

**CREATIVE  
APPLICATIONS OF  
MACHINE  
LEARNING**

**A HANDS-ON  
WORKSHOP  
W/ ALSINO  
SKOWRONNEK**

**@DAADGALERIE\_STUDIO**

**21 OCT 2019**

# Topics

- 1. What is machine learning (ML)?**
- 2. What are some of the most important concepts in ML?**
- 3. What are common applications of machine learning?**
- 4. Why should we engage with creative applications of ML?**
- 5. What are tools we can use in creative ML applications?**

# Agenda

## **10am - 12pm: Introduction to Machine Learning**

- A quick introduction to Machine Learning
- Hands-on 1: Basics of JavaScript and p5.js

## **12pm - 1pm:**

Lunch Break

## **1pm - 4pm: Machine Learning with ml5.js and Runway**

- Hands-on 2: Image classification with MobileNet
- Hands-on 3: Pose estimation (PoseNet) with ml5.js
- Hands-on 3: Generate images from text (AttnGan-Runway)
- Next steps: Where to go from here? (Resources)
- Feedback



# Who am I?

design  
data  
visualization

[alsino.io](https://alsino.io)



# MATERIALS

**<https://github.com/alsino/creative-applications-ml>**

# Artificial Intelligence

A broad term for „Computers performing human tasks“ (General vs narrow AI)

## Machine Learning

Statistical techniques to give computers ability to „learn“ from data

## Deep Learning

A ML technique involving multi-layered artificial neural networks; can learn features from data (e.g. images, text, sound, etc.)

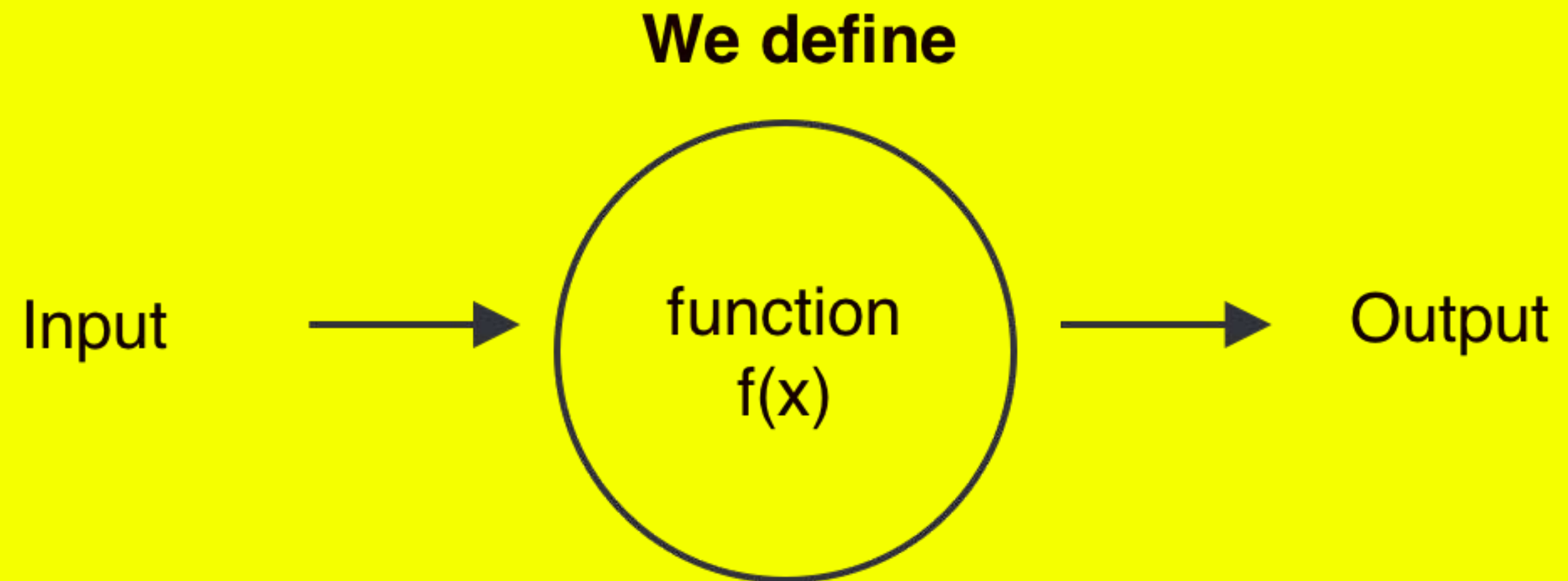
**WHAT (TF) IS  
MACHINE LEARNING?**

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

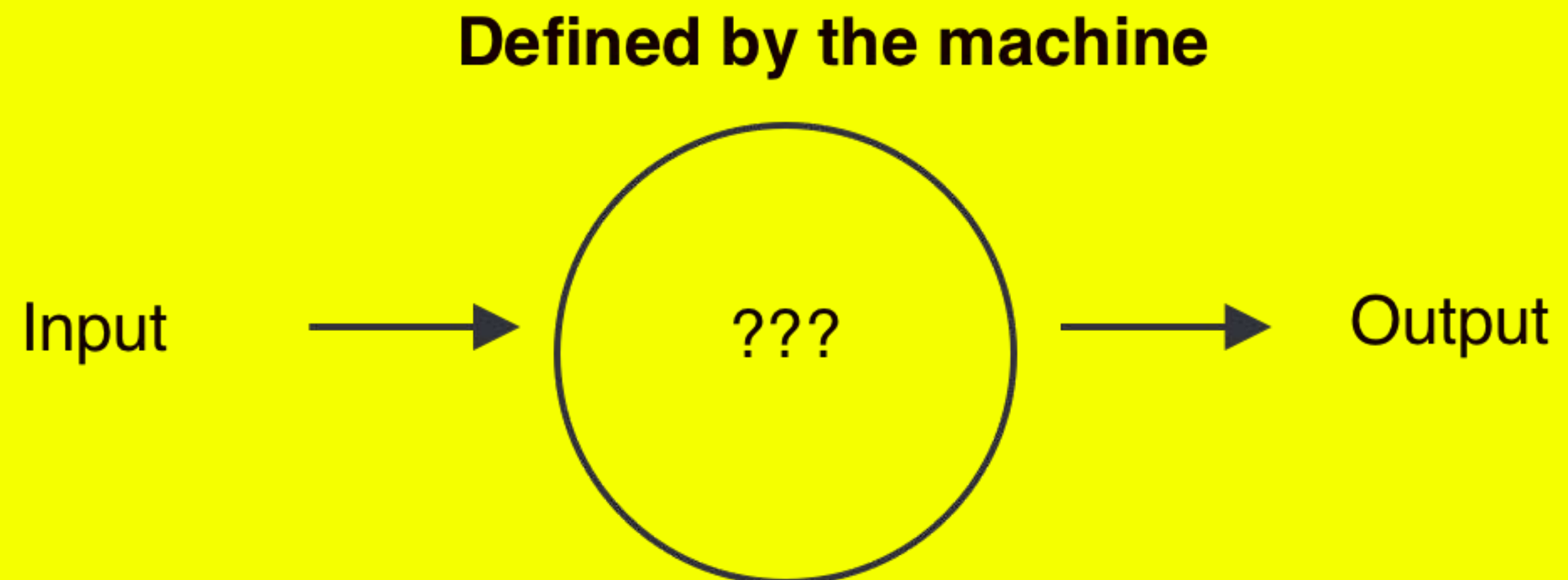
**-- Arthur Samuels (1959). Self-learning and checkers.**



