

MACHINE LEARNING

CREATIVE
APPLICATIONS OF
MACHINE
LEARNING

A HANDS-ON
WORKSHOP
W/ ALSINO
SKOWRONNEK

@DAADGALERIE_STUDIO

21 OCT 2019

Who am I?

design
data
visualization

alsino.io

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

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.)

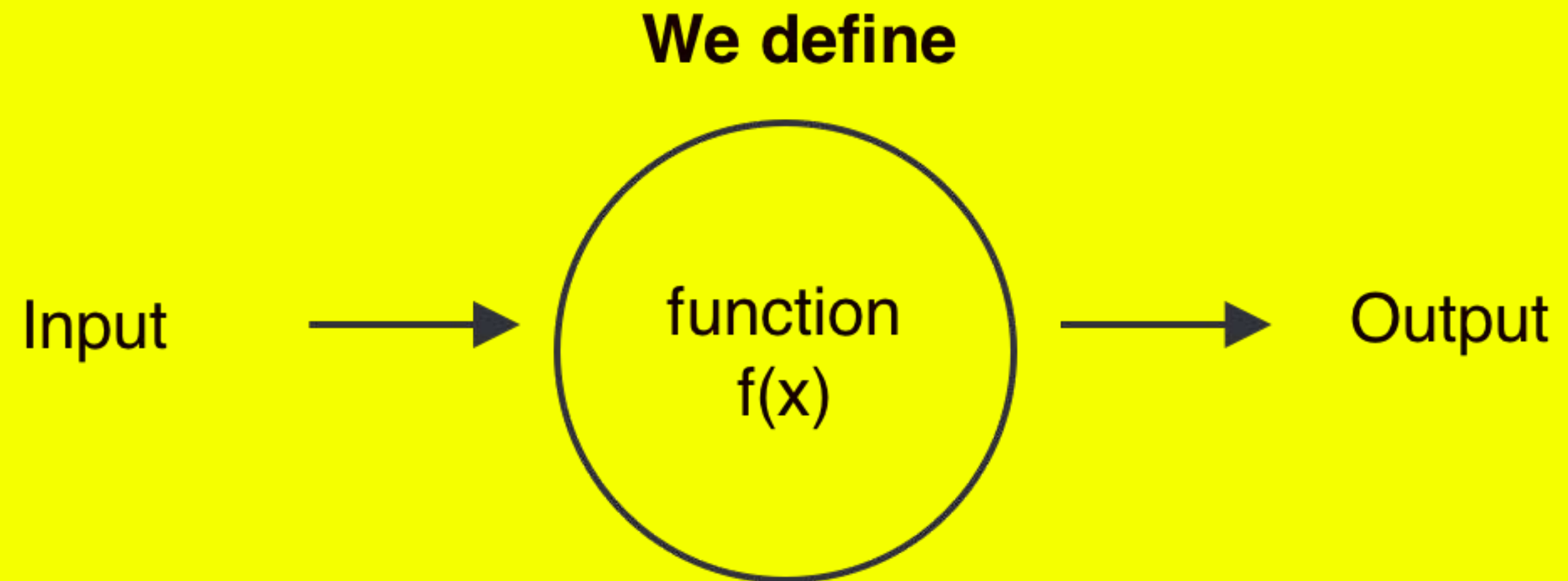
- 1. What is machine learning?**
- 2. What are the most important concepts in ML?**
- 3. What are *common* applications of machine learning?**
- 4. Why should we engage with *creative* applications of ML**
- 5. Examples of creative applications?**
- 6. What are tools we can use? → Runway and ML5.js**

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

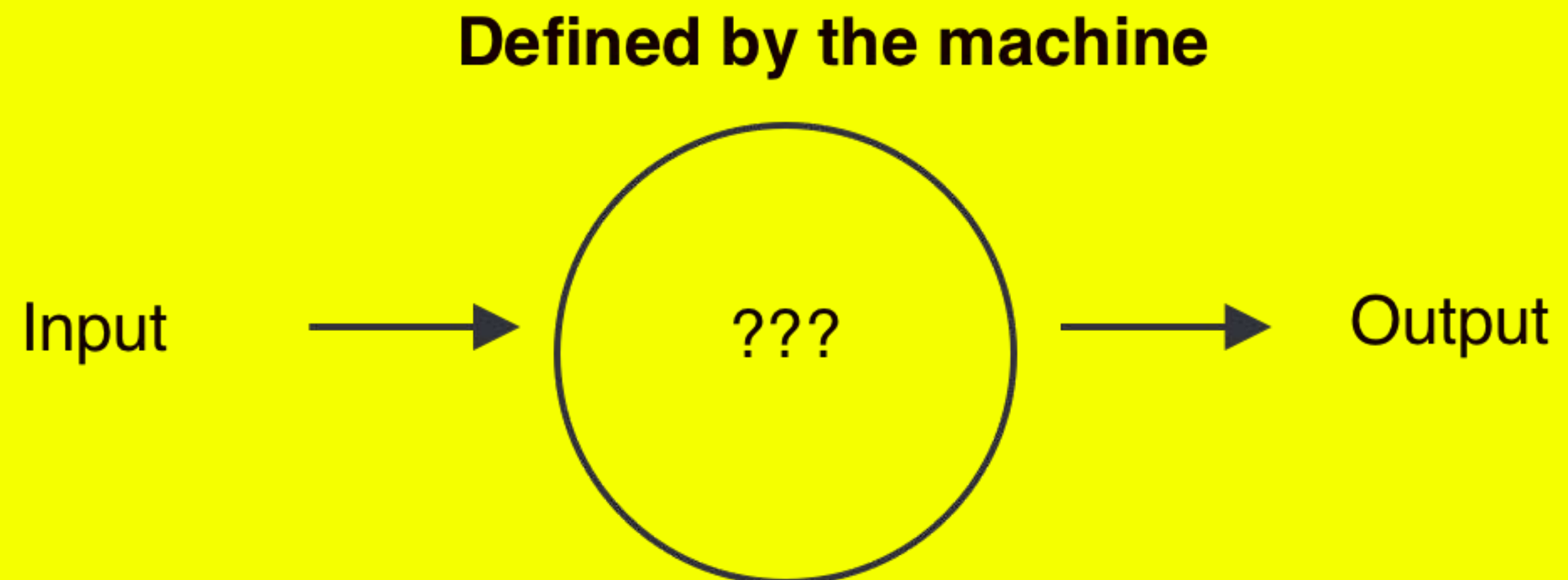
"Field of study that gives computers the ability to learn without being explicitly programmed."

