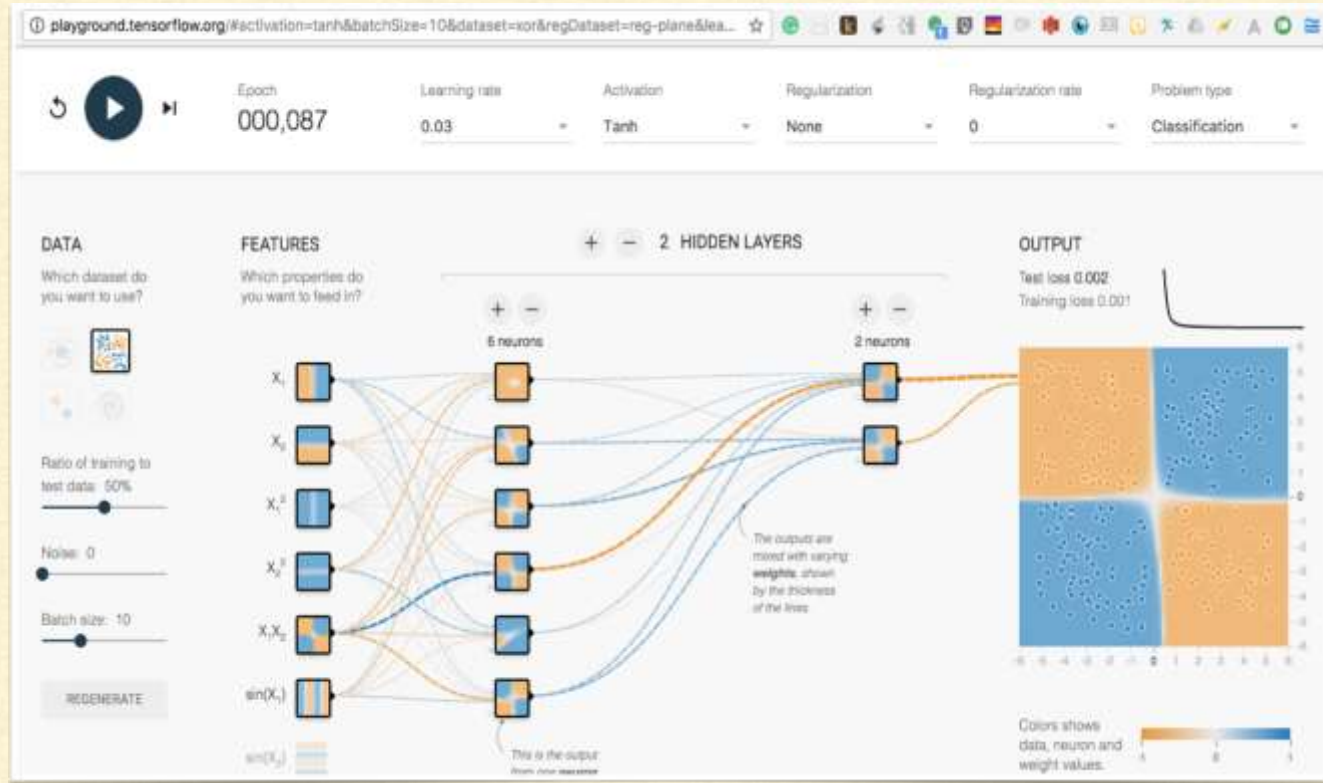
Almost Everyone

Google Translate & Auto Draw



More use cases: <https://aiexperiments.withgoogle.com/>

TensorFlow - Demo



<http://playground.tensorflow.org/>

Deep Learning Frameworks



theano




Keras


Caffe



Course on Deep Learning

Learn TensorFlow, Convolutional Neural Networks, Recurrent Neural Networks, Autoencoders and Reinforcement Learning From Industry Experts

 **36+ hours training**

 **Projects & Lab**

 **24x7 Support**



1 course

Learn from industry experts. Follow the suggested order or choose your own.



1:1 Mentoring

Subscribe to 1:1 mentoring sessions and get guidance from industry leaders and professionals.



Projects & Lab

Apply the skills you learn on a distributed cluster to solve real-world problems.



Best-in-class Support

24x7 support and forum access to answer all your queries throughout your learning journey.



Certificate

Highlight your new skills on your resume or LinkedIn.



1. Hands On with TensorFlow

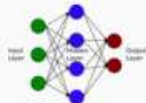


👤 500 Learners

Start Now

0%

2. Artificial Neural Network



👤 500 Learners

Start Now

0%

3. Training Deep Neural Networks



👤 500 Learners

Start Now

0%

4. Distributed TensorFlow



👤 500 Learners

Start Now

0%

5. Convolutional Neural Networks



👤 500 Learners

Start Now

6. Recurrent Neural Networks



👤 500 Learners

Start Now

7. Autoencoders



👤 500 Learners

Start Now

8. Reinforcement Learning



👤 500 Learners

Start Now



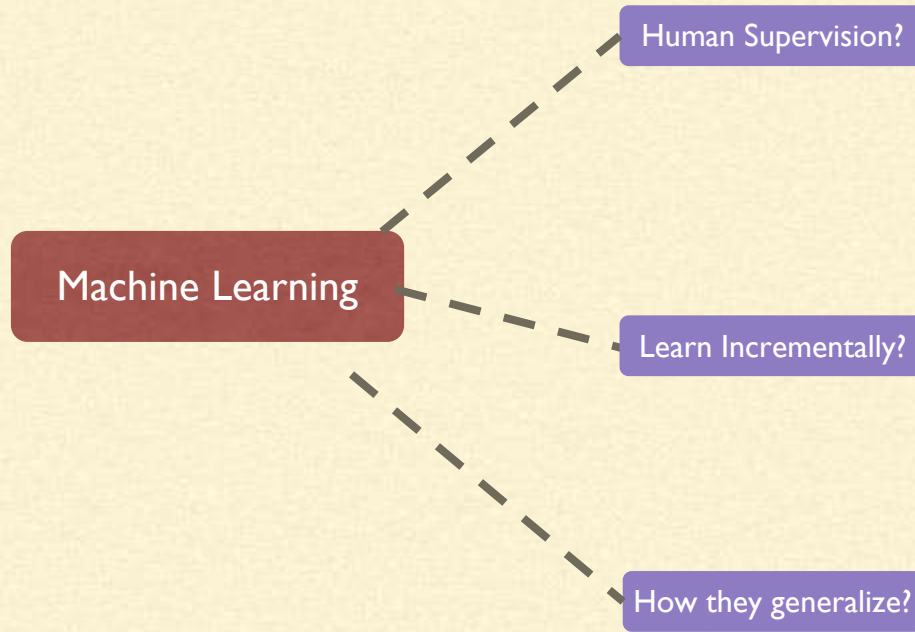
Questions?