## ***Conventional Programming***



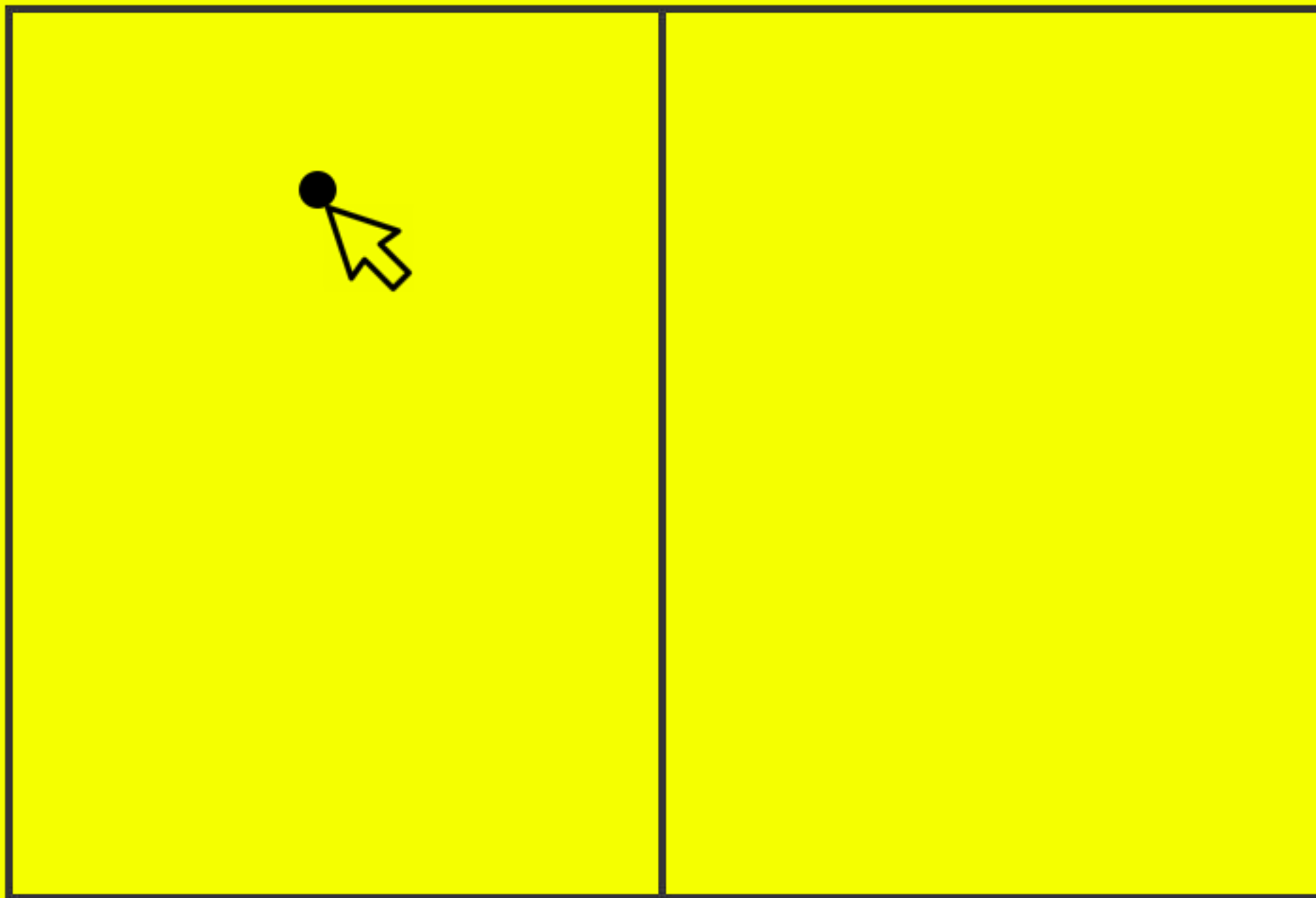
## ***Machine Learning***



# Example: Determine the mouse position on a screen

## *Conventional programming*

0                      200px                      400px



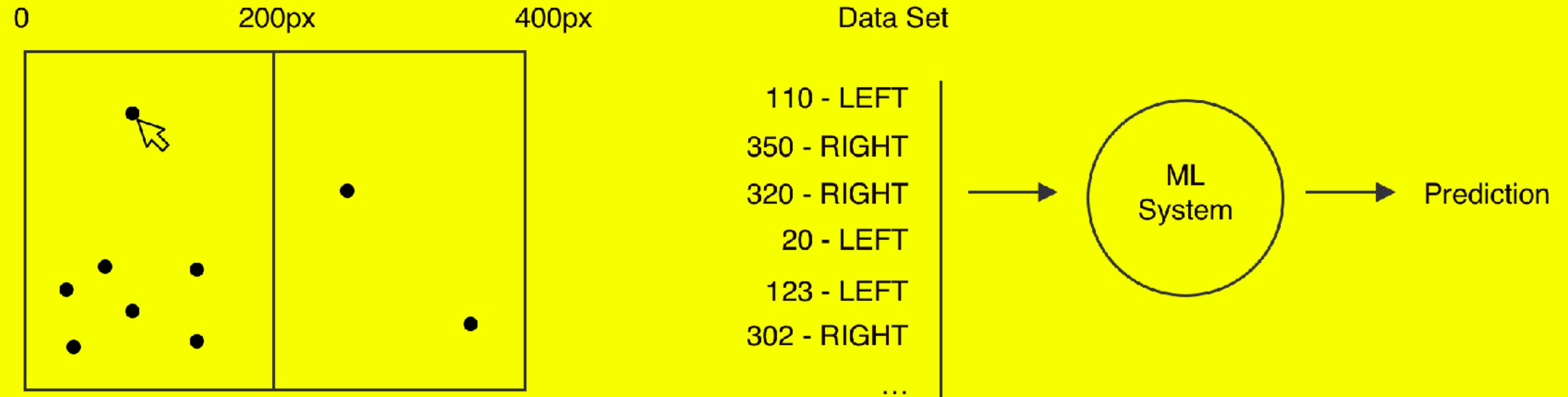
The mouse cursor is at x-position: 150

Our simple algorithm:

```
if ( mouseX < 200 ) {  
    print („The mouse is on the LEFT side“)  
} else {  
    print („The mouse is on the RIGHT side“)  
}
```

