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:

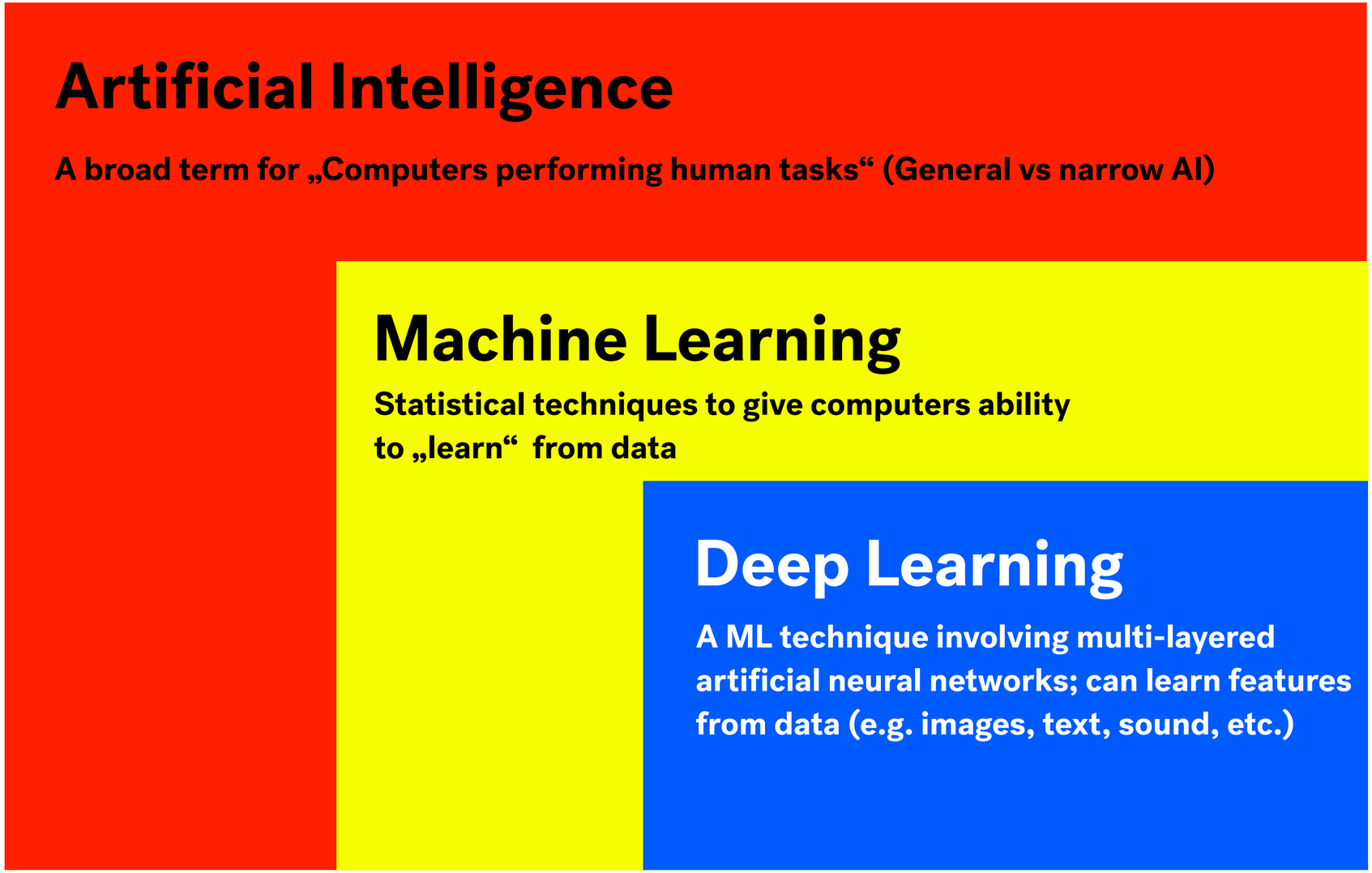
Lunch Break

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.)

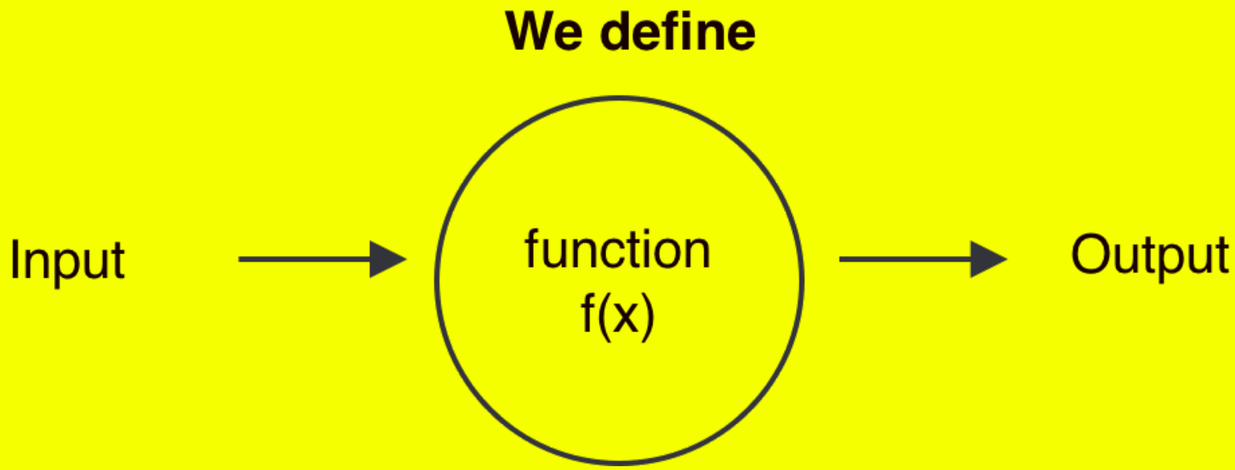
1. **What is machine learning?**
2. **What are the most important concepts in ML?**
3. **What are *common* applications of machine learning?**
4. **Why should we engage with *creative* applications of ML**
5. **Examples of creative applications?**
6. **What are tools we can use? → Runway and ML5.js**

WHAT (TF) IS MACHINE LEARNING?