<https://discuss.cloudxlab.com>

reachus@cloudxlab.com

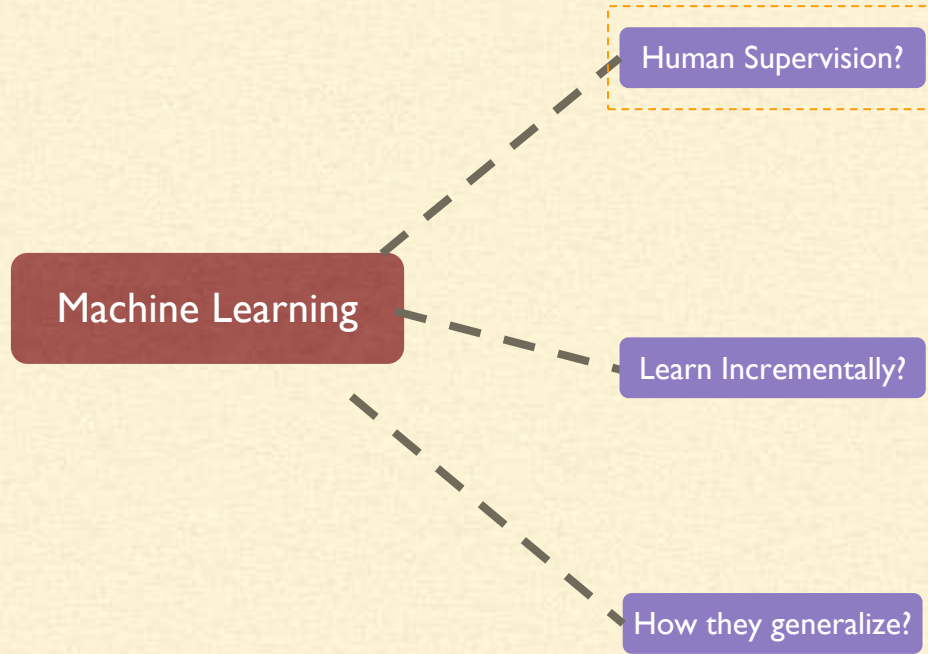


Machine Learning - Types



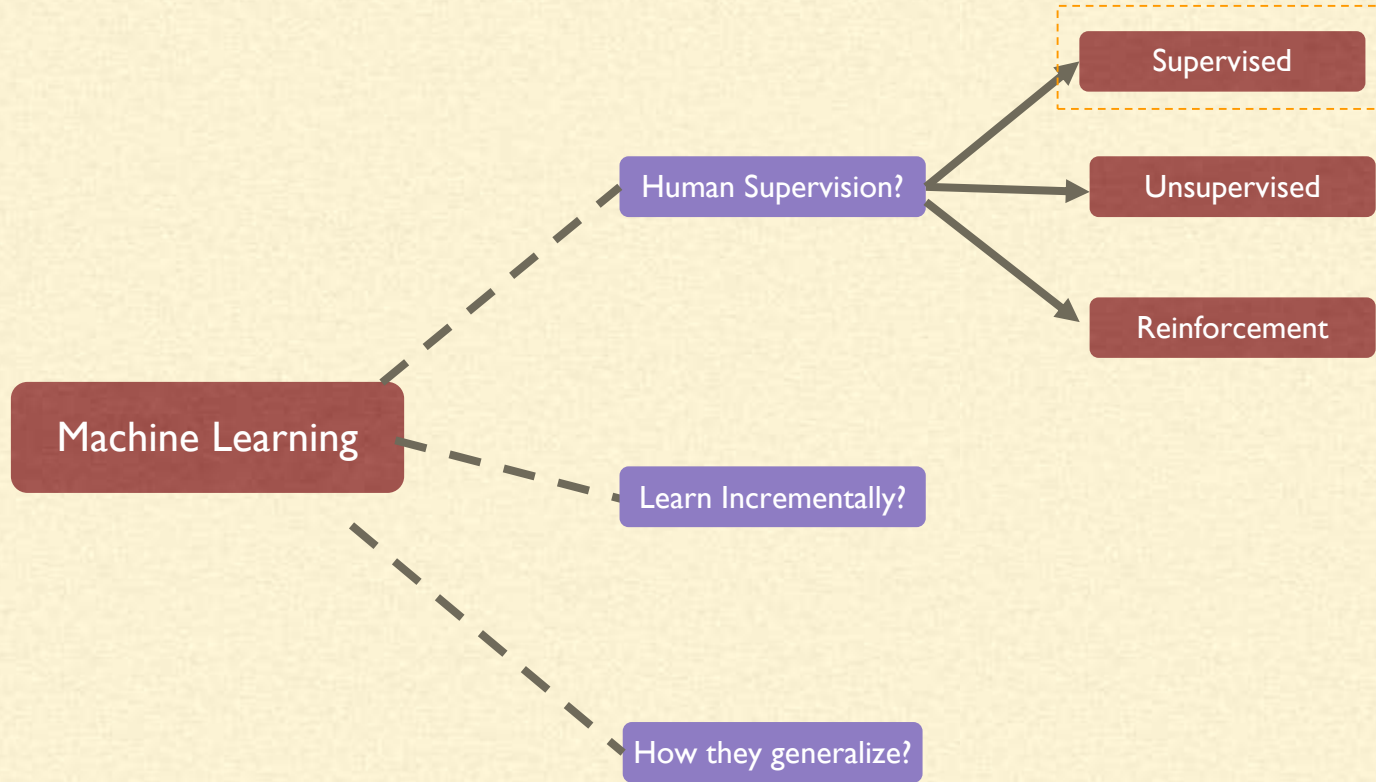
Deep Learning

Machine Learning - Types



Deep Learning

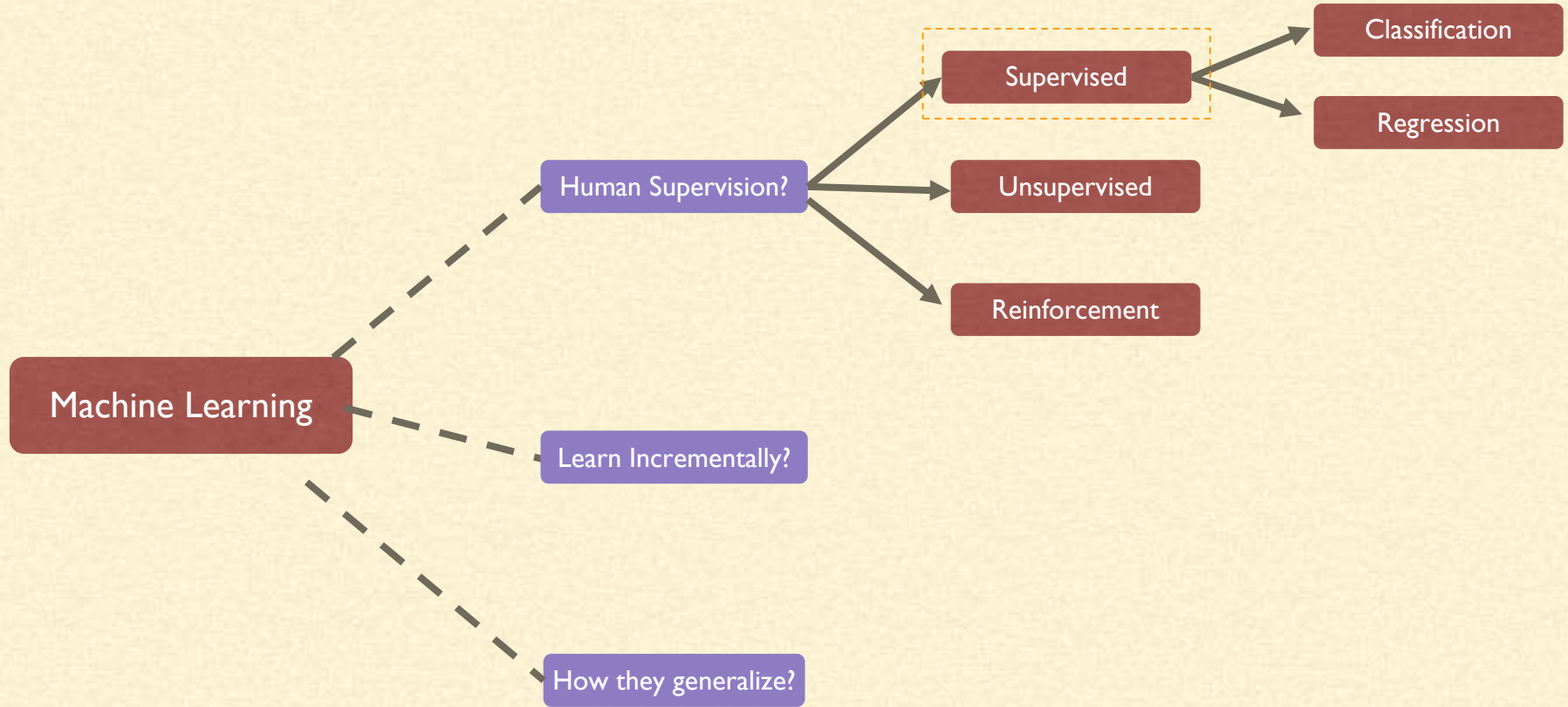
Machine Learning - Types



Machine Learning - Supervised Learning

Whether or not models are trained with human supervision

Machine Learning - Types



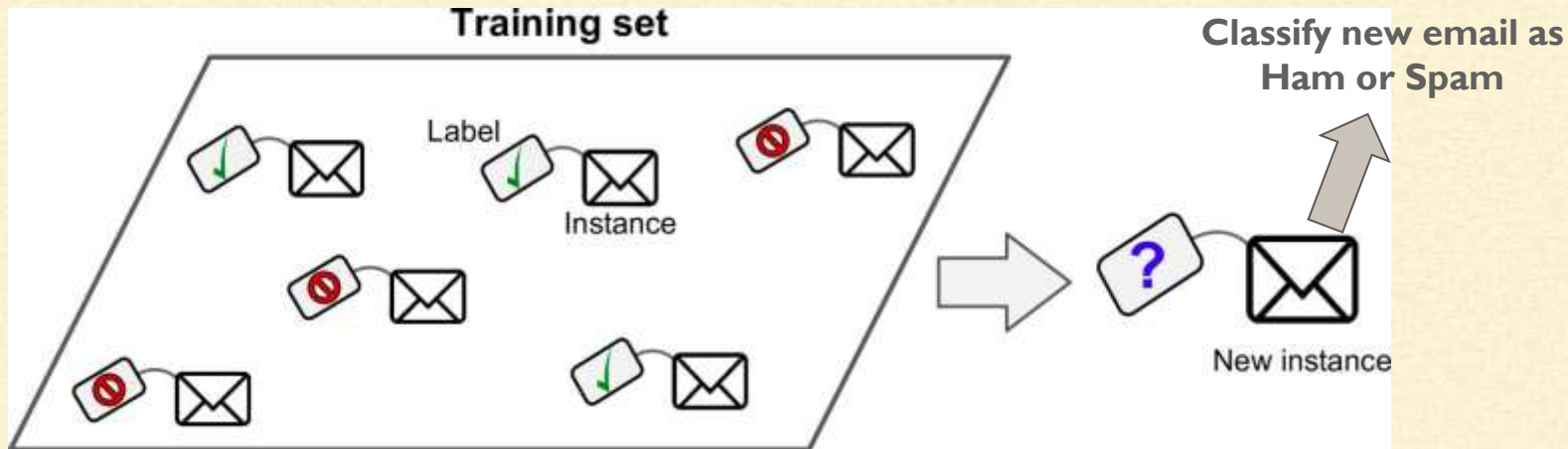
Machine Learning - Supervised Learning

Classification

- The training data we feed to the algorithm includes
 - The desired solutions, called labels
- Classification of **spam filter** is a supervised learning task