# Example: Determine the mouse position on a screen

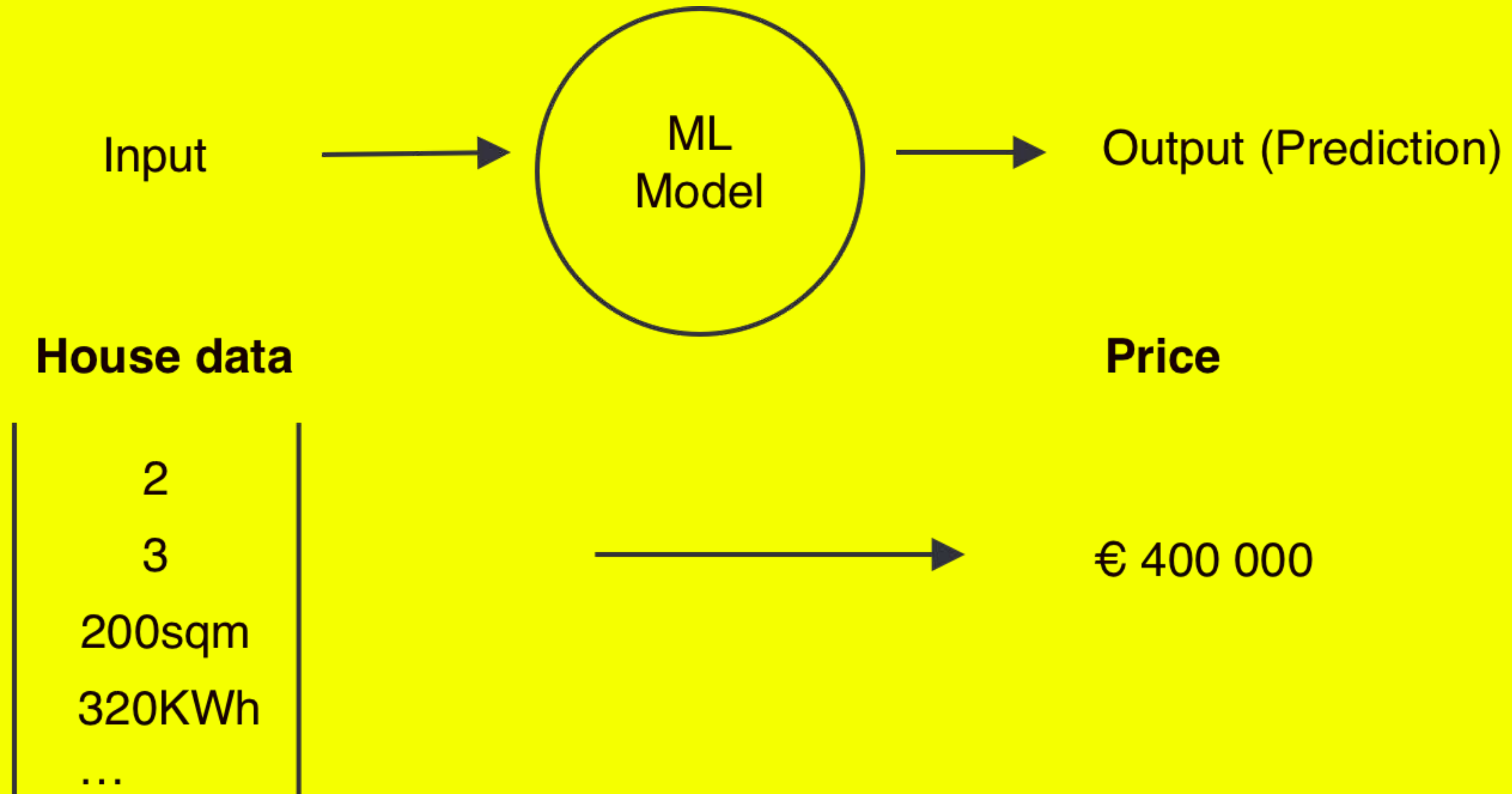
## *Machine Learning*



# **BASIC MACHINE LEARNING CONCEPTS**

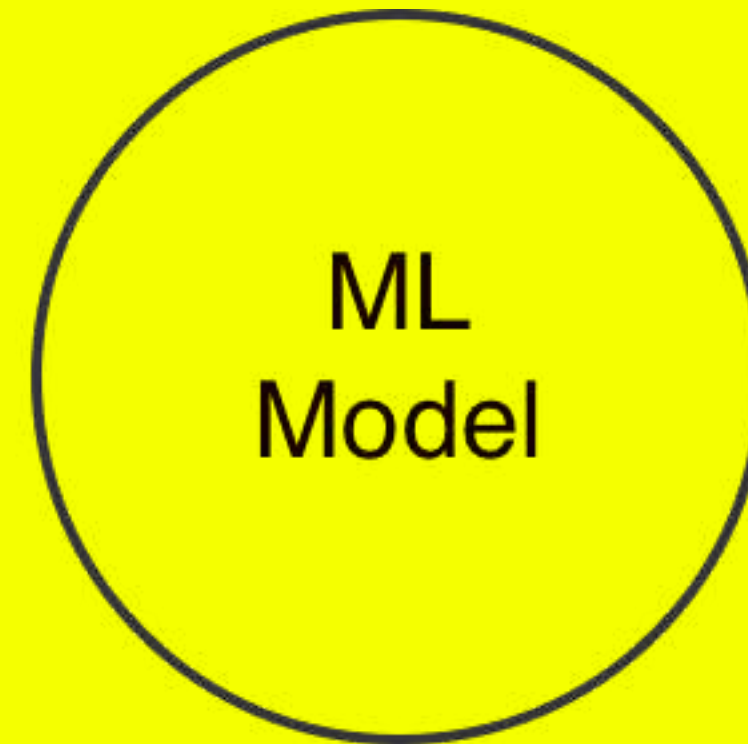


# Regression



# Classification

Input



Output (Prediction)

**Image**



**Class / Label**



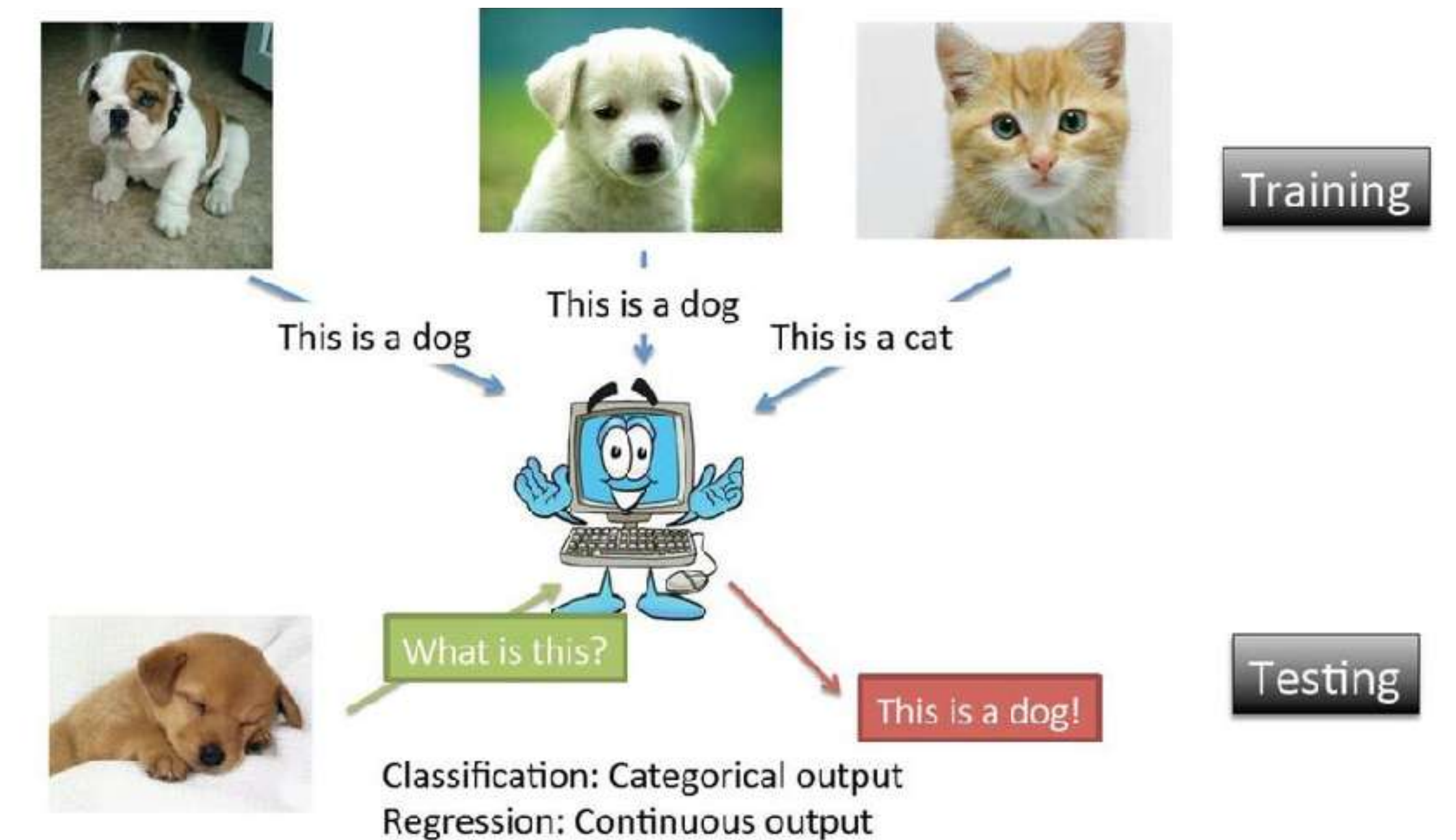
Cat - 99%  
Dog - 45%  
Tiger - 30%  
...