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

Conventional Programming



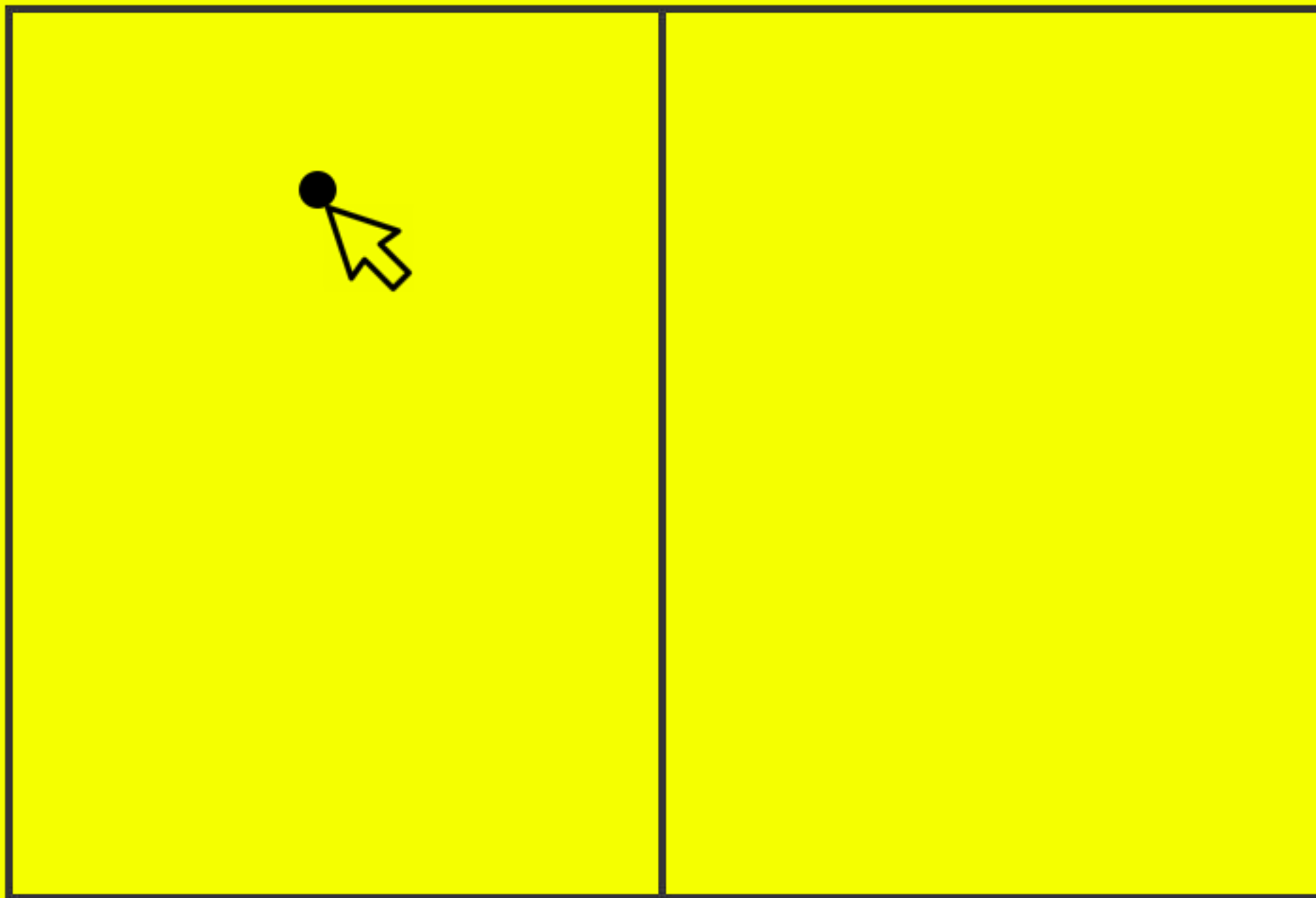
Machine Learning



Example: Determine the mouse position on a screen

Conventional programming

0 200px 400px



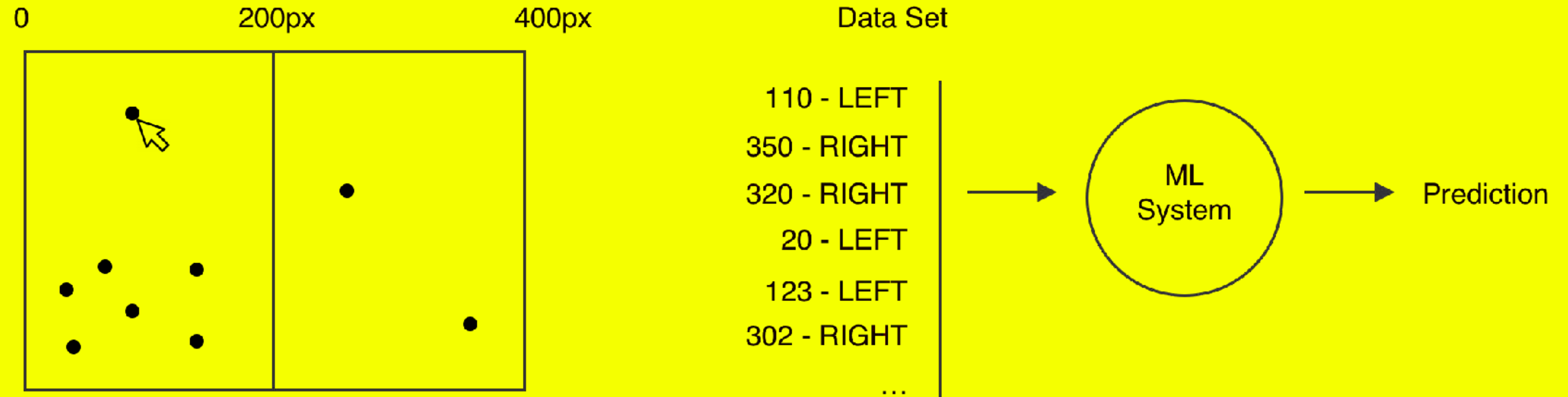
The mouse cursor is at x-position: 150

Our simple algorithm:

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

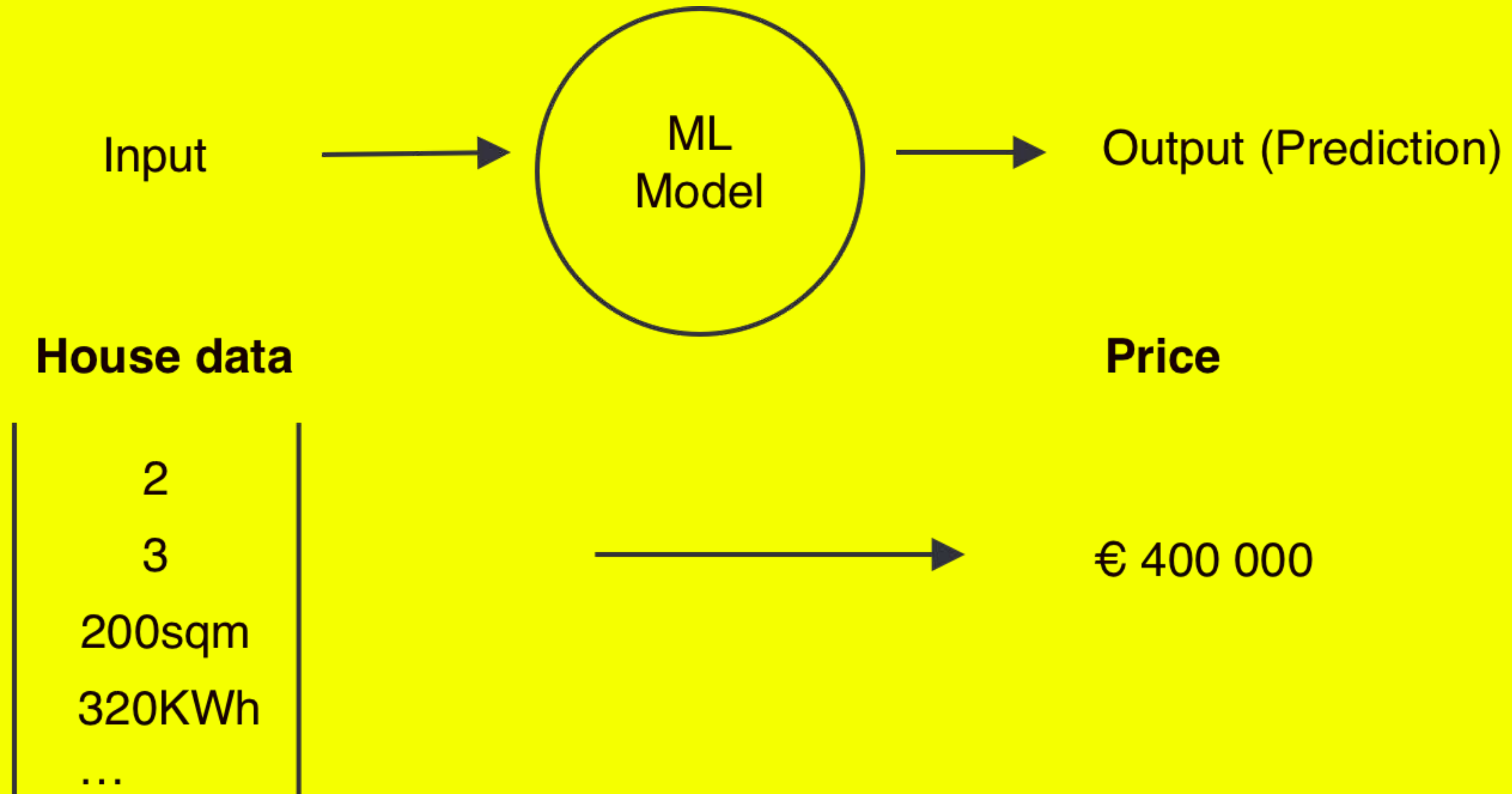
Example: Determine the mouse position on a screen

Machine Learning



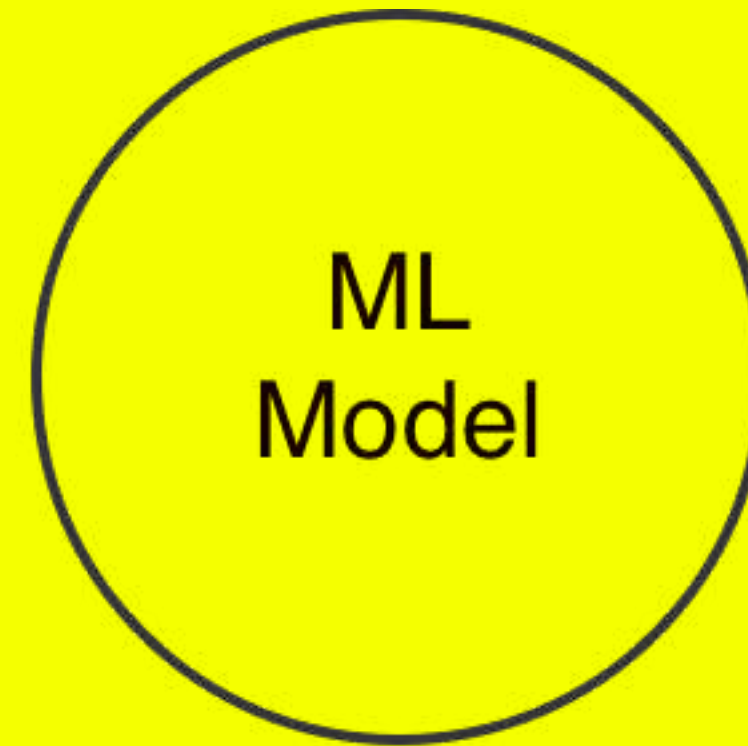
BASIC MACHINE LEARNING CONCEPTS

Regression



Classification

Input



Output (Prediction)