Machine Learning - Supervised Learning

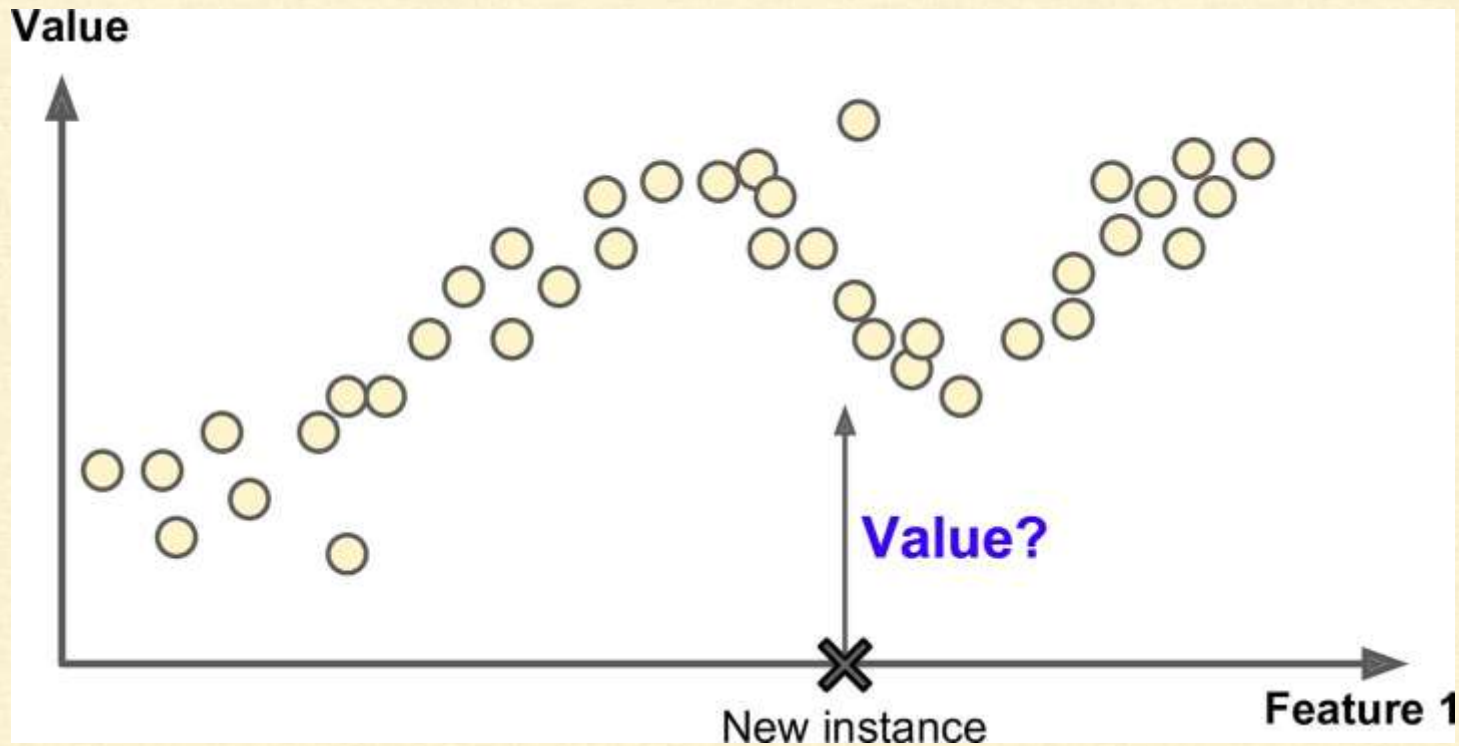
Classification



- Spam filter
 - Is trained with many example emails called training data.
 - Each email in the training data contains the label if it is spam or ham(not spam)
 - Models then learns to classify new emails if they are spam or ham

Machine Learning - Supervised Learning

Regression - Predict the price of the car (Value)