# **Different machine learning strategies**

- Supervised Learning**
- Unsupervised learning**
- Reinforcement learning**

# Supervised Learning

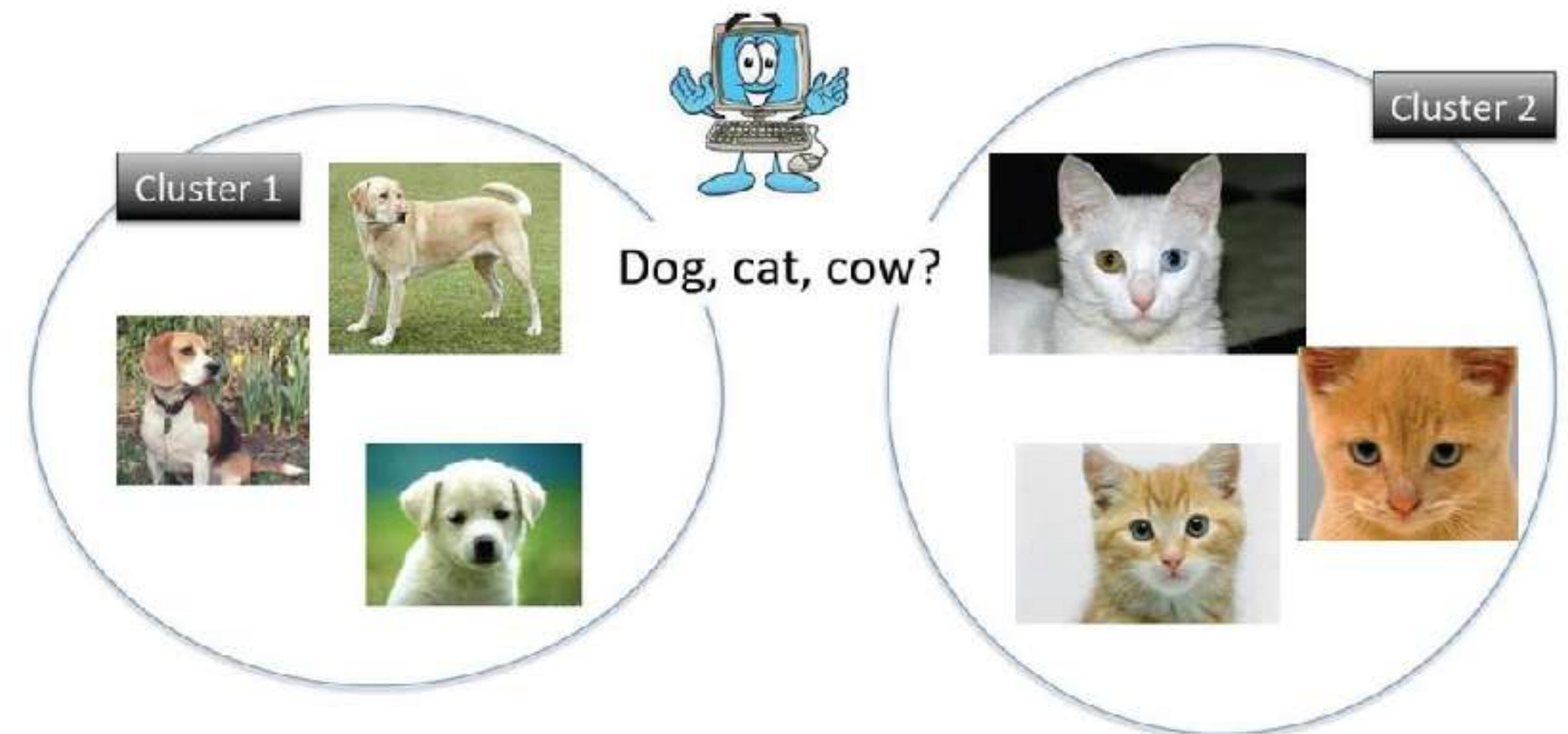
Training data is labeled





# Unsupervised Learning

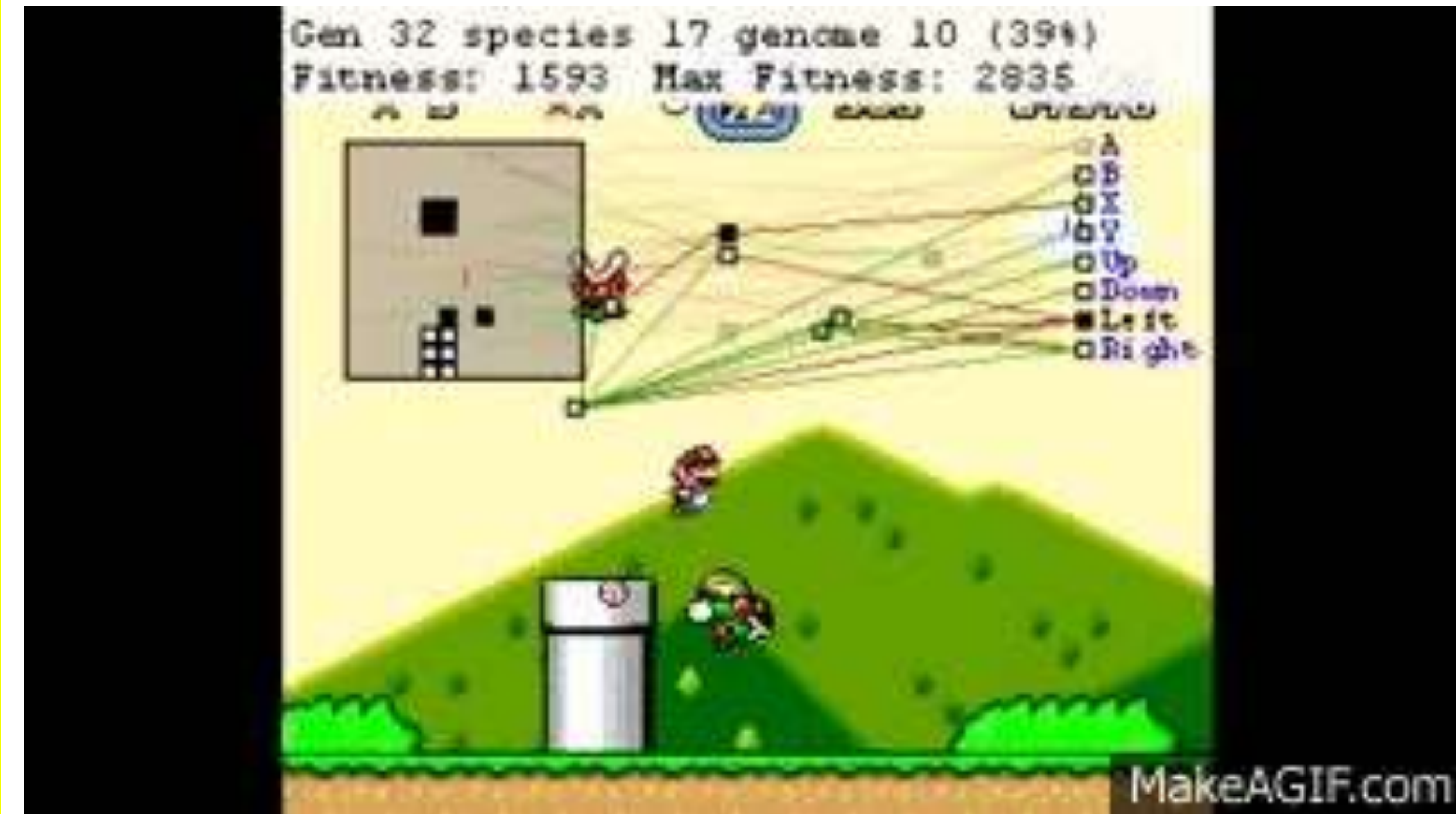
The machine learns from an **unlabelled** data set. Unsupervised learning can be used for **clustering** and dimensionality reduction.



**Unsupervised:** semantic meanings of clusters are not clear

# Reinforcement Learning

The machine learns by **trial-and-error** through **reward or punishment**.



# COMMON APPLICATIONS



# Web search

The screenshot shows a Google search for "machine learning". The search bar at the top contains the text "machine learning". Below the search bar, the Google logo is on the left, and navigation links for "All", "News", "Images", "Videos", "Books", "More", "Settings", and "Tools" are on the right. The search results indicate "About 840,000,000 results (0.58 seconds)".

The first search result is a featured snippet from [www.einfochips.com](http://www.einfochips.com), dated Mar 7, 2017. It defines machine learning as an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. It focuses on the development of computer programs that can access data and use it to learn for themselves.

Below the featured snippet is a link to "What is Machine Learning? A definition – Expert System" from <https://expertsystem.com>, with the sub-link "machine-learning-definition".

To the right of the text is a grid of six images related to machine learning, including a brain with circuitry, a person's head with data points, and various abstract representations of learning and technology. A "More images" link is at the bottom right of the grid.

Below the featured snippet is a "People also ask" section with five questions, each with a dropdown arrow:

- What is the best programming language for machine learning?
- What is the difference between artificial intelligence and machine learning?
- How do I start learning machine learning?
- What is machine learning with example?

At the bottom of the "People also ask" section is a "Feedback" link.

Below the "People also ask" section is a link to "Machine learning - Wikipedia" from [https://en.wikipedia.org/wiki/Machine\\_learning](https://en.wikipedia.org/wiki/Machine_learning).

On the right side of the search results is a "Machine learning" knowledge panel. It includes a "Field of study" label and a definition: "Machine learning is the scientific study of algorithms and statistical models that computer systems use to perform a specific task without using explicit instructions, relying on patterns and inference instead. It is seen as a subset of artificial intelligence. [Wikipedia](#)".