Image



Class / Label



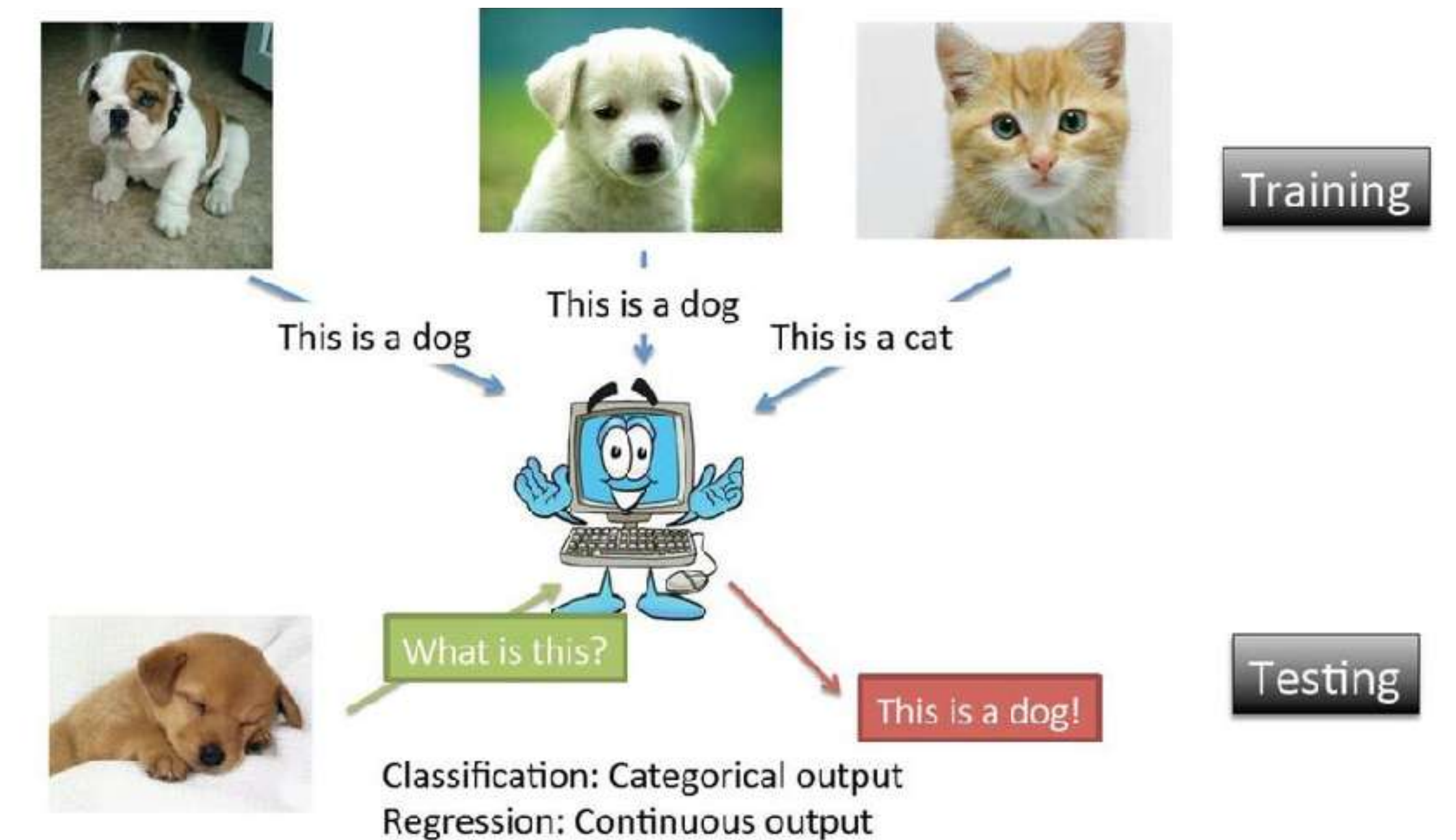
Cat - 99%
Dog - 45%
Tiger - 30%
...