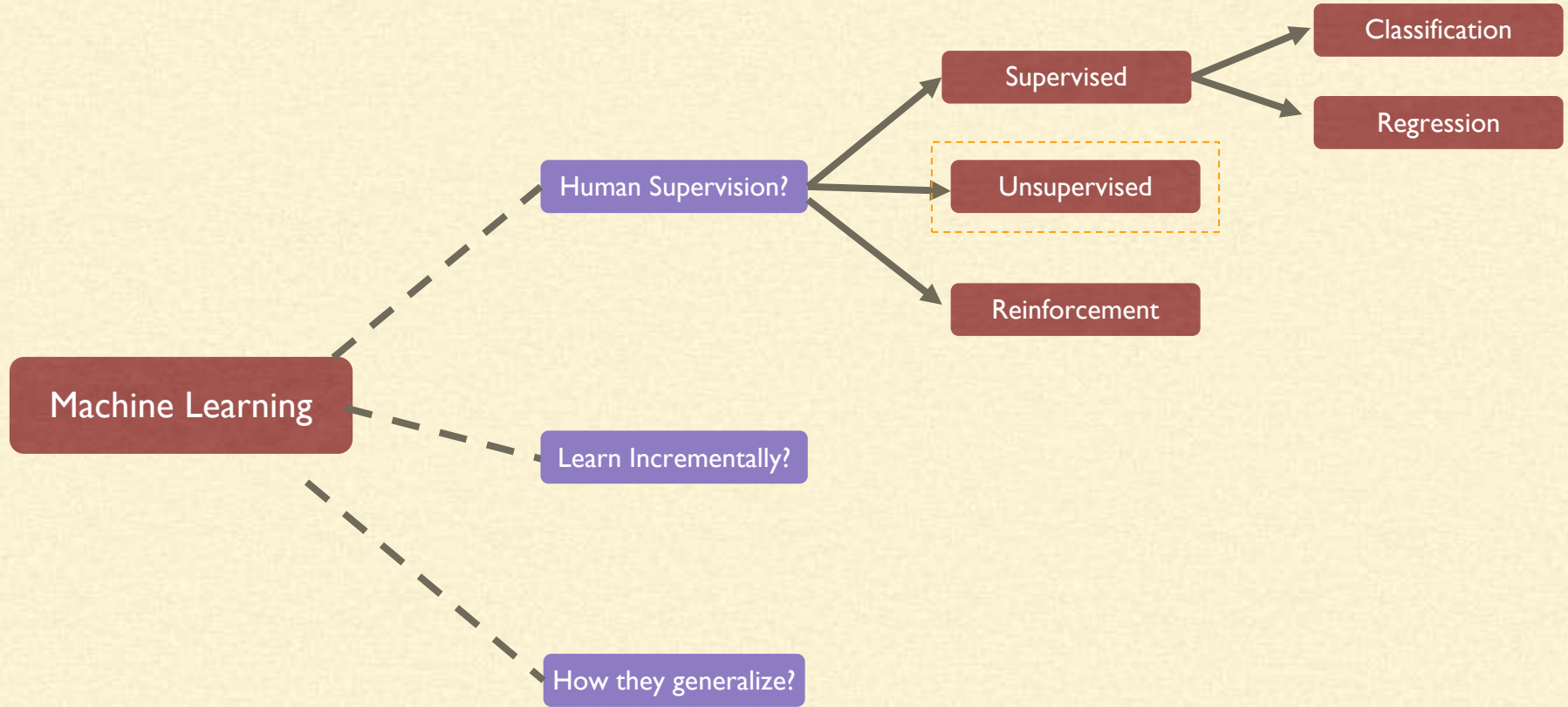


Machine Learning - Supervised Learning

Regression

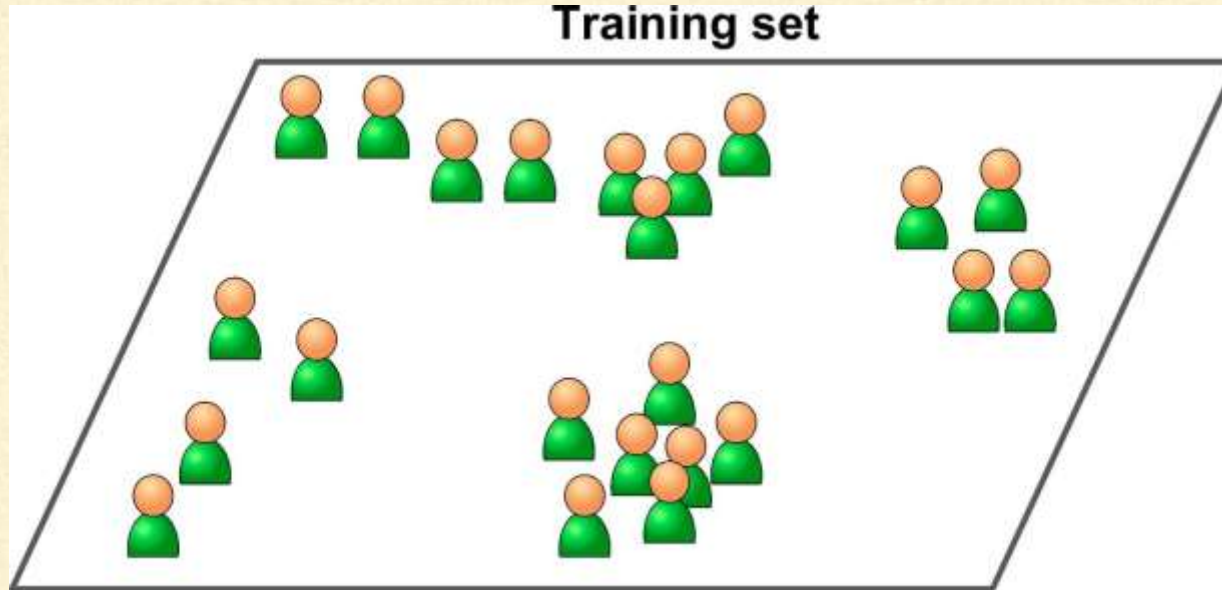
- Predict price of the car
 - Given a set of features called predictors such as
 - Mileage, age, brand etc
- To train the model
 - We have to give many examples of cars
 - Including their predictors and labels(prices)

Machine Learning - Types

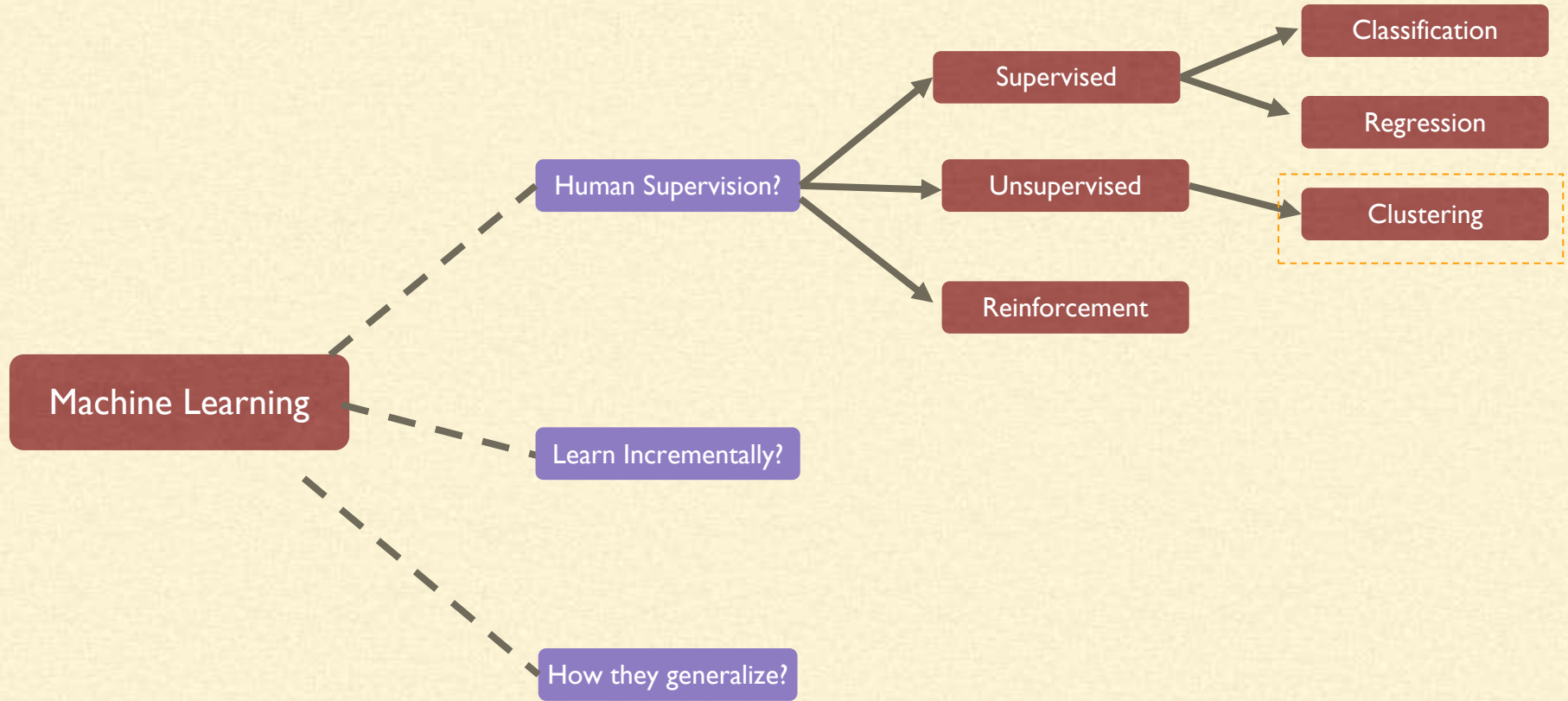


Machine Learning - Unsupervised Learning

- The training data is unlabeled
- The system tries to learn without a teacher

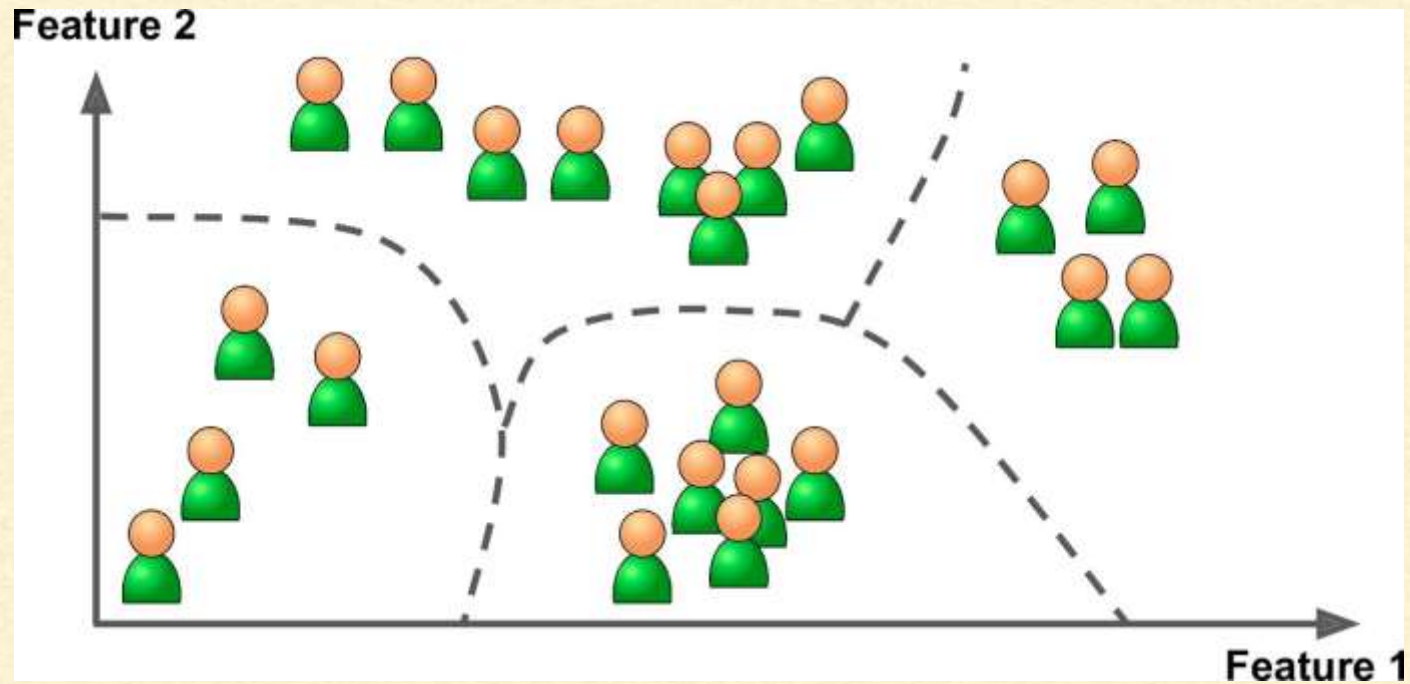


Machine Learning - Types



Machine Learning - Unsupervised Learning

Clustering - Detect group of similar visitors in your blog



Machine Learning - Unsupervised Learning

Clustering

- Detect group of similar visitors in blog
 - Notice the training set is unlabeled
- To train the model
 - We just feed the training set to clustering algorithm
 - At no point we tell the algorithm which group a visitor belongs to
 - It find groups without our help