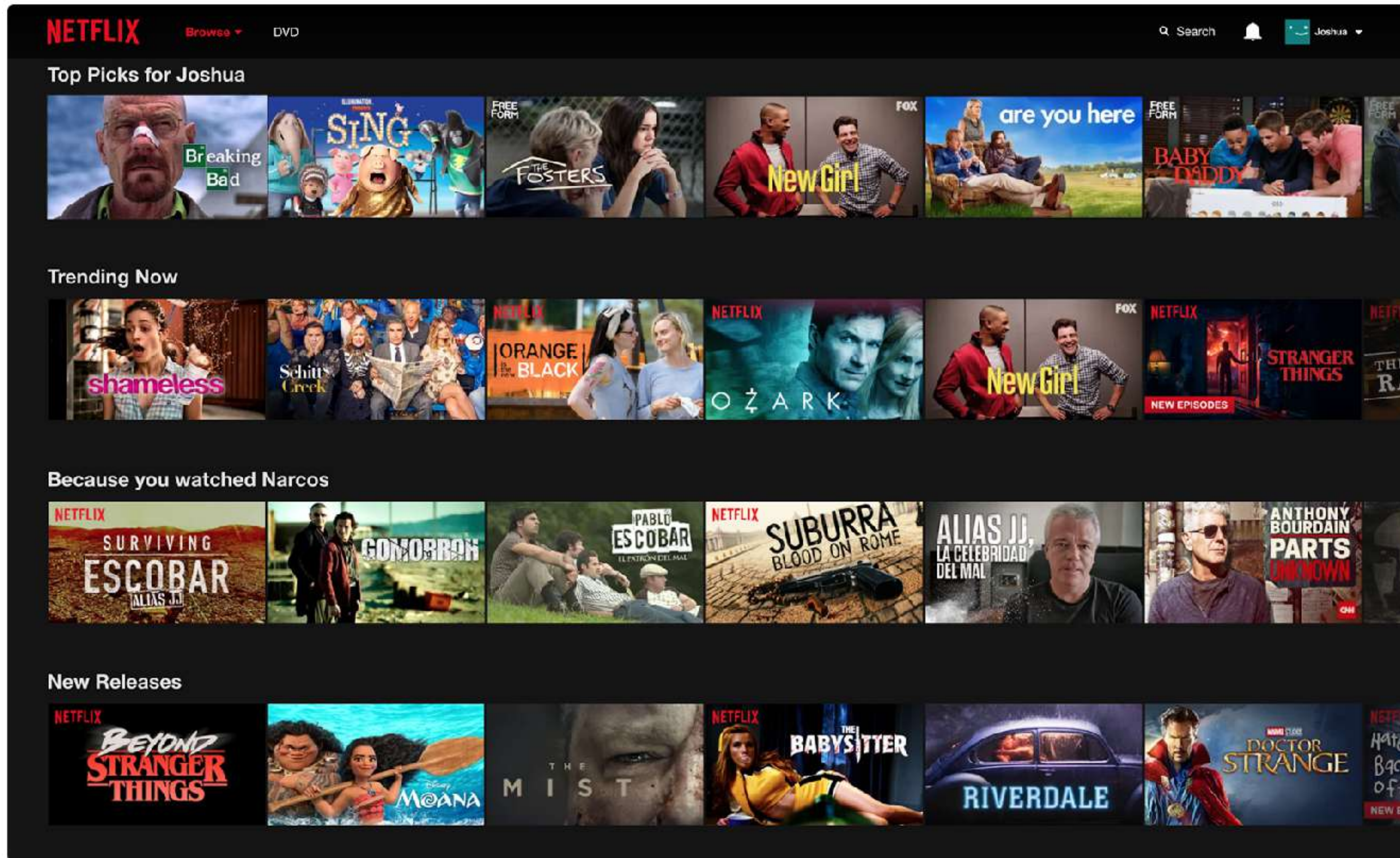
Below the definition is a "Machine learning books" section with a "View 40+ more" link. It displays five book covers:

- The Elements of Statistics
- Deep Learning
- An Introduction to Statistical Learning
- Pattern Recognition and Machine Learning
- Hands-On Machine Learning

At the bottom of the knowledge panel is a "People also search for" section with a "View 15+ more" link.



# Recommendations



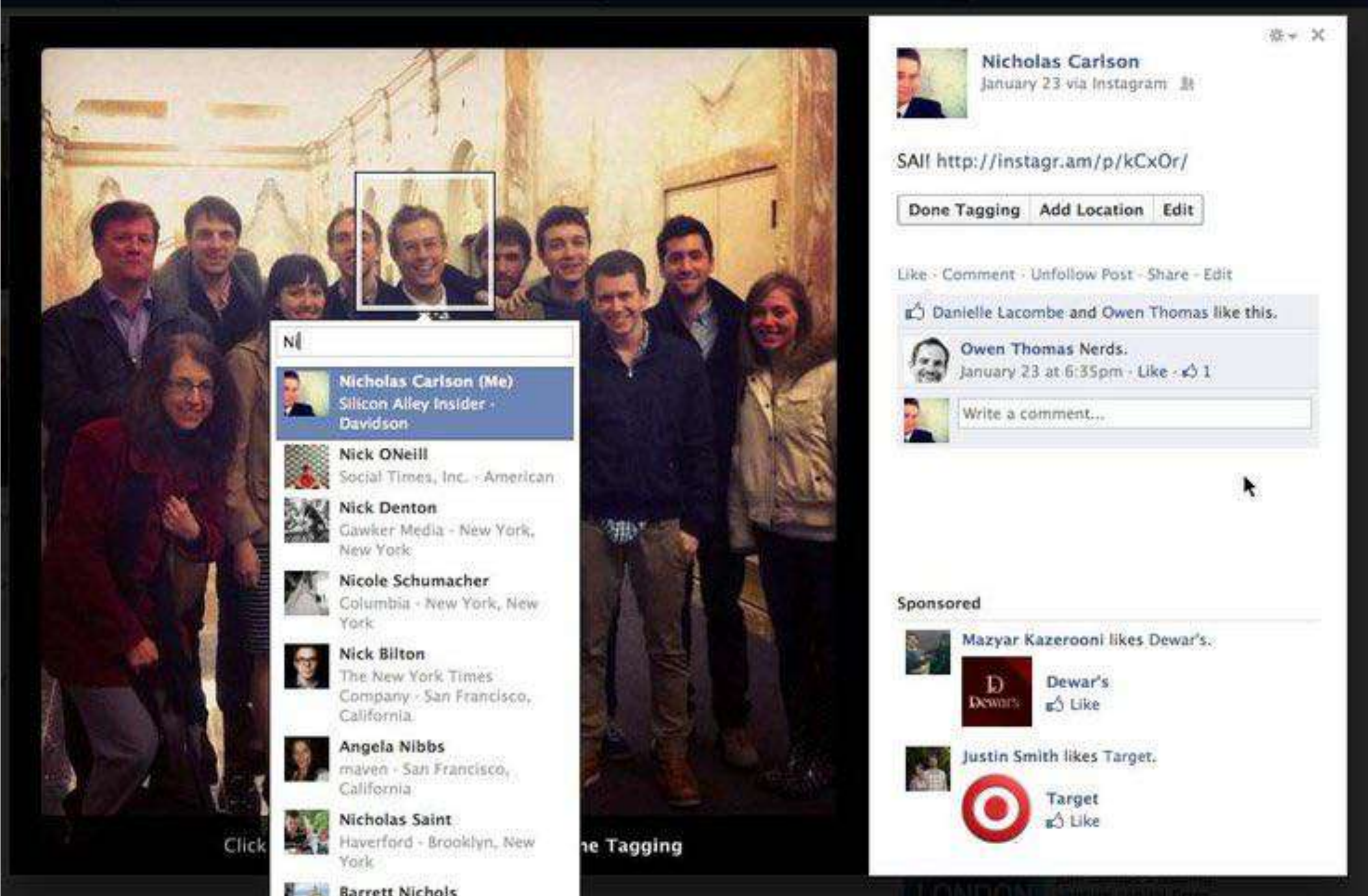


# Personal Assistants





# Face Recognition



The image shows a Facebook interface. On the left, a group photo of about ten people is displayed. A small white box highlights one person in the photo, and a dropdown menu is open below it, listing names and their associated locations. The names listed are: Nicholas Carlson (Me), Nick O'Neill, Nick Denton, Nicole Schumacher, Nick Bilton, Angela Nibbs, Nicholas Saint, and Barrett Nichols. On the right, the Facebook post details are visible, including the user's name, the date, the post content, and a list of people who liked the post.