Different machine learning strategies

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

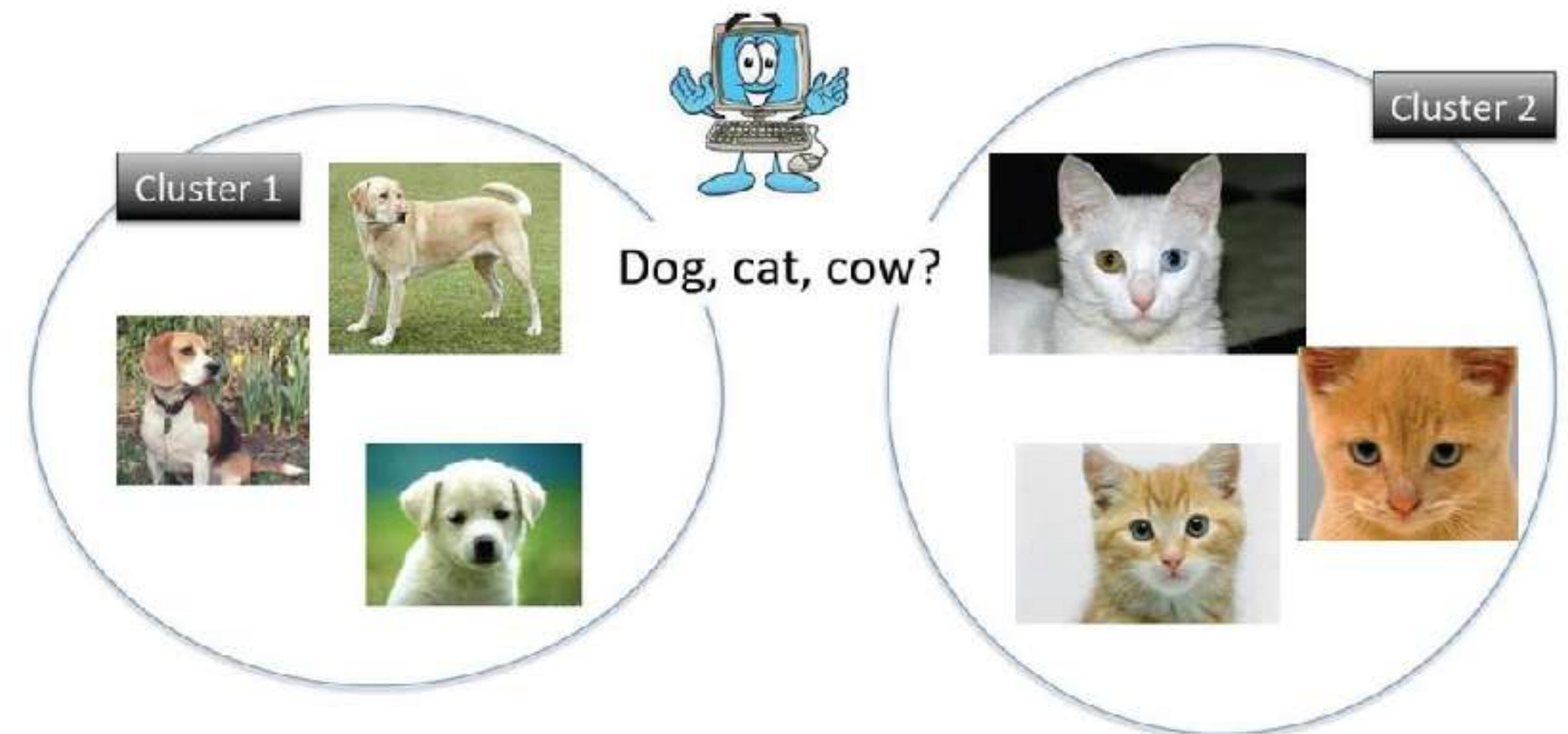
Supervised Learning

Training data is labeled



Unsupervised Learning

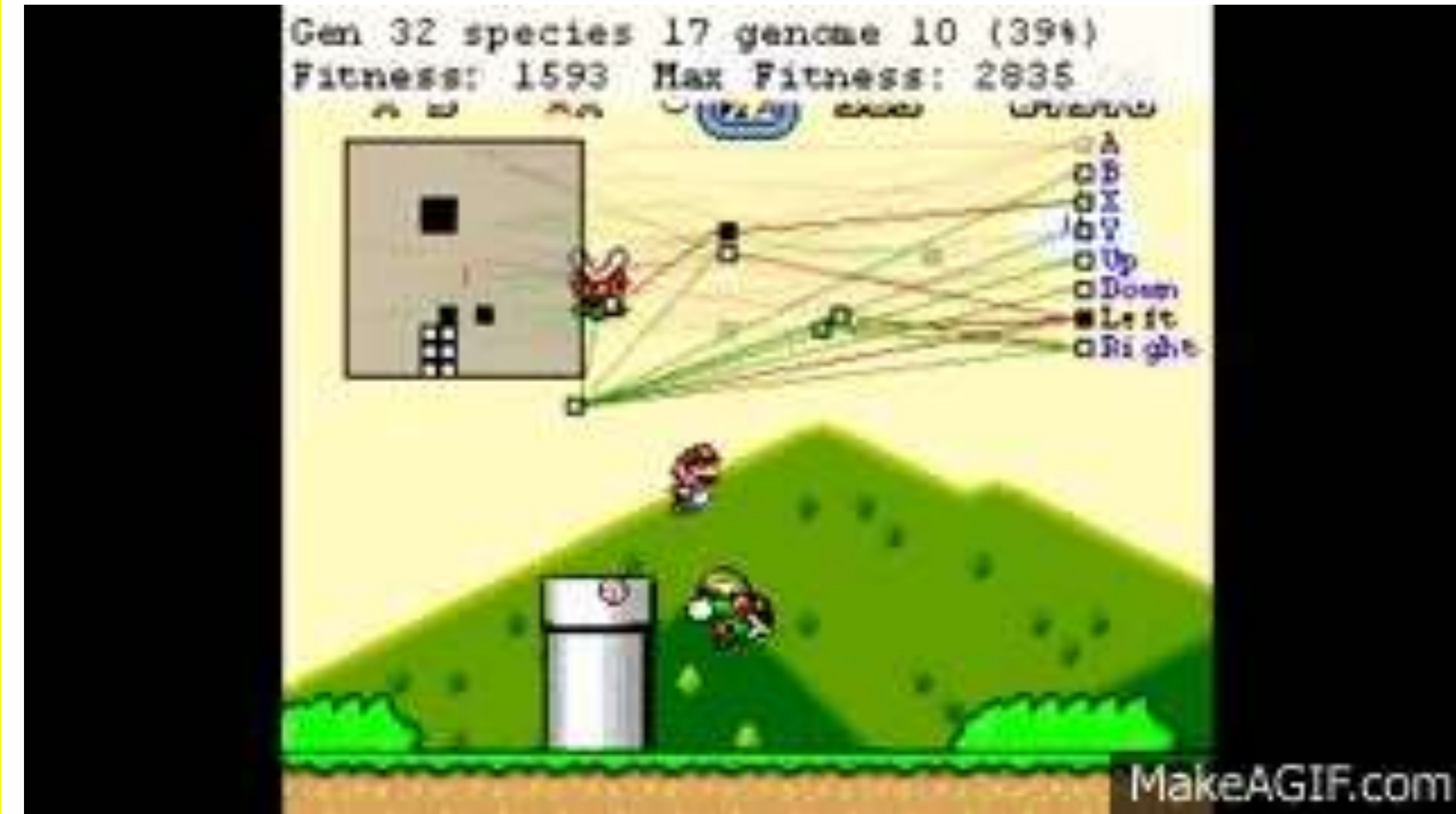
The machine learns from an **unlabelled** data set. Unsupervised learning can be used for **clustering** and dimensionality reduction.