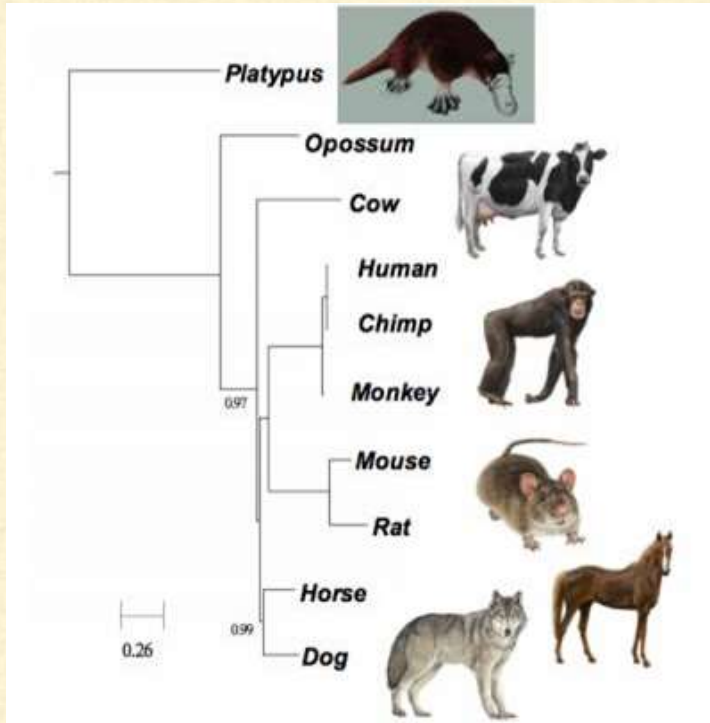
Machine Learning - Unsupervised Learning

Clustering

- It may notice that
 - 40% visitors are comic lovers and read the blog in evening
 - 20% visitors are sci-fi lovers and read the blog during weekends
- This data helps us in targeting our blog posts for each group

Machine Learning - Unsupervised Learning

Hierarchical Clustering - Bring similar elements together



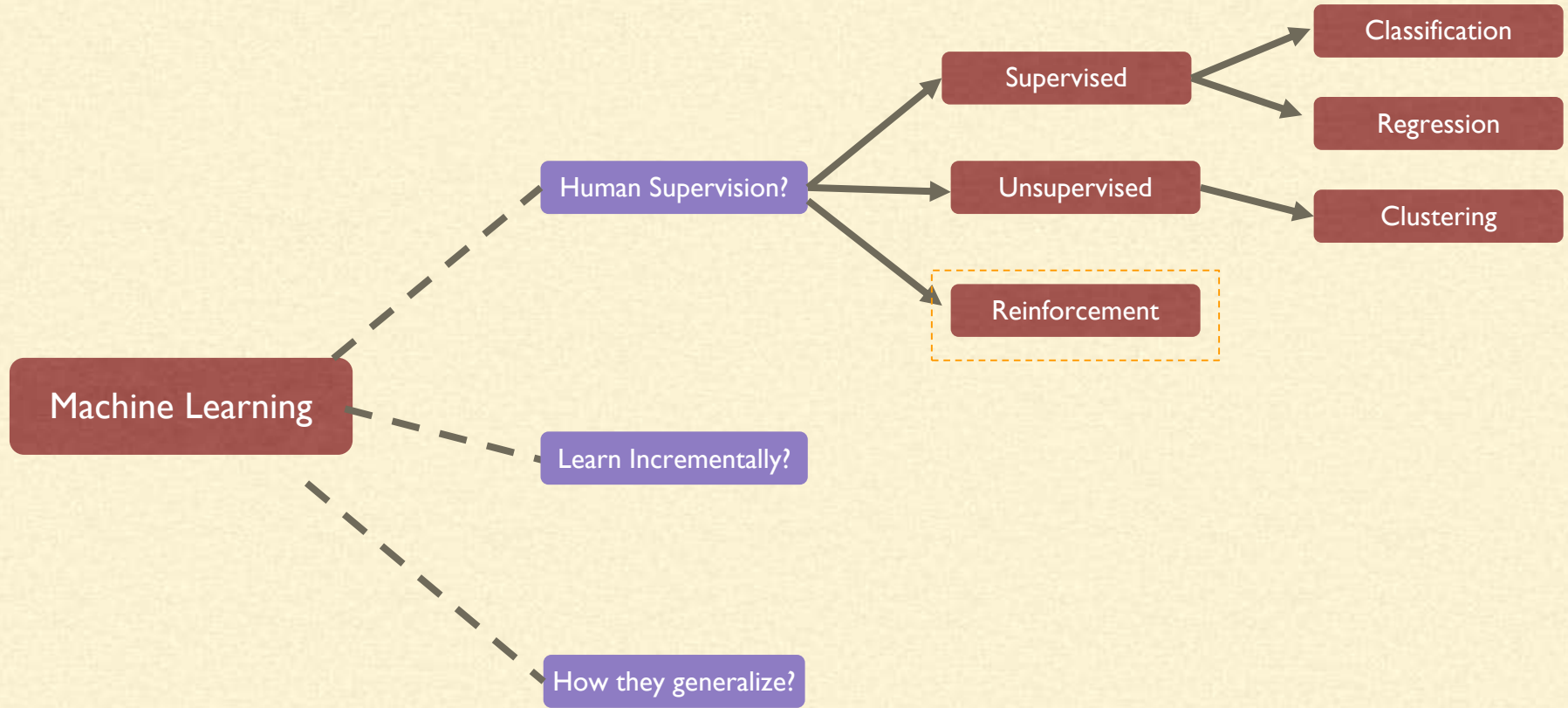
- In the form of a tree
- Nodes closer to each other are similar

Machine Learning - Unsupervised Learning

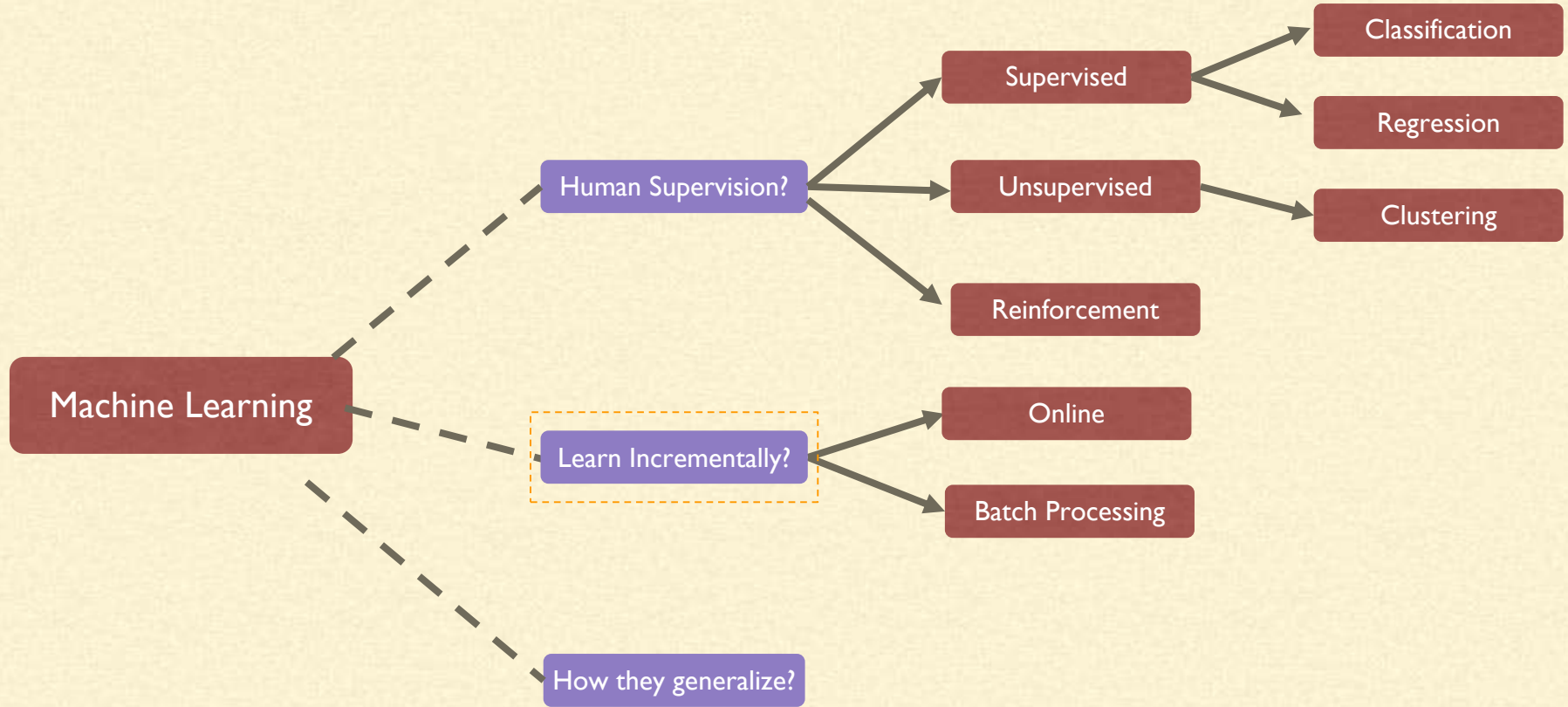
Anomaly Detection - Detecting unusual credit card transactions to prevent fraud