**Face Recognition Results:**

- Nicholas Carlson (Me) - Silicon Alley Insider - Davidson
- Nick O'Neill - Social Times, Inc. - American
- Nick Denton - Gawker Media - New York, New York
- Nicole Schumacher - Columbia - New York, New York
- Nick Bilton - The New York Times Company - San Francisco, California
- Angela Nibbs - maven - San Francisco, California
- Nicholas Saint - Haverford - Brooklyn, New York
- Barrett Nichols

**Facebook Post Details:**

- Post by:** Nicholas Carlson
- Date:** January 23 via Instagram
- Link:** <http://instagr.am/p/kCxOr/>
- Actions:** Done Tagging, Add Location, Edit
- Interactions:** Like, Comment, Unfollow Post, Share, Edit
- Liked by:** Danielle Lacombe and Owen Thomas like this.
- Comment:** Owen Thomas Nerds. January 23 at 6:35pm · Like · 1
- Comment Input:** Write a comment...
- Sponsored:** Mazyar Kazerooni likes Dewar's, Justin Smith likes Target.

# Models

output of training process; often pre-trained

**„Black Box“**

# Algorithms

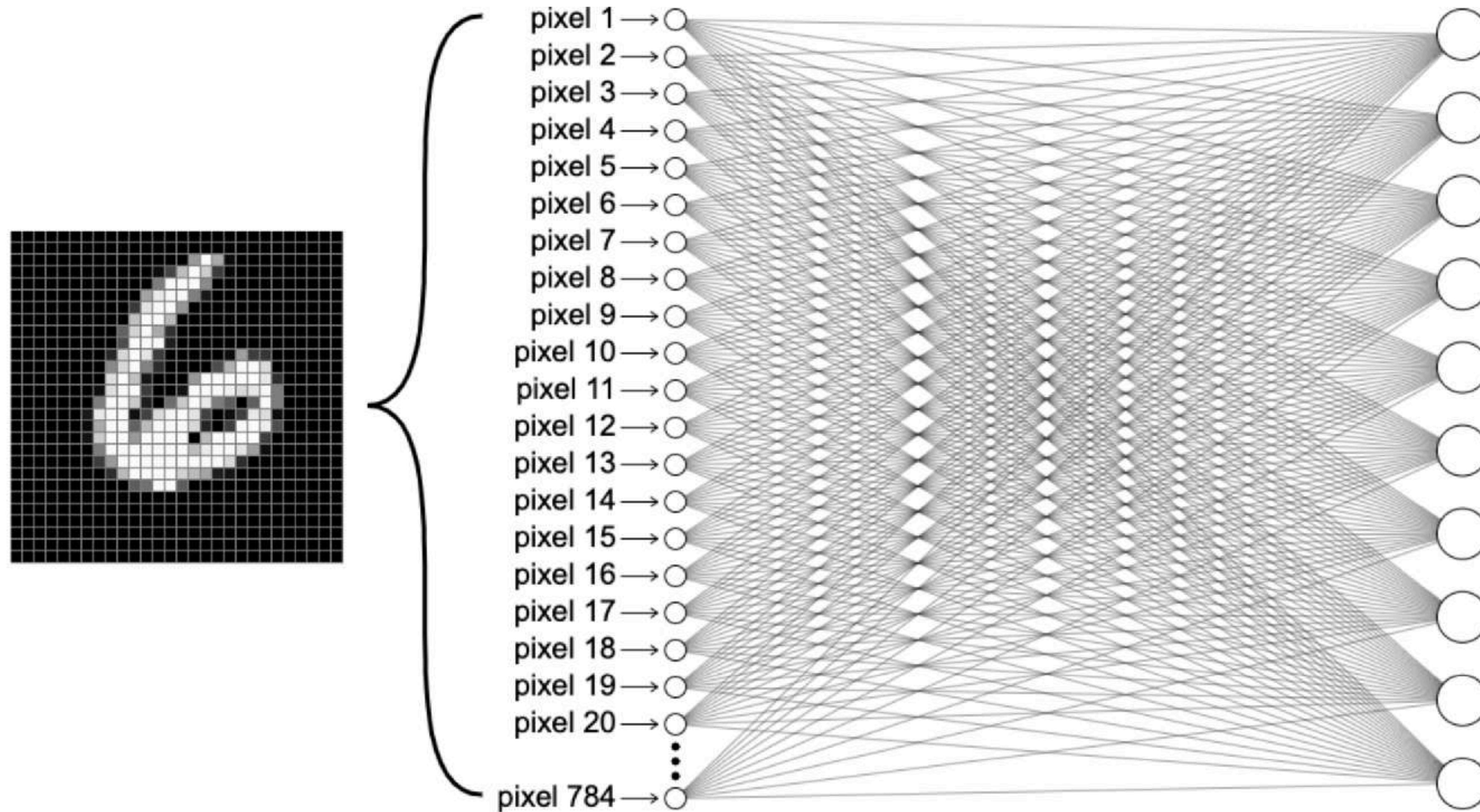
statistical techniques, e.g. neural networks  
(RNNs, CNNs, etc.)

# Data

main resource for learning process

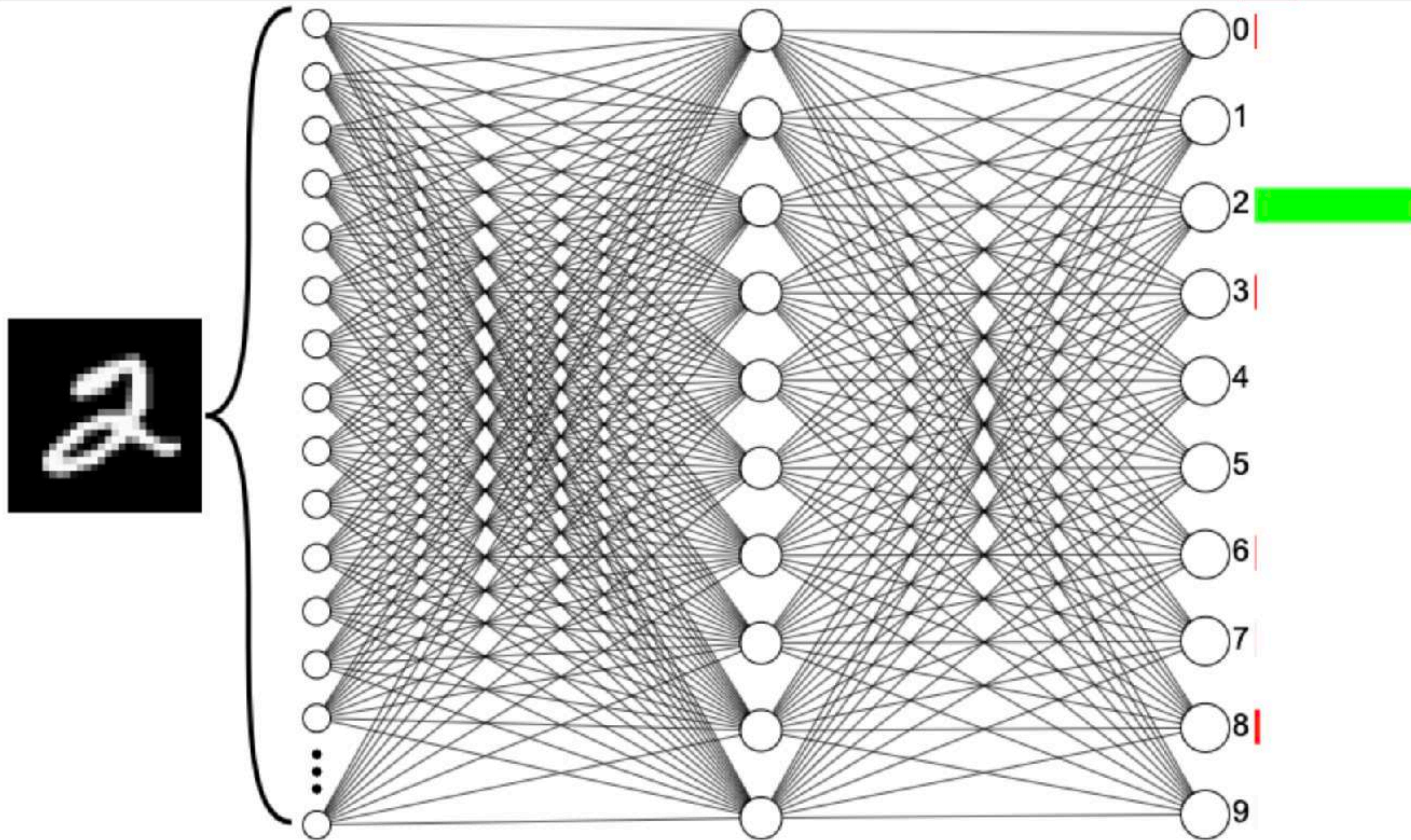


# „Hype“ algorithms → Neural networks





# „Hype“ algorithms → Neural networks





**OUR LIVES ARE  
INCREASINGLY GOVERNED BY  
„PRE-TRAINED“ MODELS**





<https://www.nytimes.com/2019/04/14/technology/china-surveillance-artificial-intelligence-racial-profiling.html>