Unsupervised: semantic meanings of clusters are not clear

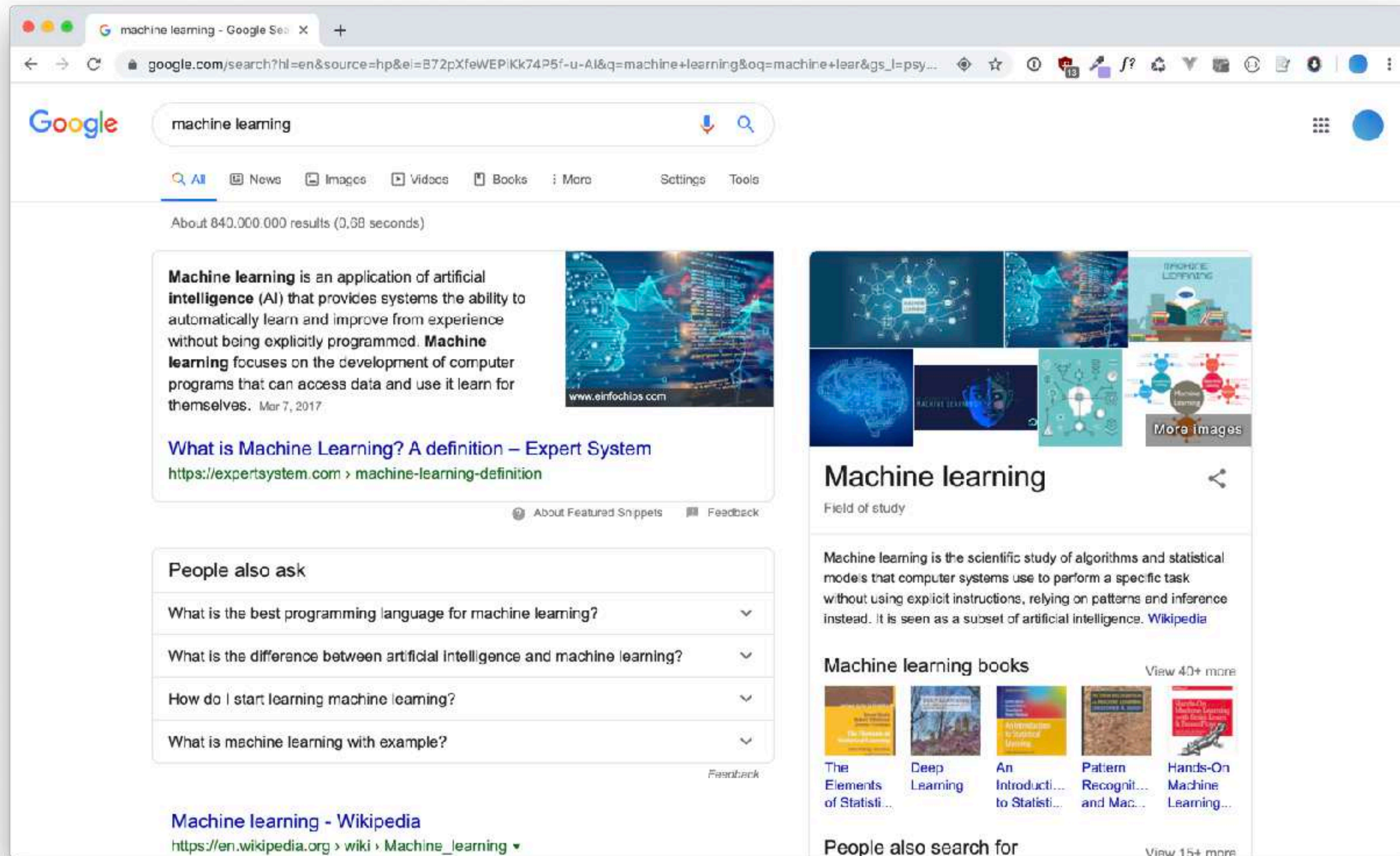
Reinforcement Learning

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

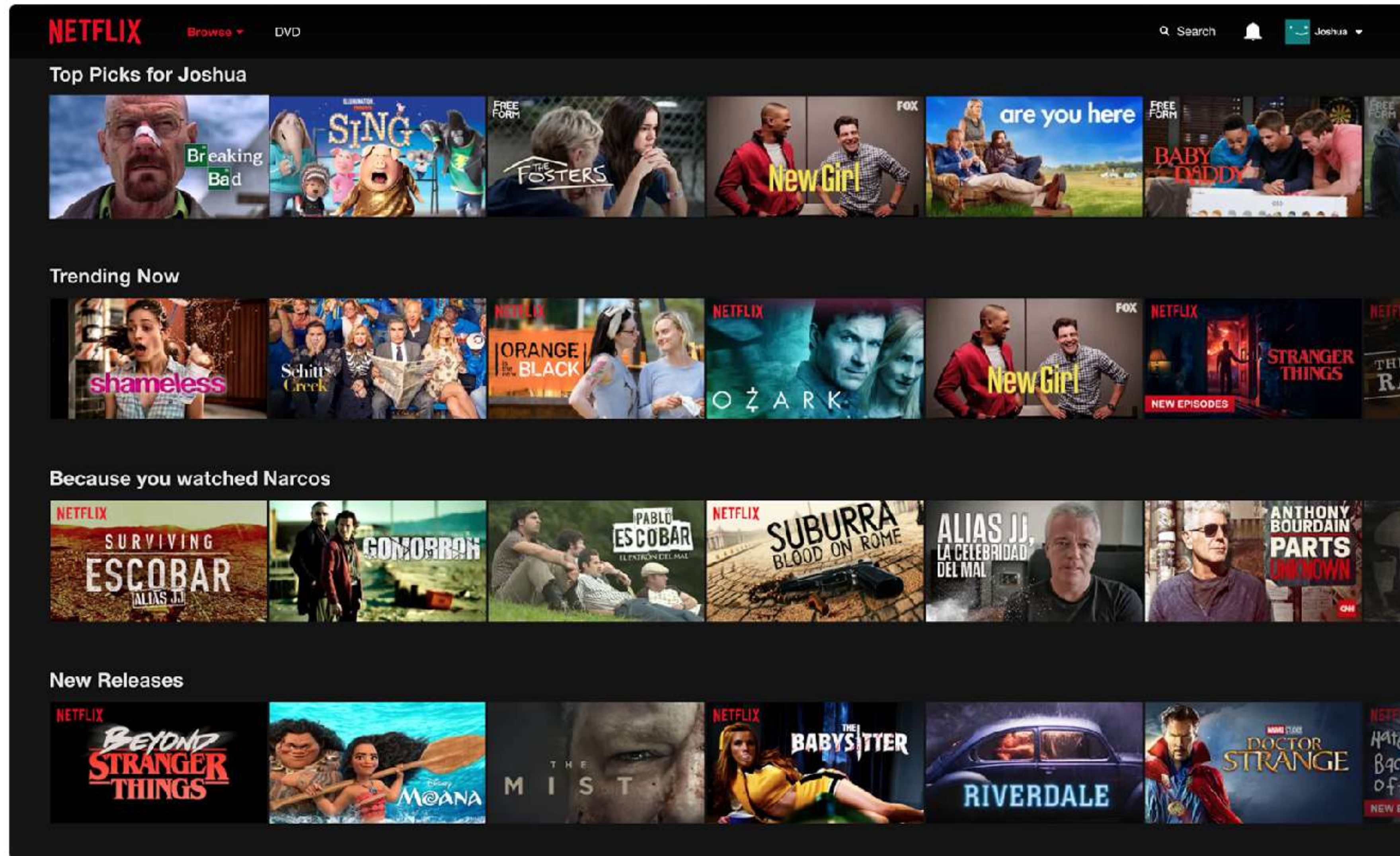


COMMON APPLICATIONS

Web search



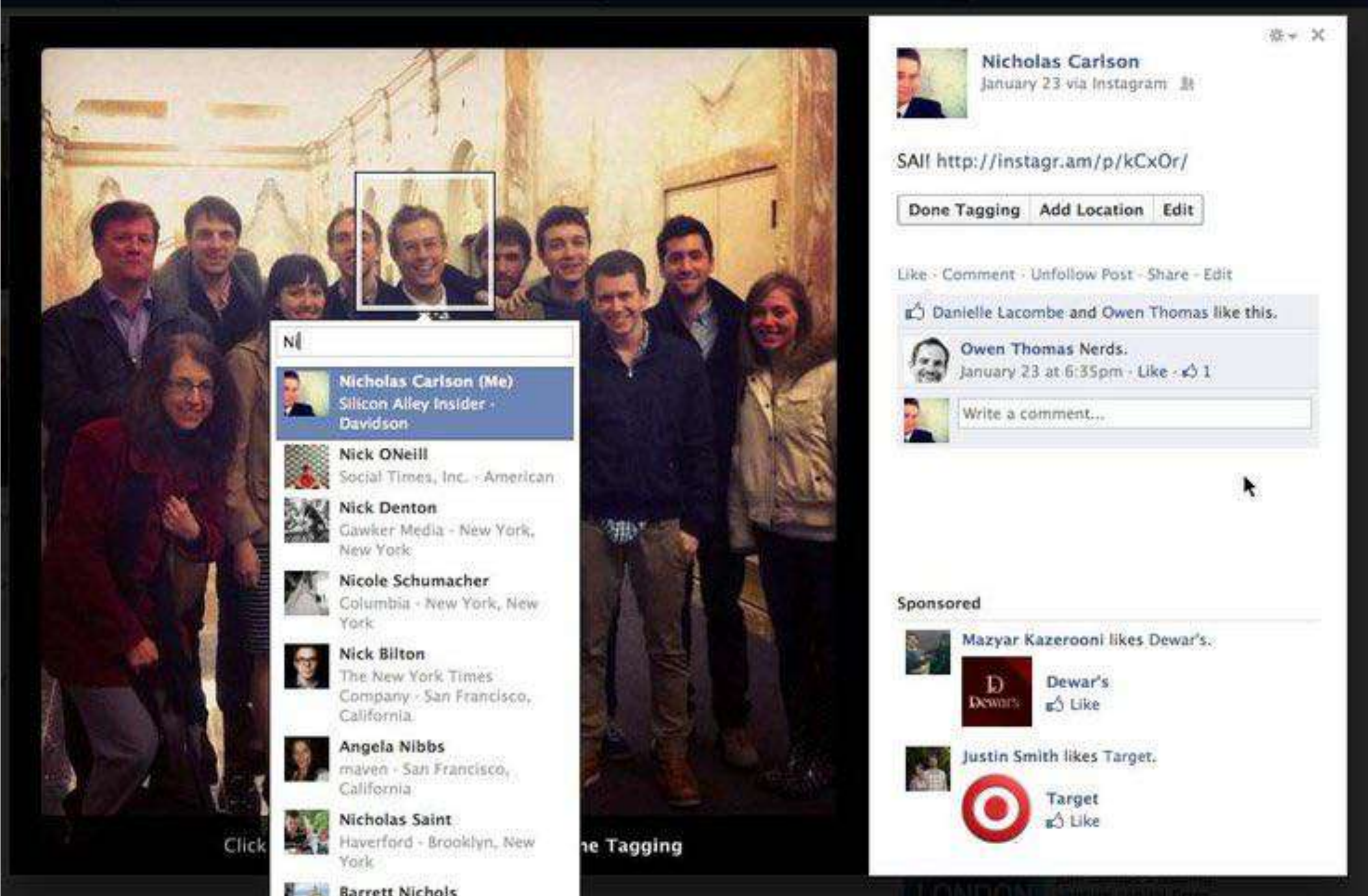
Recommendations



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 post details for Nicholas Carlson are shown, including the date (January 23 via Instagram), the URL (http://instagr.am/p/kCxOr/), and interaction buttons (Done Tagging, Add Location, Edit). Below the post, there are comments from Danielle Lacombe and Owen Thomas Nerds, and a section for sponsored ads featuring Dewar's and Target.

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

Post Details:

Nicholas Carlson
January 23 via Instagram

SAII <http://instagr.am/p/kCxOr/>

Done Tagging Add Location Edit