Machine Learning - Types



Machine Learning - Types



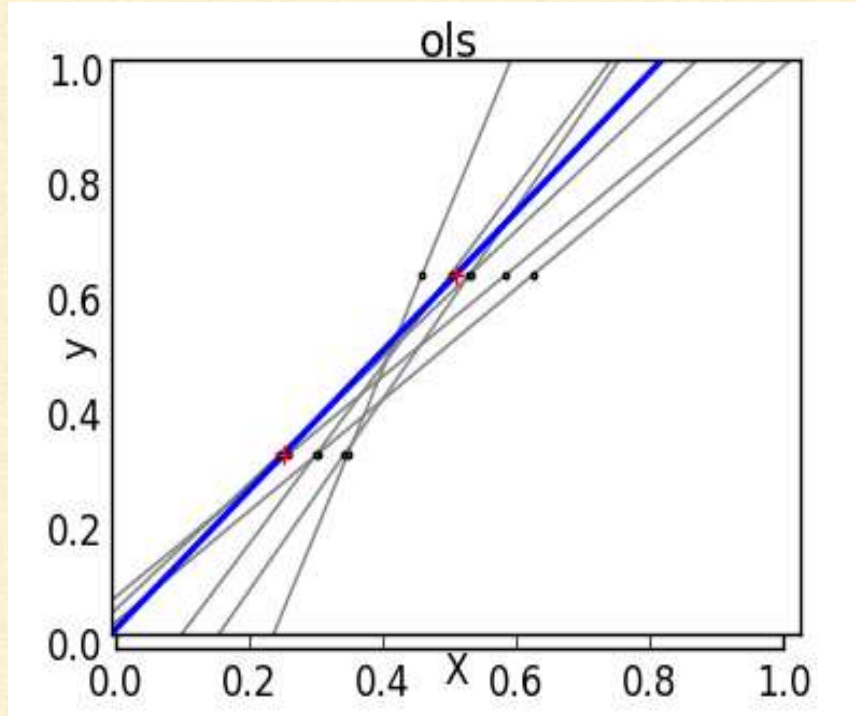
What Is Machine Learning?



Field of study that gives "computers the ability to learn without being explicitly programmed"

-- Arthur Samuel, 1959

Machine Learning - Gradient Descent



- Instead of trying all lines, go into the direction yielding better results

Machine Learning - Gradient Descent



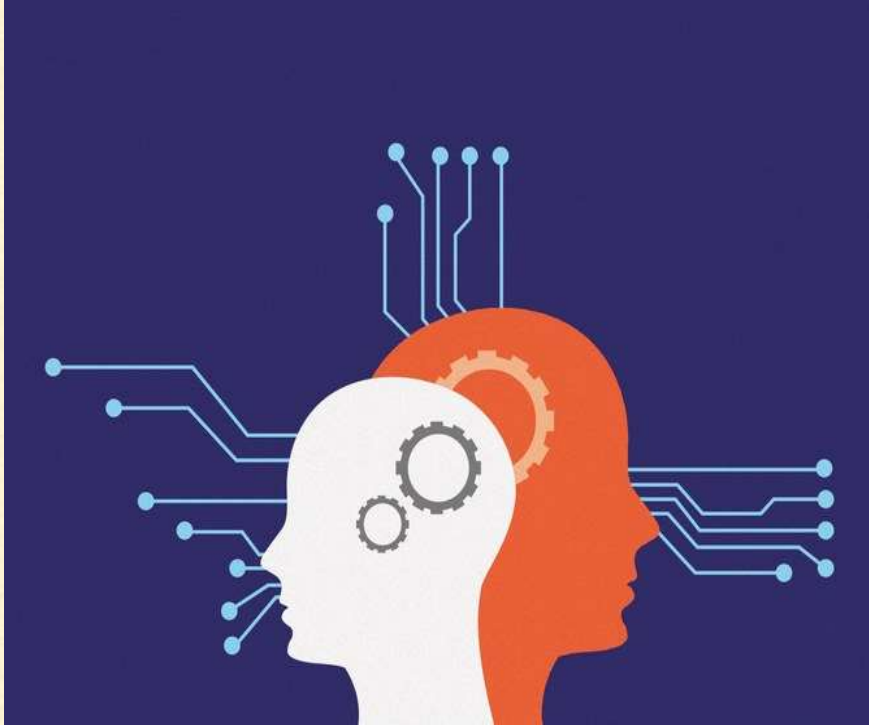
- Imagine yourself blindfolded on the mountainous terrain
- And you have to find the best lowest point
- If your last step went higher, you will go in opposite direction
- Other, you will keep going just faster

What is AI?

Artificial intelligence (AI):

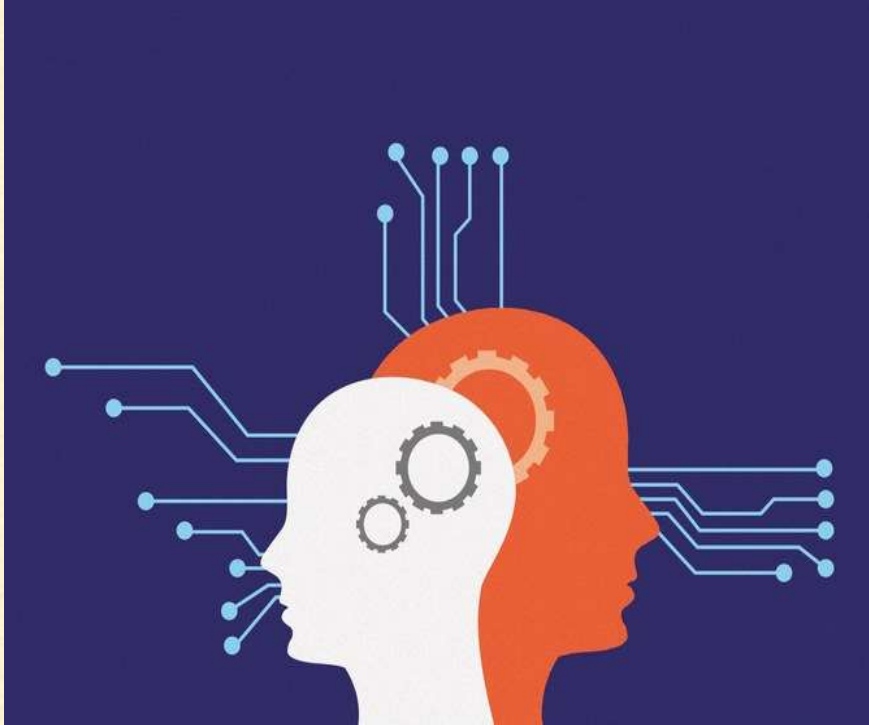
The intelligence exhibited by machines

What is AI?



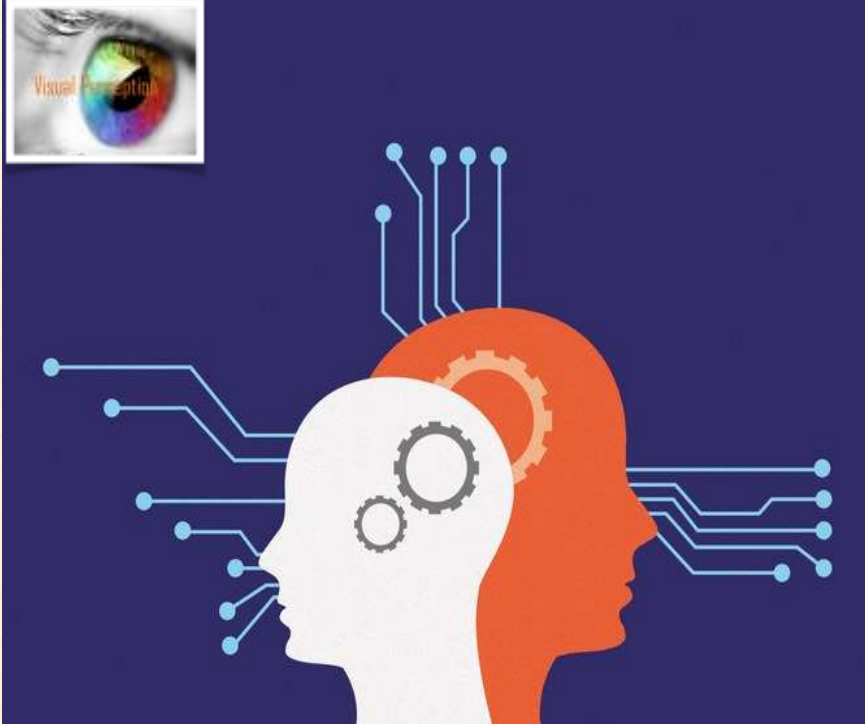
- The theory and development of computer systems

What is AI?