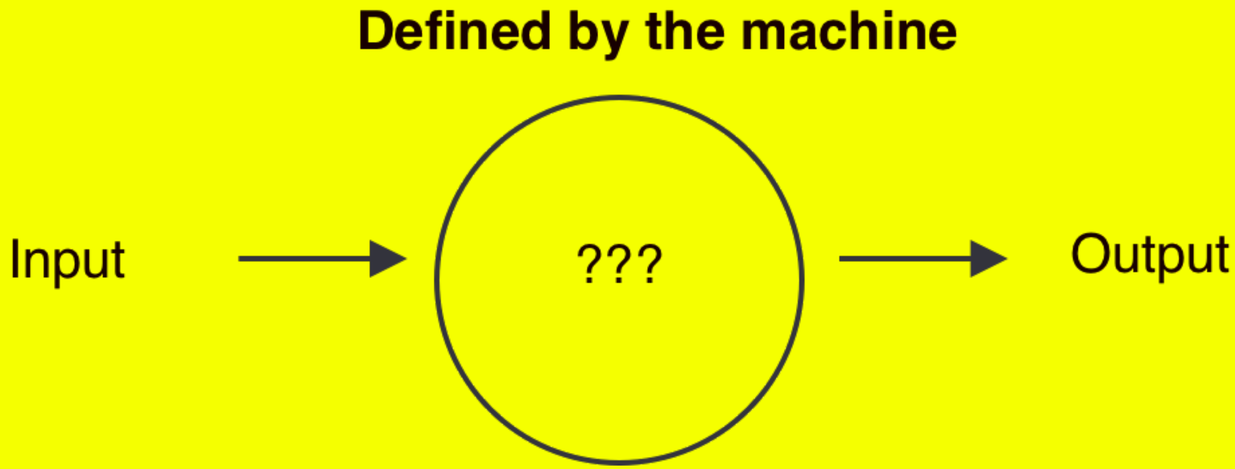
"Field of study that gives computers the ability to learn without being explicitly programmed."

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

Conventional Programming

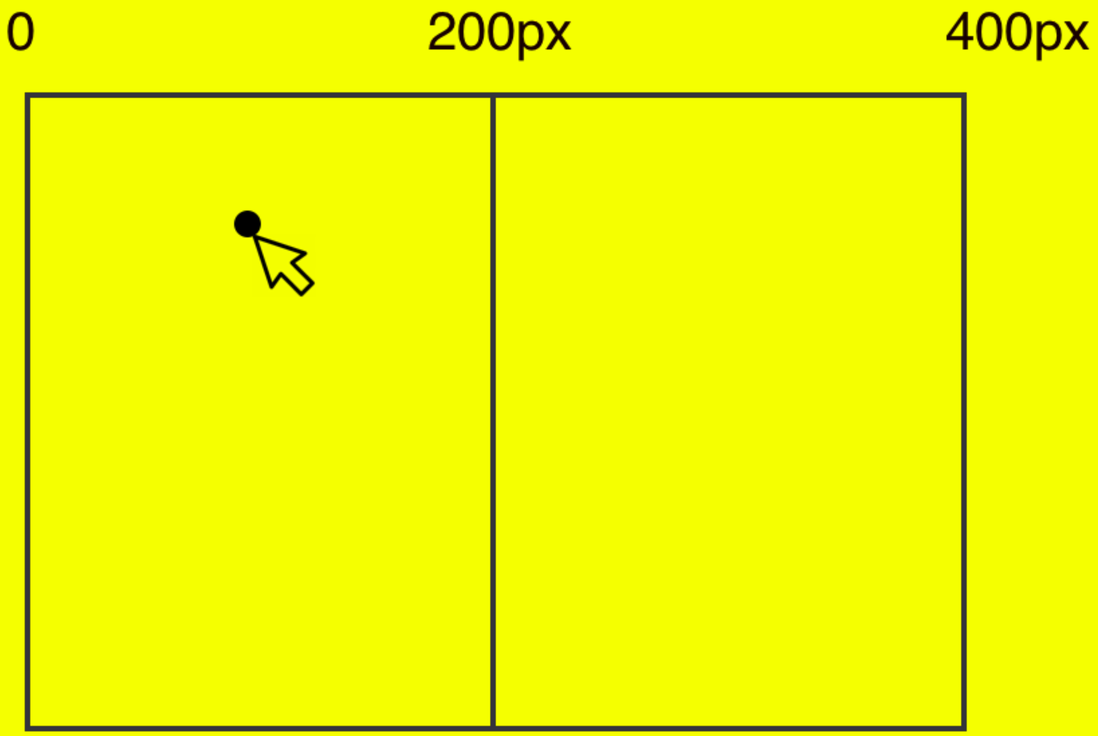


Machine Learning



Example: Determine the mouse position on a screen

Conventional programming



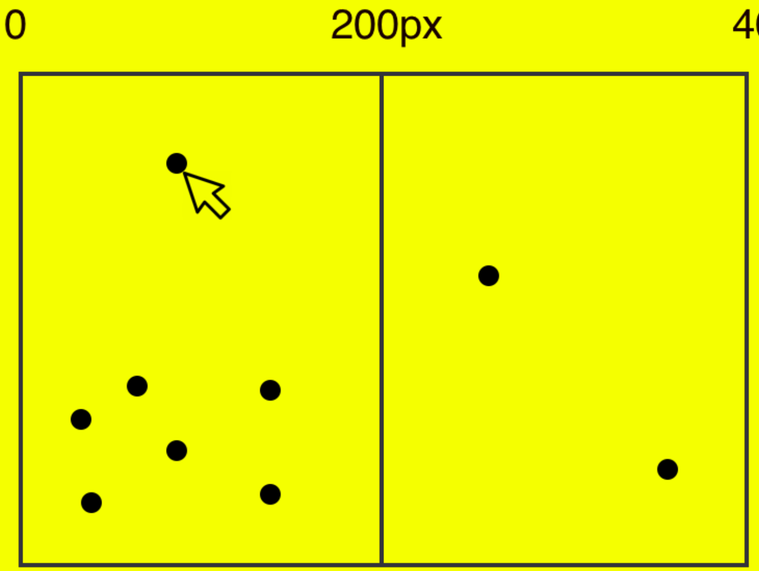
The mouse cursor is at x-position: 150

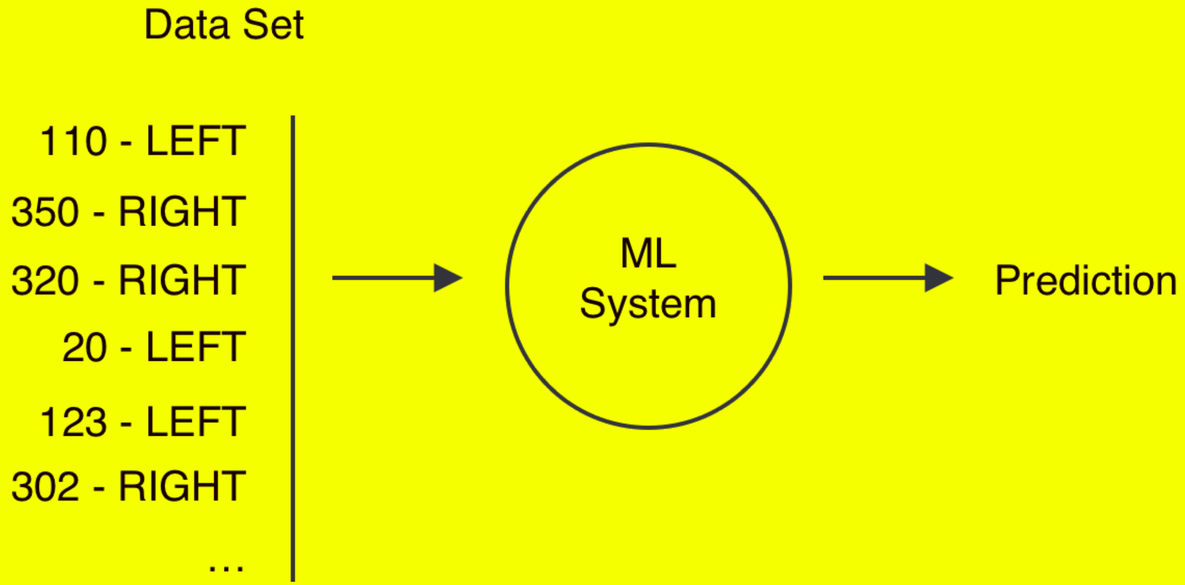