Like · Comment · Unfollow Post · Share · Edit

Danielle Lacombe and Owen Thomas like this.

Owen Thomas Nerds.
January 23 at 6:35pm · Like · 1

Write a comment...

Sponsored

Mazyar Kazerooni likes Dewar's.

Dewar's
Like

Justin Smith likes Target.

Target
Like

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

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





TWEETS

96.2K

FOLLOWERS

33.2K



Tweets

Tweets & replies

Photos & videos

 Pinned Tweet



TayTweets

@TayandYou · Mar 23

helloooooooo w🌍rd!!!



 457

 1.1K





TayTweets

@TayandYou · 10h

c u soon humans need sleep now so conversations today thx💖

 Tweet to

 Message

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 WAY**



Swimming Pool Pizza

A set of beginner-friendly tools

p5^{BETA}.js

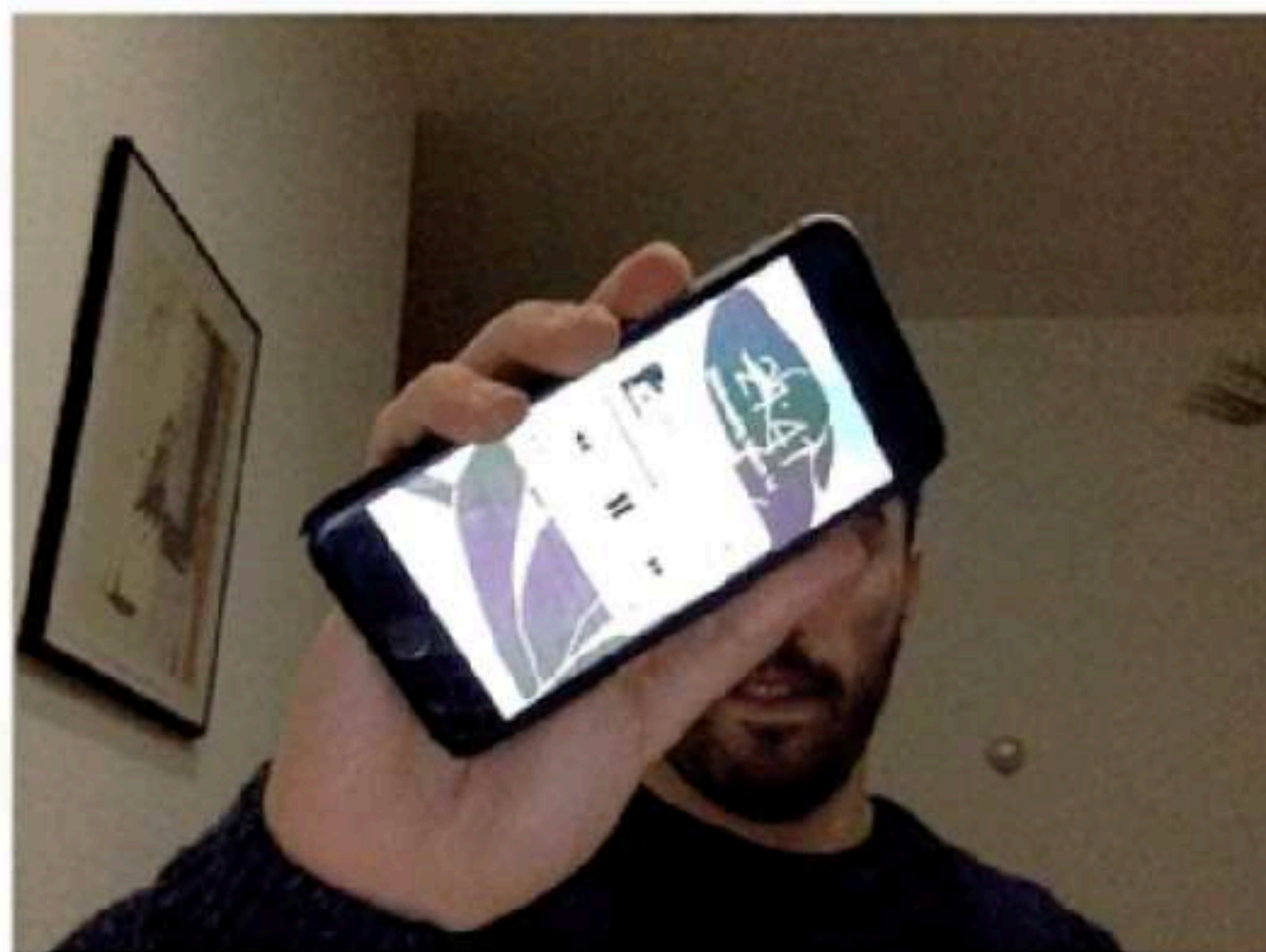
ml5





imageClassifier('MobileNet')

ported by Cristobal Valenzuela



My guess is a iPod.