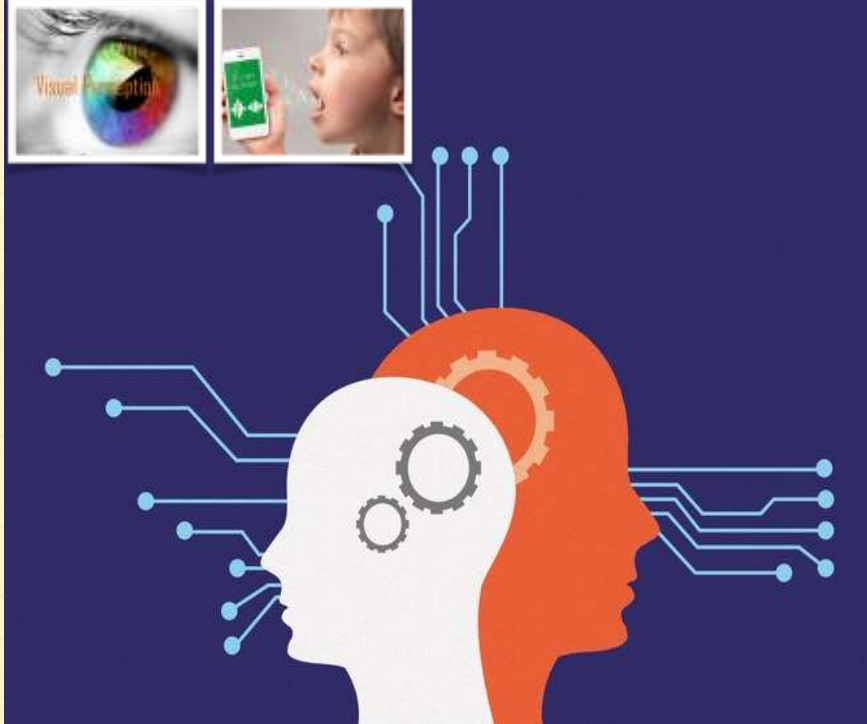
- The theory and development of computer systems
- To perform tasks requiring human intelligence such as

What is AI?



- The theory and development of computer systems
- To perform tasks requiring human intelligence such as
 - Visual perception

What is AI?



- The theory and development of computer systems
- To perform tasks requiring human intelligence such as
 - Visual perception
 - Speech Recognition

What is AI?



- The theory and development of computer systems
- To perform tasks requiring human intelligence such as
 - Visual perception
 - Speech Recognition
 - Decision Making

What is AI?



- The theory and development of computer systems
- To perform tasks requiring human intelligence such as
 - Visual perception
 - Speech Recognition
 - Decision Making
 - Translation between languages

History - Mythology / Fiction



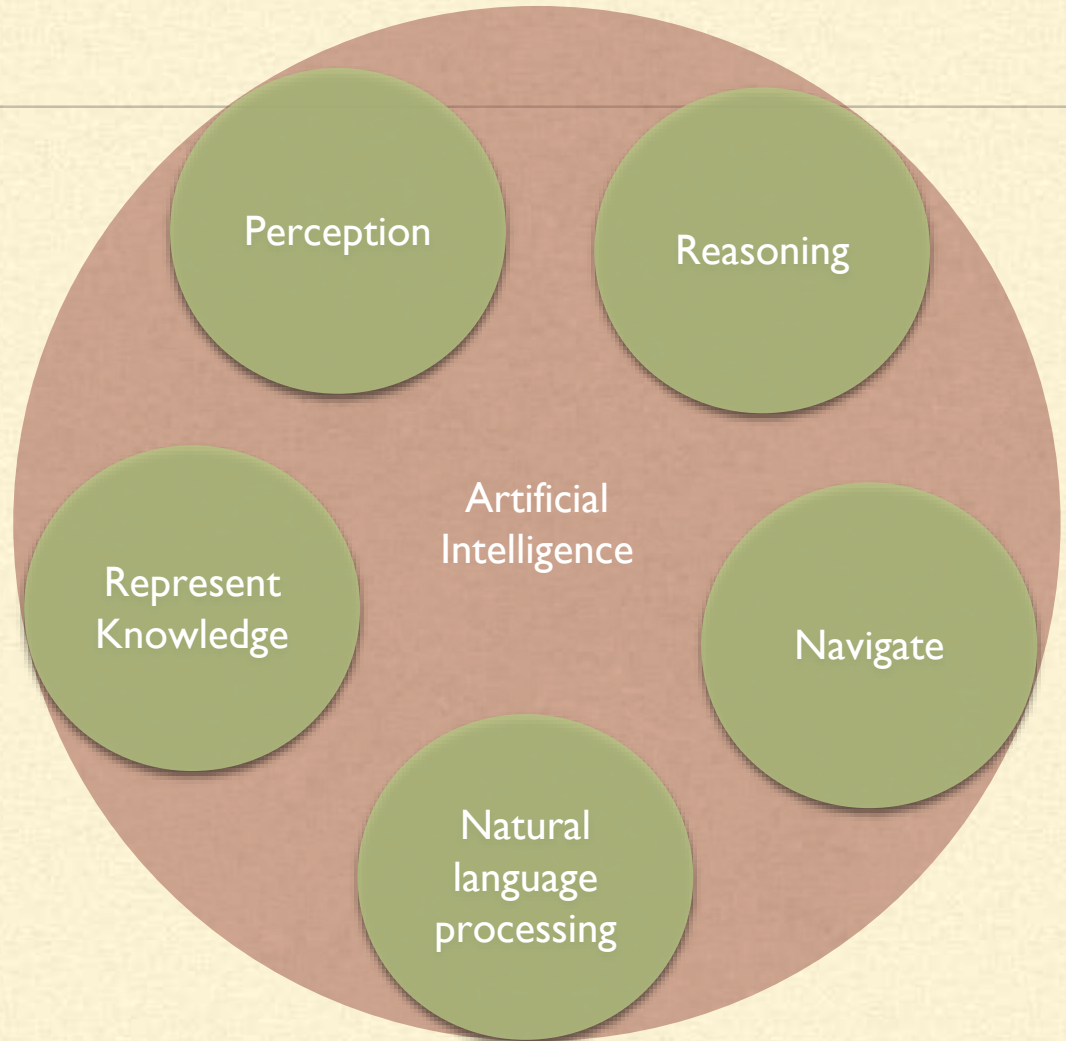
- In every mythology, there is some form of mechanical man such talos from greek mythology.
- In fiction novels, we have Mary Shelley's Frankenstein
- We are fascinated by the idea of creating things which can behave like human

History - Summer of 1956

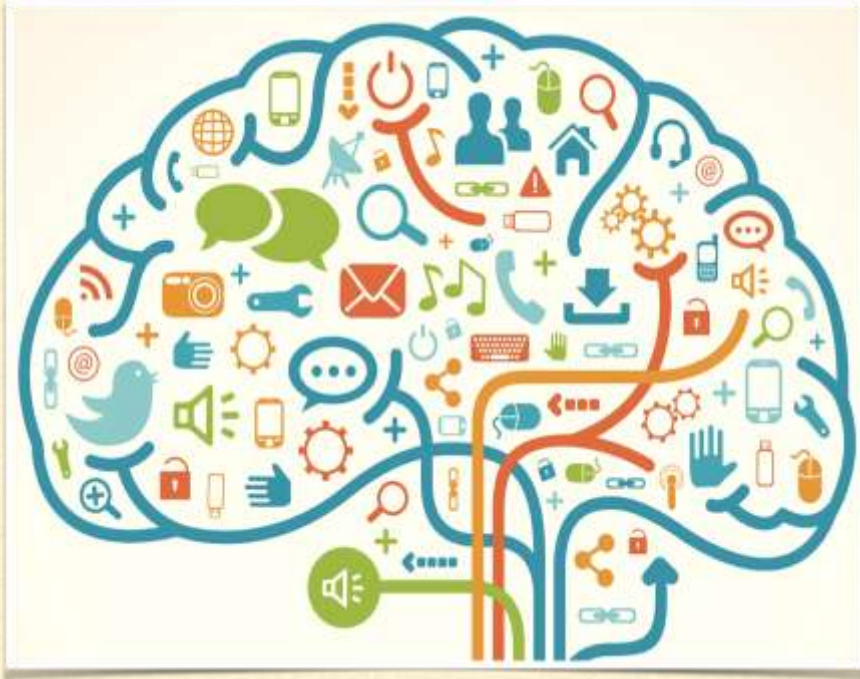


- The term artificial intelligence was coined by
 - John McCarthy
 - In a workshop at
 - Dartmouth College in New Hampshire
 - Along with Marvin Minsky, Claude Shannon, and Nathaniel Rochester

Sub-objectives of AI



AI - Represent Knowledge



- Understanding and classifying terms or things in world e.g.
 - What is computer?
 - What is a thought?
 - What is a tool?
- Languages like **lisp** were created for the same purpose

AI - Reasoning



Aja Huang plays the first move for AlphaGo, against Lee Sedol 9 dan in game two.