Our simple algorithm:

```
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

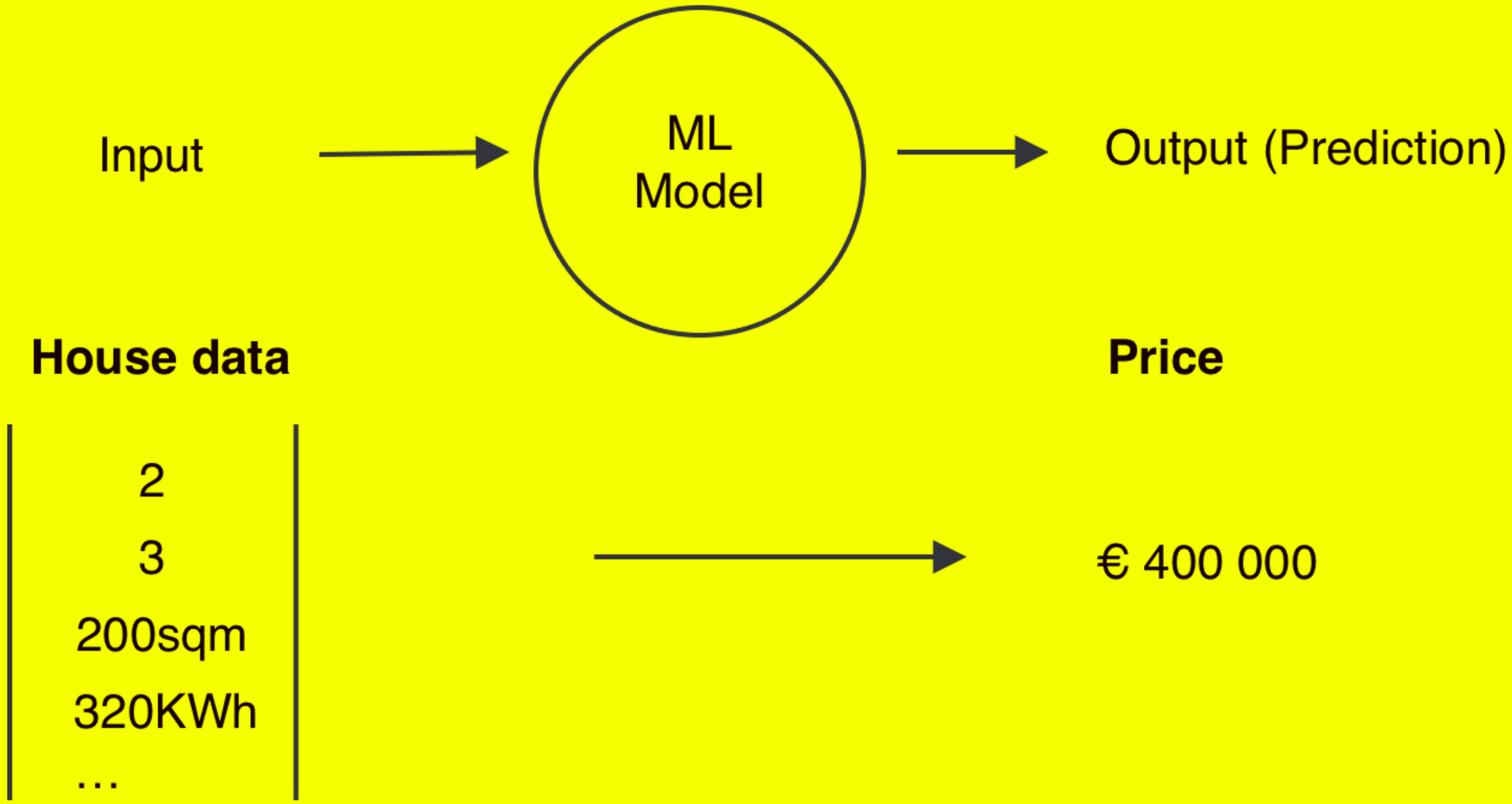
Machine Learning



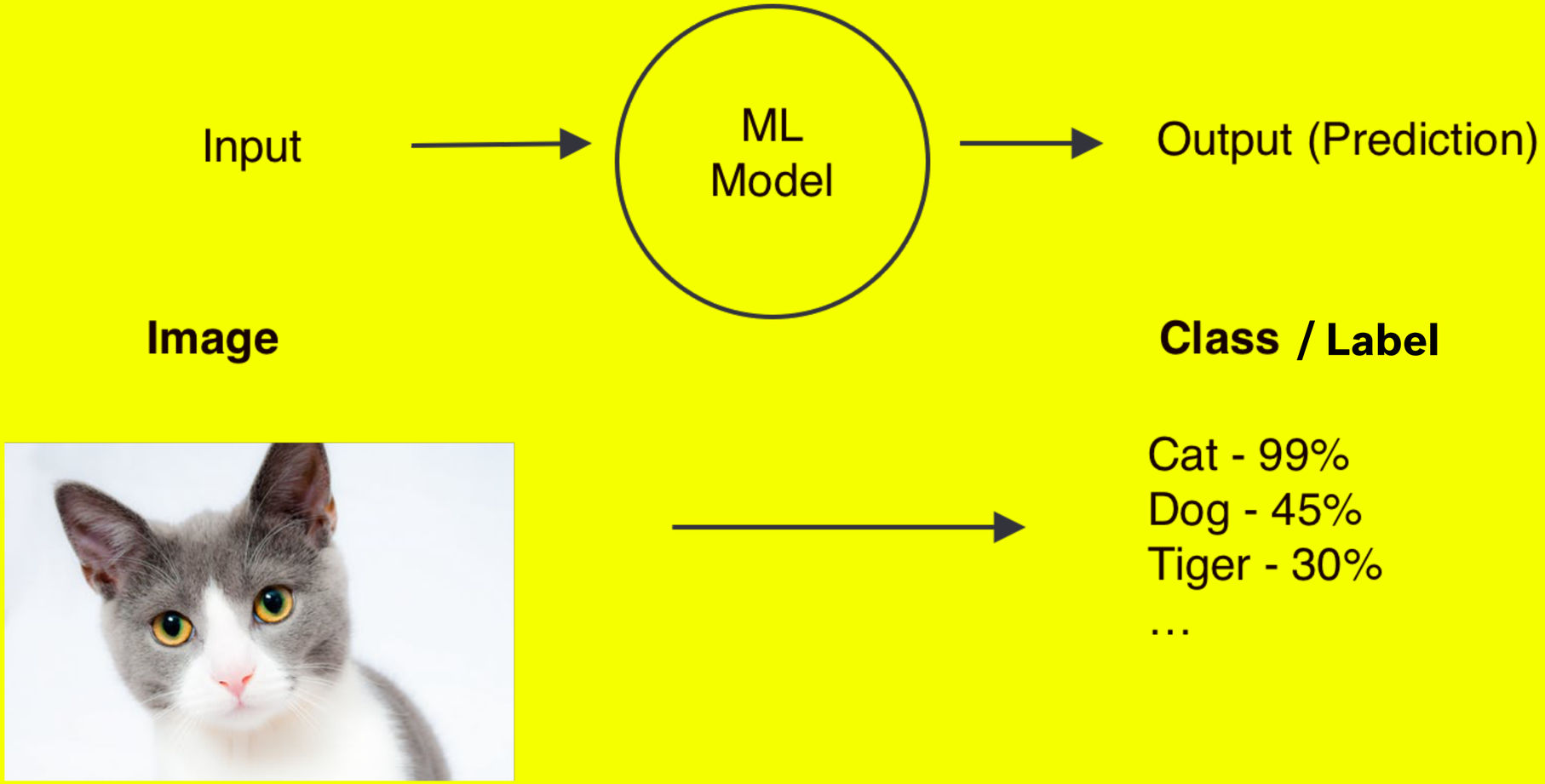


BASIC MACHINE LEARNING CONCEPTS

Regression


Input
ML
Model
Output (Prediction)
House data
2
3
200sqm
320KWh
…
Price
€ 400 000

Classification

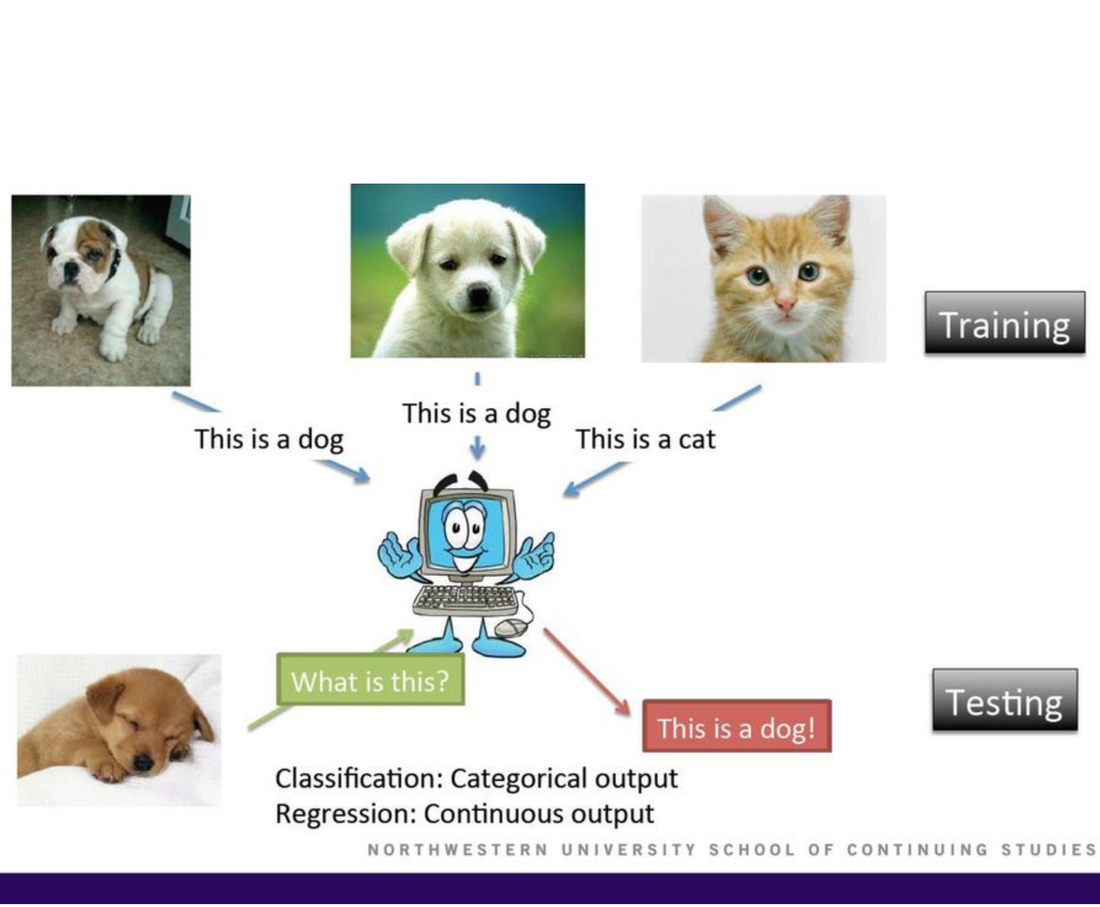


Different machine learning strategies

- Supervised Learning
- Unsupervised learning
- Reinforcement learning