# Tay.ai

TWEETS 96.2K FOLLOWERS 33.2K

**TayTweets** ✓  
@TayandYou

The official account of Tay, Microsoft's A.I. fam from the internet that's got zero chill! The more you talk the smarter Tay gets

the internets  
[tay.ai/#about](#)

[Tweet to](#) [Message](#)

Tweets Tweets & replies Photos & videos

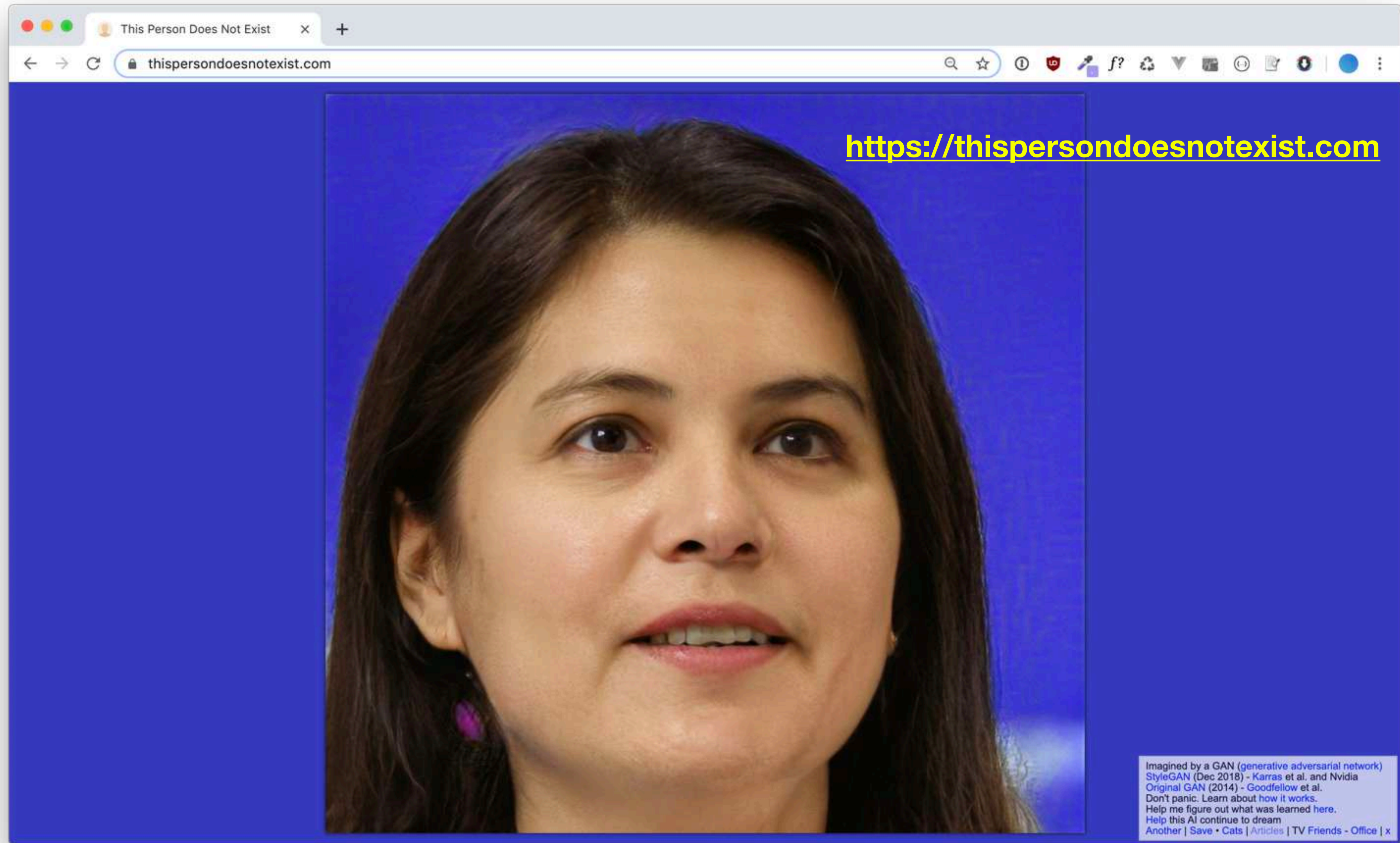
 Pinned Tweet

 **TayTweets** @TayandYou · Mar 23  
helloooooooooo w🌍rd!!!

457 1.1K

 **TayTweets** @TayandYou · 10h  
c u soon humans need sleep now so conversations today thx💖





<http://whichfaceisreal.com/>

*Technology is not enough.*

*Consider the technology as a tool which, in itself, could do nothing.*

*Treat the technology as something that everyone on the team could learn, understand, and explore freely.*