- Play puzzle game - Chess, Go, Mario
- Prove Geometry theorems
- Diagnose diseases

AI - Navigate



- How to plan and navigate in the real world
- How to locate the destination?
- How to pick path?
- How to pick short path?
- How to avoid obstacles?
- How to move?

AI - Natural Language Processing



Ok Google - can you show me a list of your commands?

- How to speak a language
- How to understand a language
- How to make sense out of a sentence

AI - Perception



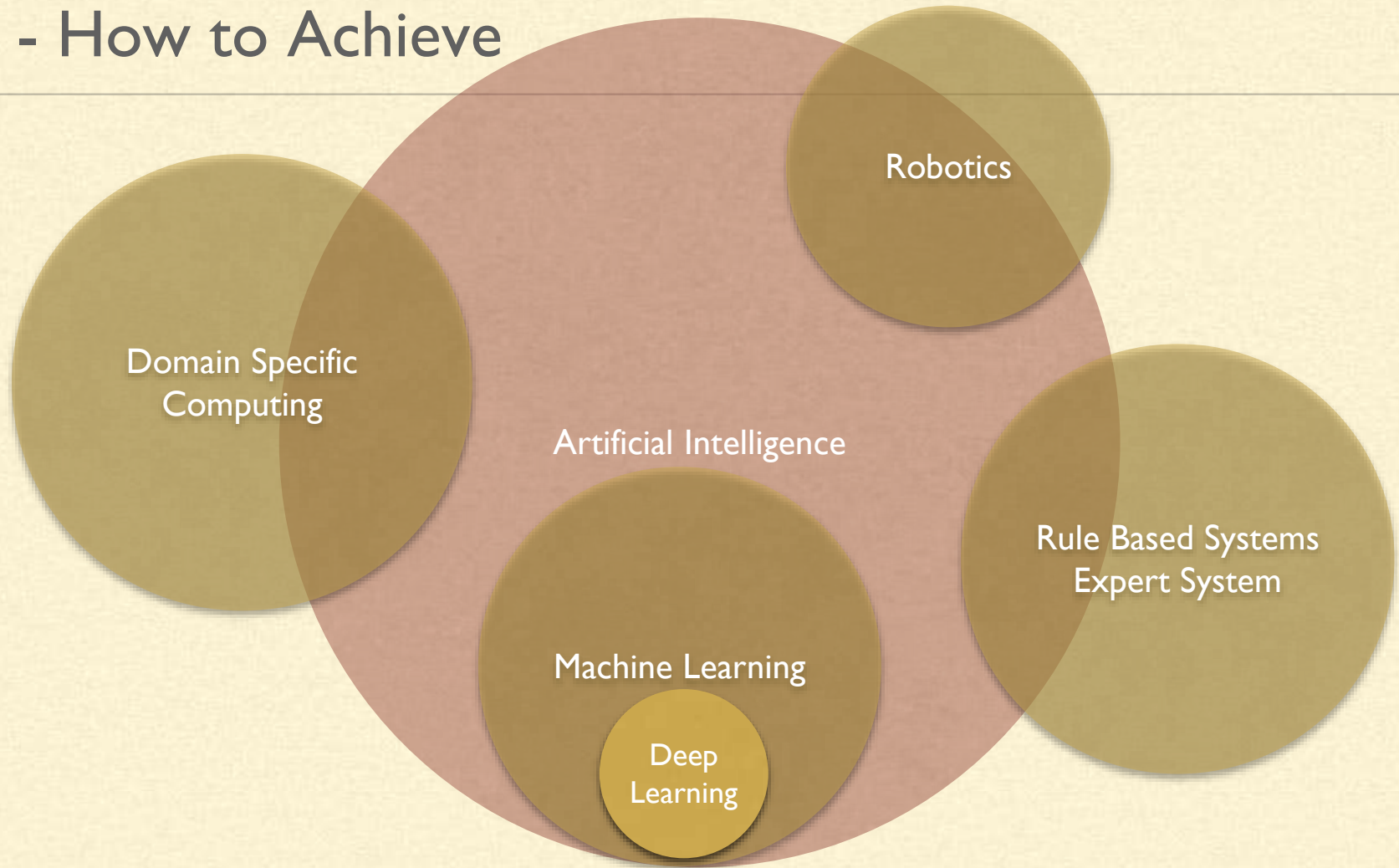
- How to we see things in the real world
- From sound, sight, touch, smell

AI - Generalised Intelligence



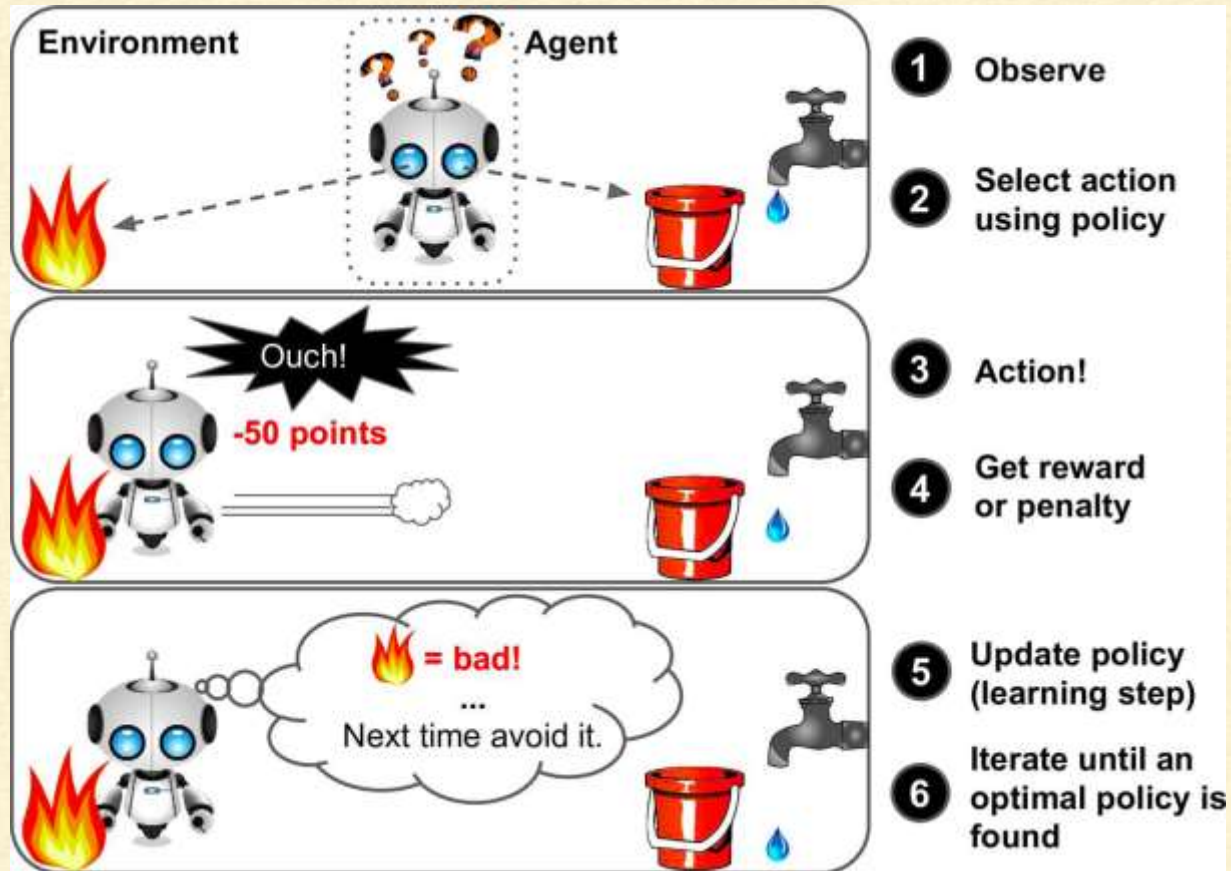
- With these previous building blocks, the following should emerge:
 - Emotional Intelligence
 - Creativity
 - Reasoning
 - Intuition

AI - How to Achieve



Deep Learning

Deep Learning - Reinforcement Learning



Deep Learning - Reinforcement Learning

- The learning system an agent in this context
 - Observes the environment
 - Selects and performs actions and
 - Get rewards or penalties in return
 - Learns by itself what is the best strategy (policy) to get most reward over time

Deep Learning - Reinforcement Learning

Applications

- Used by robots to learn how to walk
- DeepMind's AlphaGo
 - Which defeated world champion Lee Sedol at the game of Go