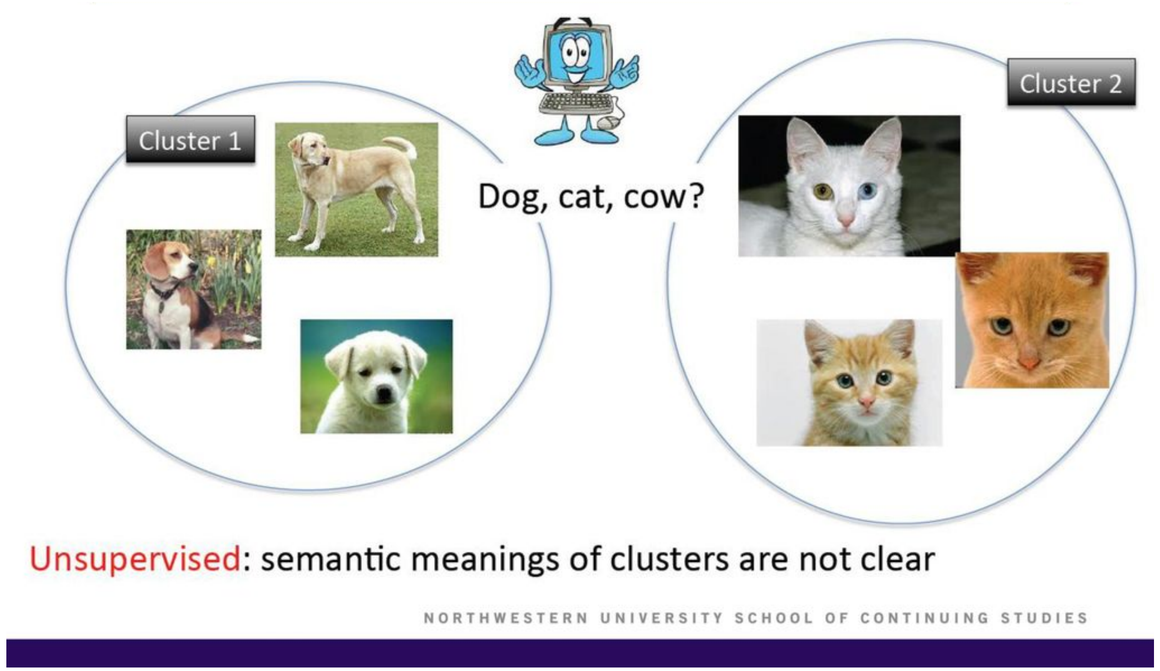
Supervised Learning

Training data is labeled



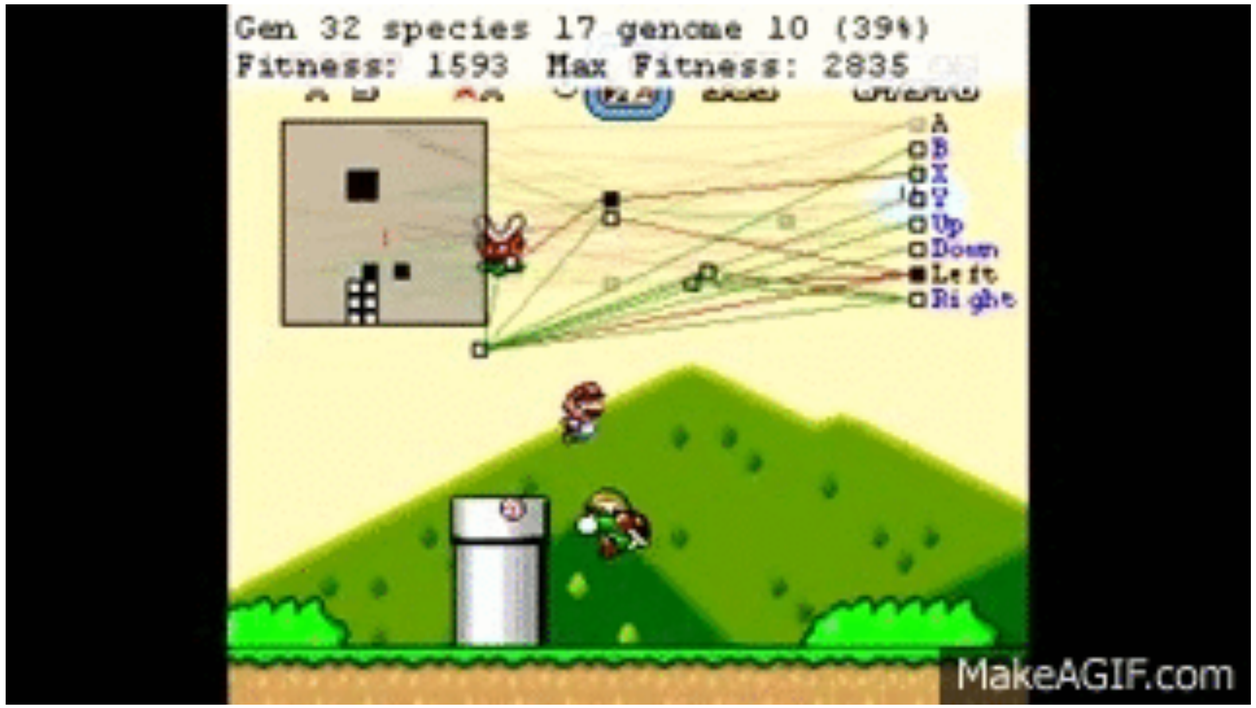
Unsupervised Learning

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



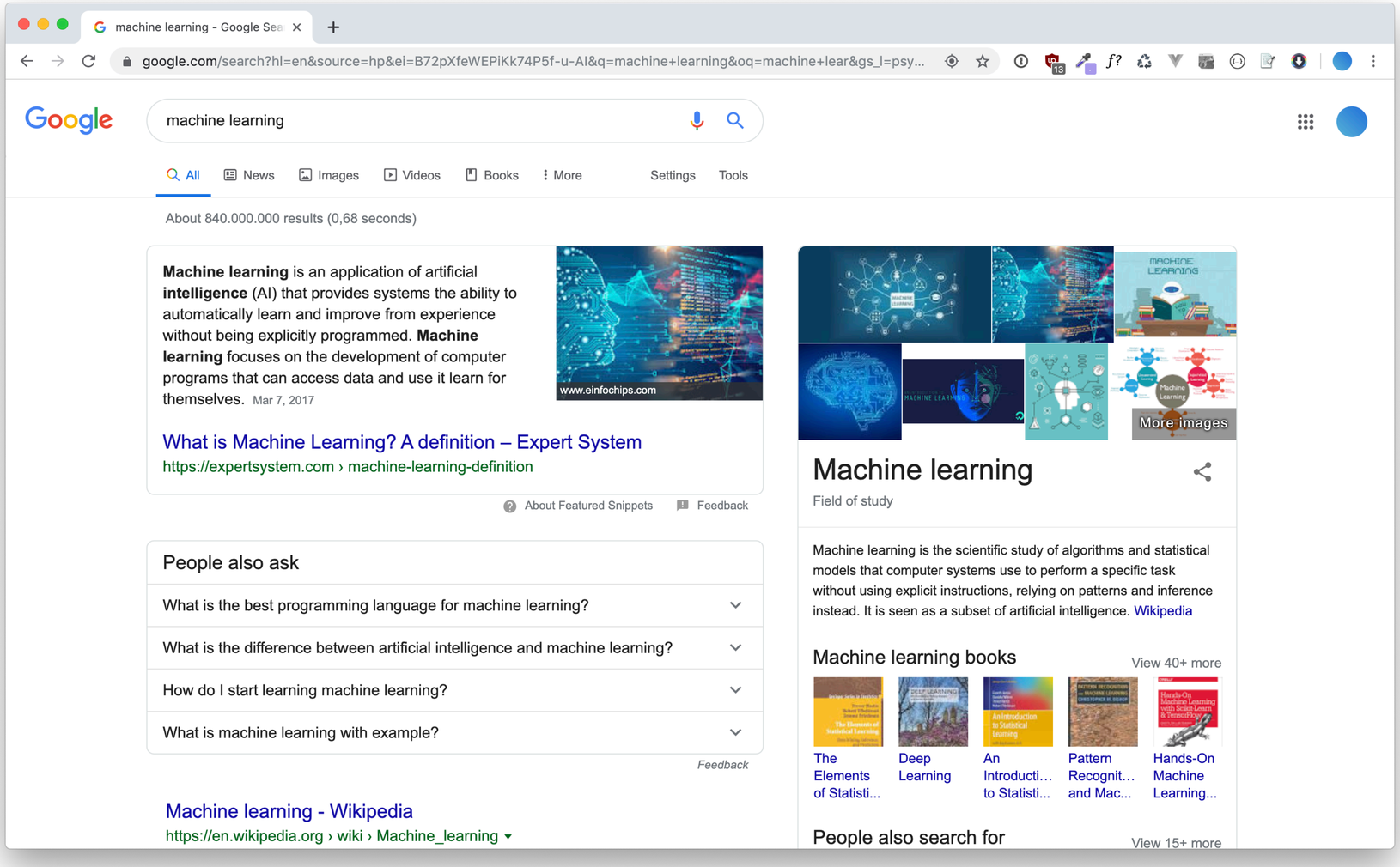
Reinforcement Learning

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



COMMON APPLICATIONS

Web search


machine learning - Google Sea
google.com/search?hl=en&source=hp&ei=B72pXfeWEPiKk74P5f-u-AI&q=machine+learning&oq=machine+lear&gs_l=psy...
Google
machine learning
All
News
Images
Videos
Books
More
Settings
Tools
About 840.000.000 results (0,68 seconds)
Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. Machine learning focuses on the development of computer programs that can access data and use it learn for themselves. Mar 7, 2017
www.einfochips.com
What is Machine Learning? A definition – Expert System
https://expertsystem.com › machine-learning-definition
About Featured Snippets
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People also ask
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?
Feedback
Machine learning - Wikipedia
https://en.wikipedia.org › wiki › Machine_learning
More images
Machine learning
Field of study
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
Machine learning books
View 40+ more
The Elements of Statisti...
Deep Learning
An Introducti... to Statisti...
Pattern Recognit... and Mac...
Hands-On Machine Learning...