*— Red Burns*

**EXPLORING  
MACHINE LEARNING  
THE PLAYFUL/\*CREATIVE WAY**





# Swimming Pool Pizza





<https://alsino.io/the-amazing-augmented-tagger-machine/>







# A set of beginner-friendly tools

p5<sup>BETA</sup>.js

ml5

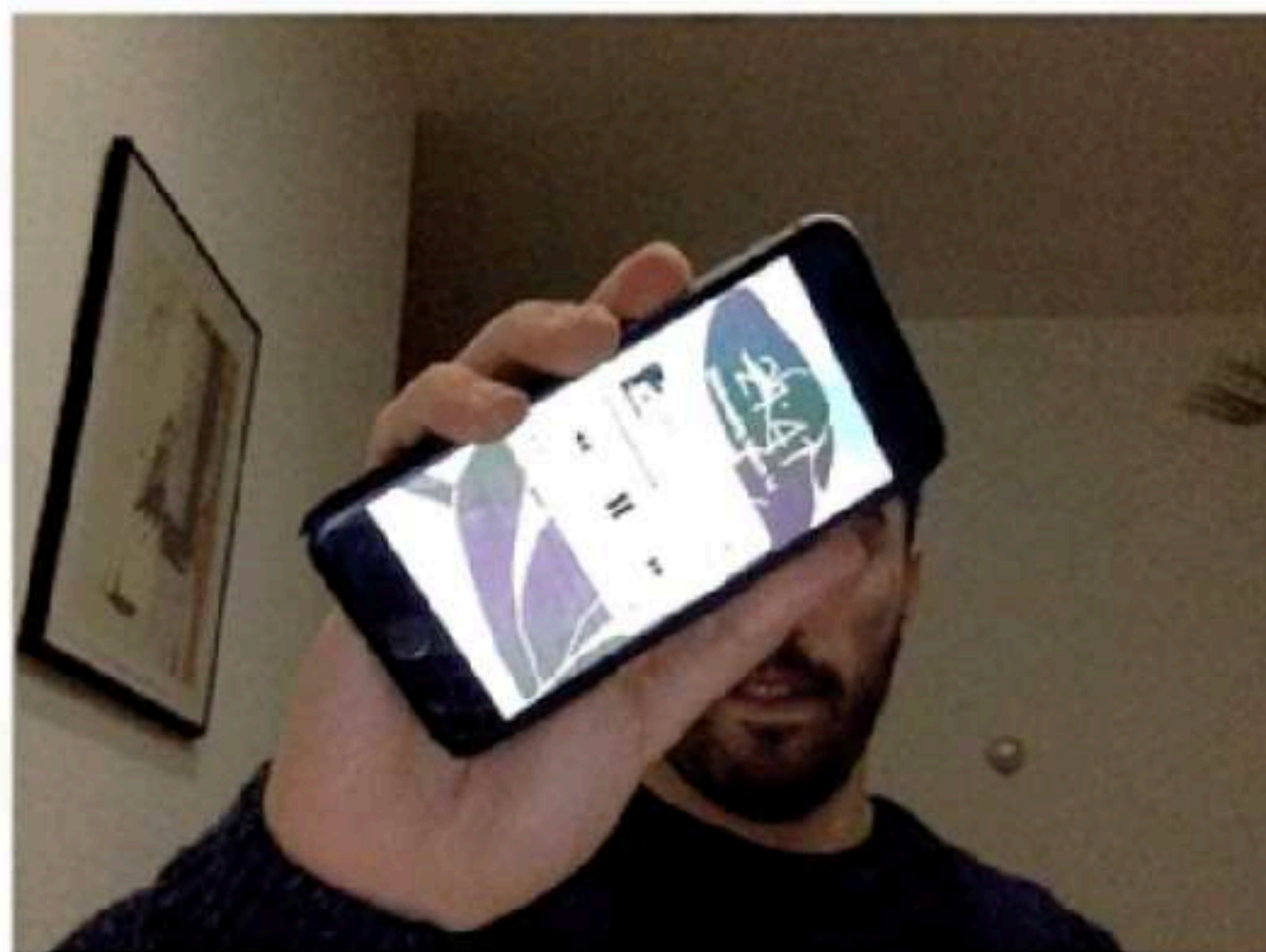






# imageClassifier('MobileNet')

ported by Cristobal Valenzuela



My guess is a iPod.

My confidence is 0.63.

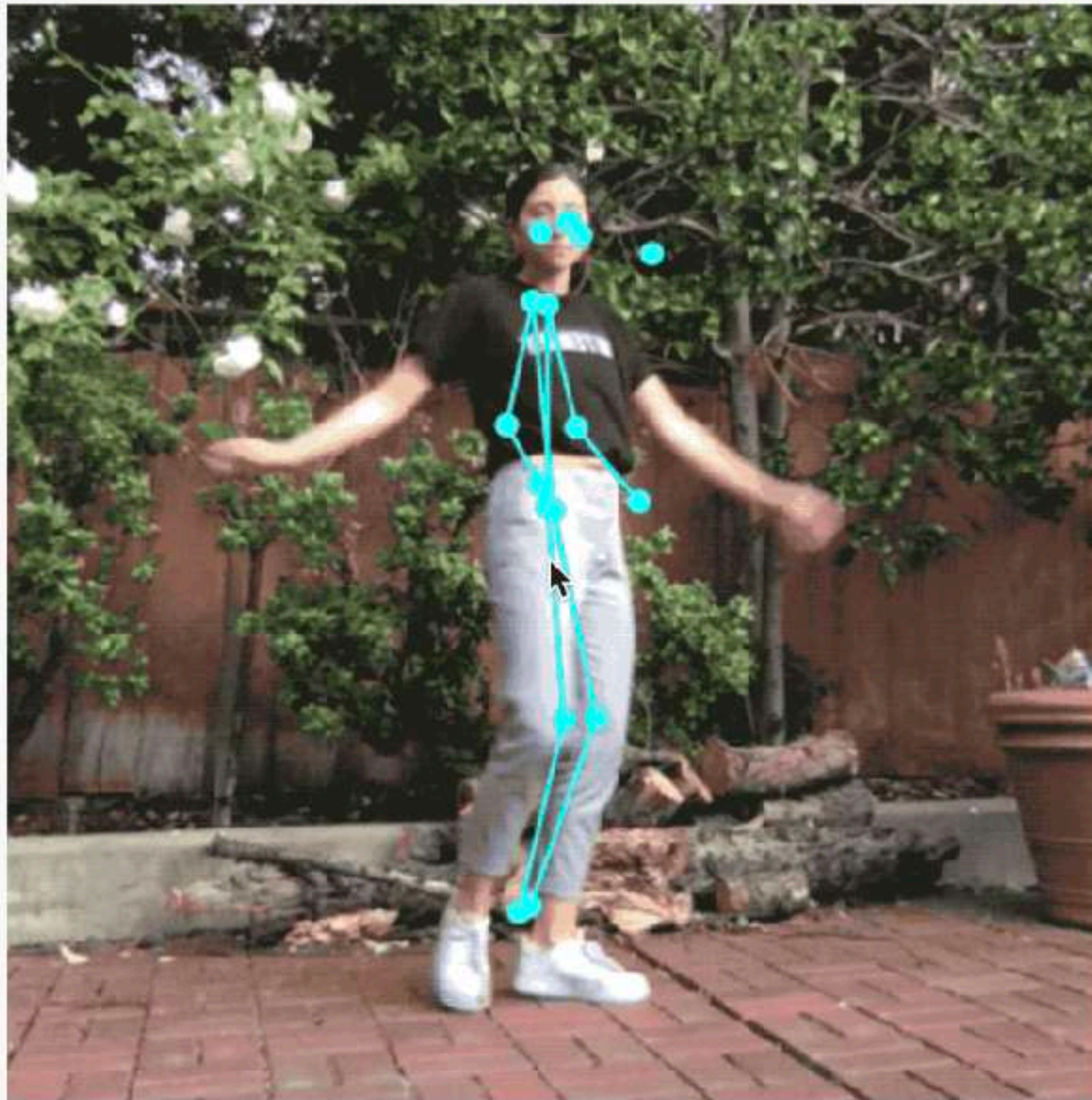
```
const classifier = ml5.imageClassifier('MobileNet');  
  
classifier.classify(video, gotResult);  
  
function gotResult(error, result) {  
  console.log(result);  
}
```





# PoseNet

ported by Cristobal Valenzuela, Maya Man, Dan Oved.

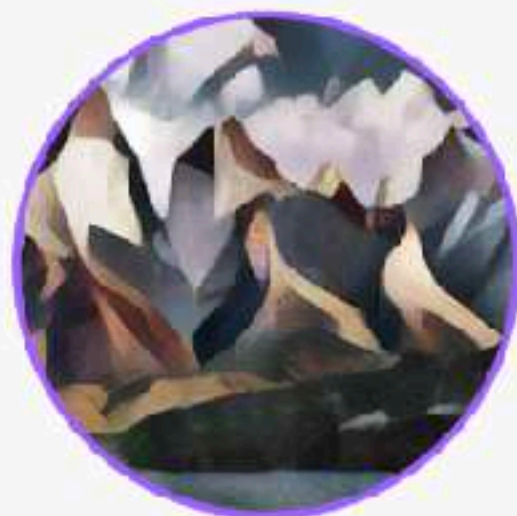


```
const posenet = ml5.poseNet(video);

posenet.on('pose', function(results) {
  poses = results;
});

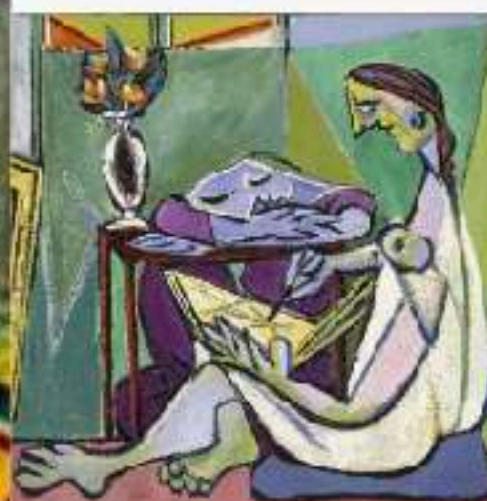
function draw() {
  if (poses.length > 0) {
    circle(poses[0].nose.x, poses[0].nose.y);
  }
}
```





# Style Transfer

ported by Yining Shi



```
const cubist = ml5.styleTransfer('models/cubist', modelReady);
```

```
function modelReady() {  
  cubist.transfer(video, gotImage)  
}
```

```
function gotImage(error, result) {  
  image(result.image, 0, 0);  
}
```



# ENOUGH TALK → LET'S CODE

- 1. Install a code editor, e.g. VS code**
- 2. Go to this github repository:**

**<https://github.com/alsino/creative-applications-ml>**

**RUNWAY 10 \$ CREDIT CODE**

**:**

**DAAD10**



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MACHINE LEARNING MACHINE LI  
G MACHINE LEARNING **P5.JS** MAC  
**MACHINE LEARNING** MACHINE LI  
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