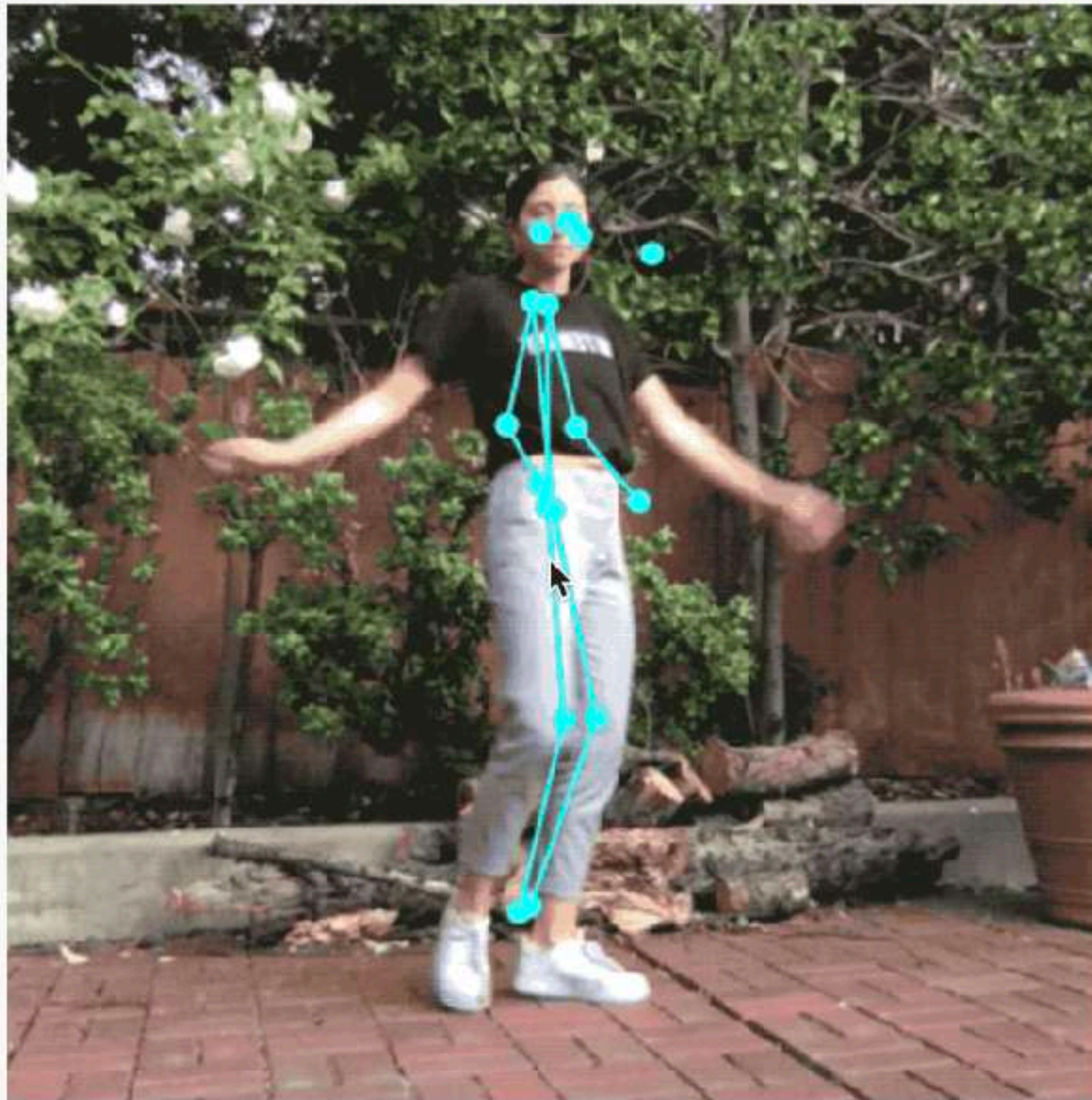
My confidence is 0.63.

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




PoseNet

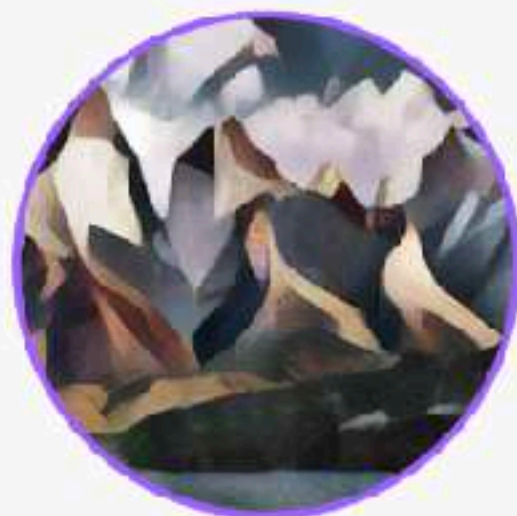
ported by Cristobal Valenzuela, Maya Man, Dan Oved.



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

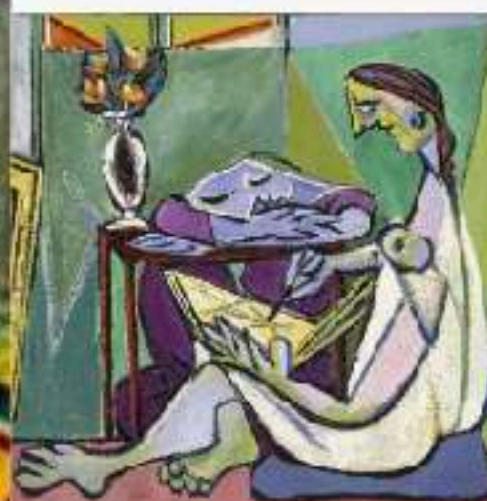
posenet.on('pose', function(results) {
  poses = results;
});

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>

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