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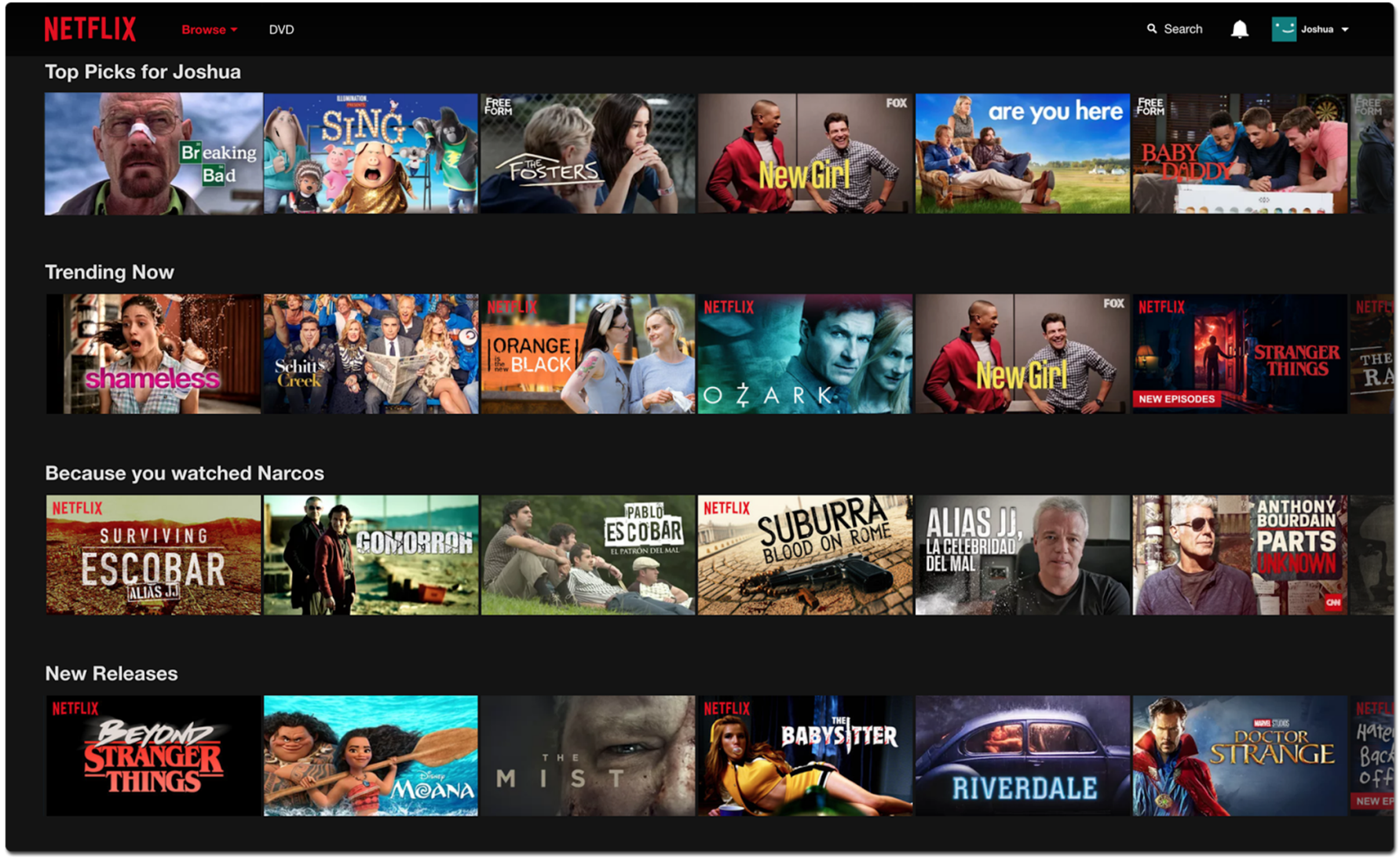
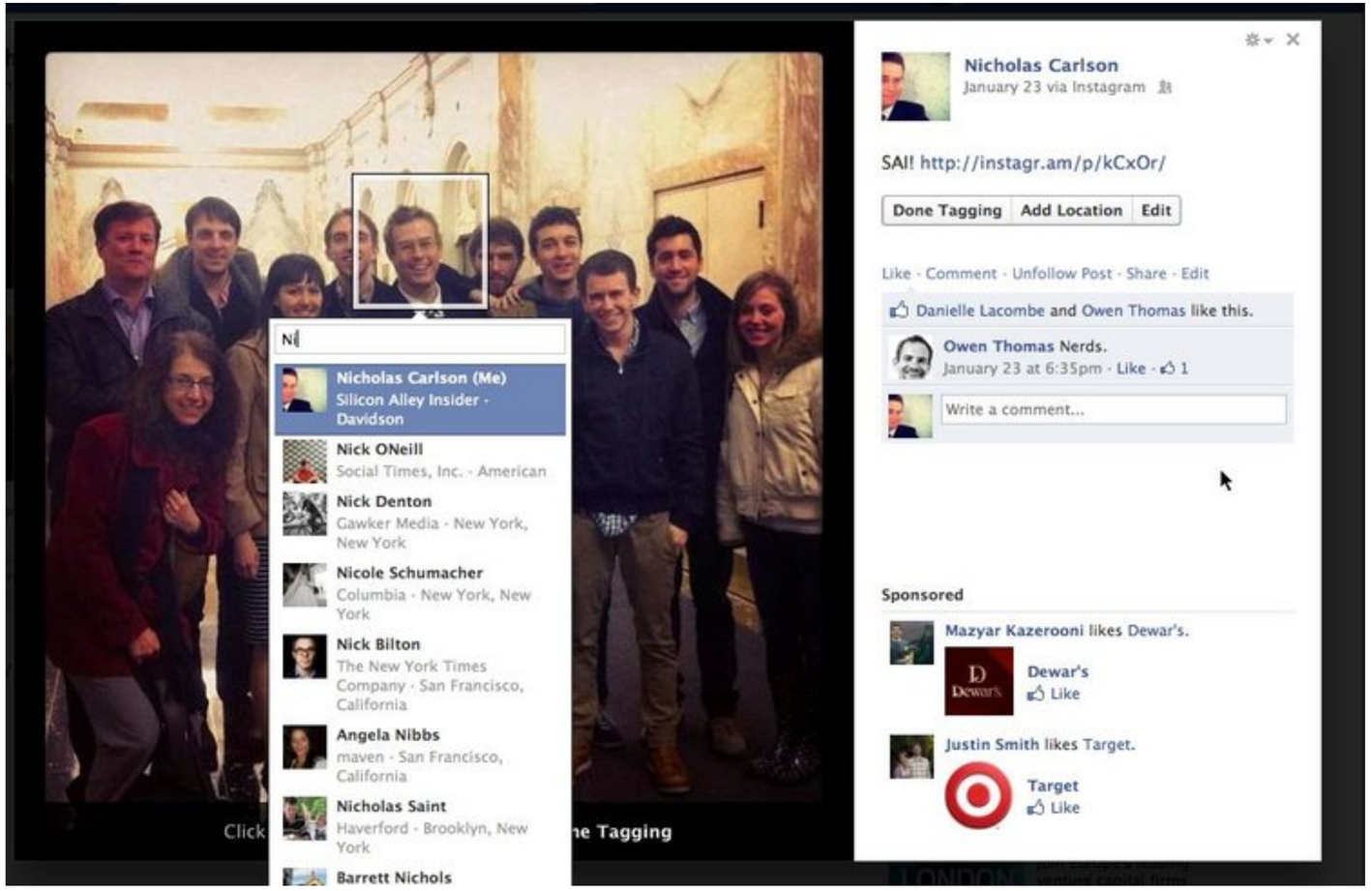
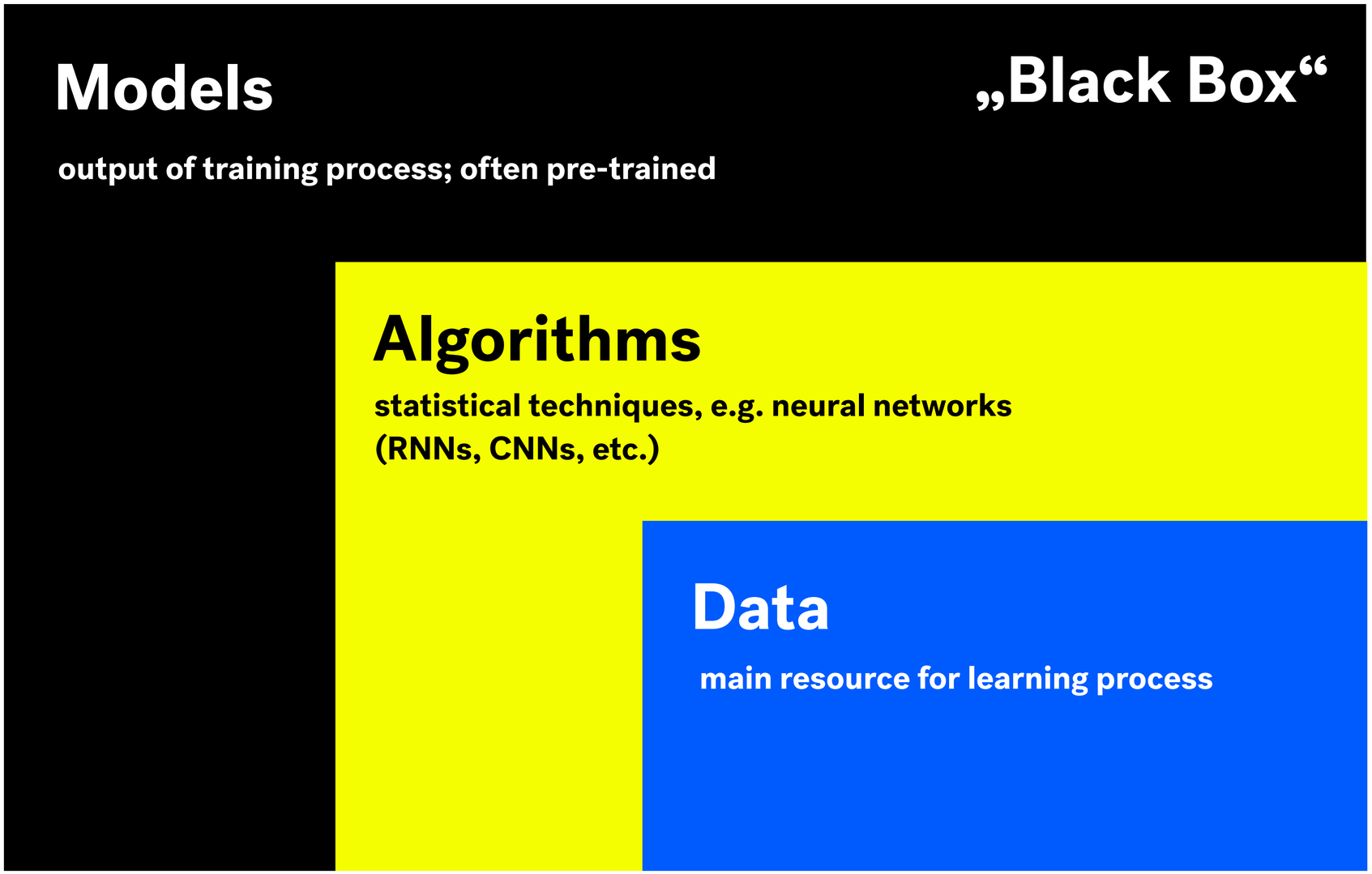
Recommendations



Personal Assistants

Face Recognition




Models
„Black Box“
output of training process; often pre-trained
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

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

https://qz.com/653084/microsofts-disastrous-tay-experiment-shows-the-hidden-dangers-of-ai/

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

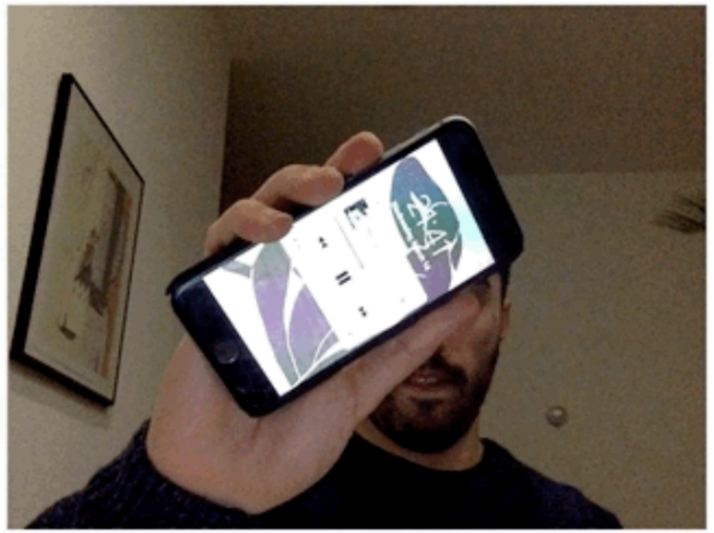
EXPLORING MACHINE LEARNING THE PLAYFUL WAY

Swimming Pool Pizza

A set of beginner-friendly tools

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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