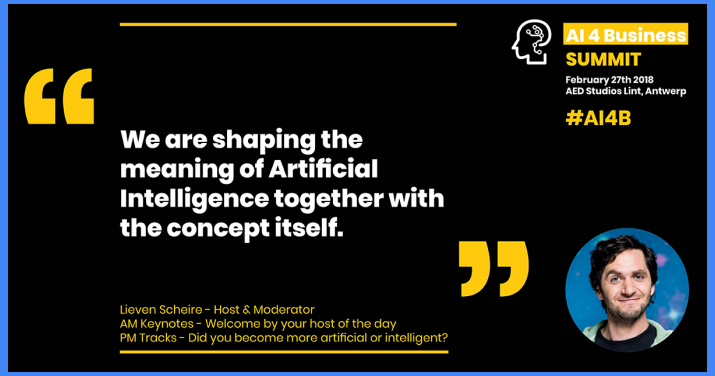
WTF is AI?!

An introduction to Artificial Intelligence

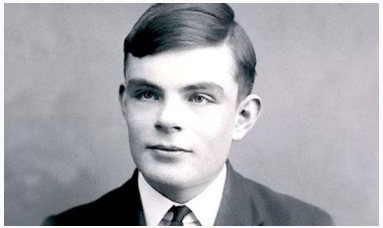
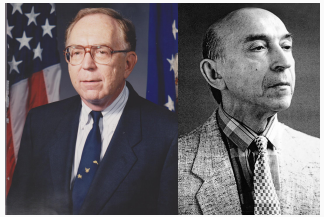
Hamidreza Hosseinkhani
School of AI - 2018

First things first,
Let’s define the **AI**

people disagree on what intelligence (and so AI) really is...

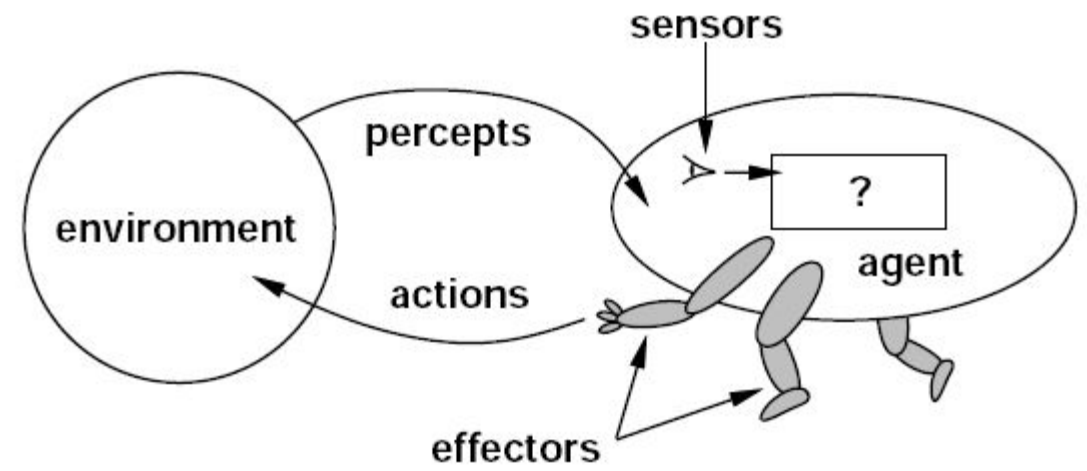


Approaches

Thinking Humanly 	*Acting Humanly* 
Thinking Rationally 	*Acting Rationally* 

Intelligent Agent

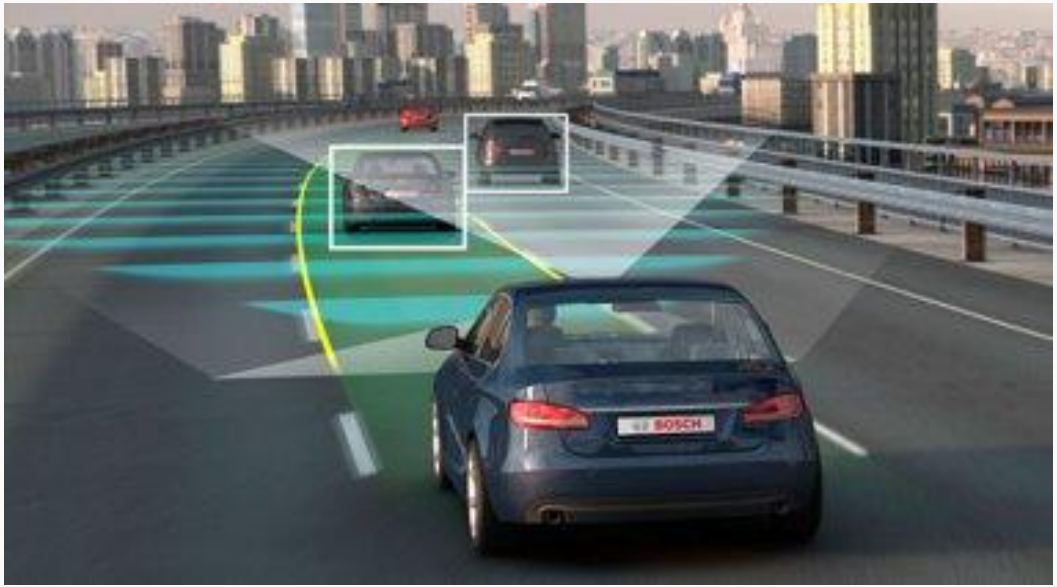
- Agent
- Environment
- Events, Signals (State)
- Sensors, Perception
- **Agent Function (Policy) (?)**
- Actuators (Effectors)



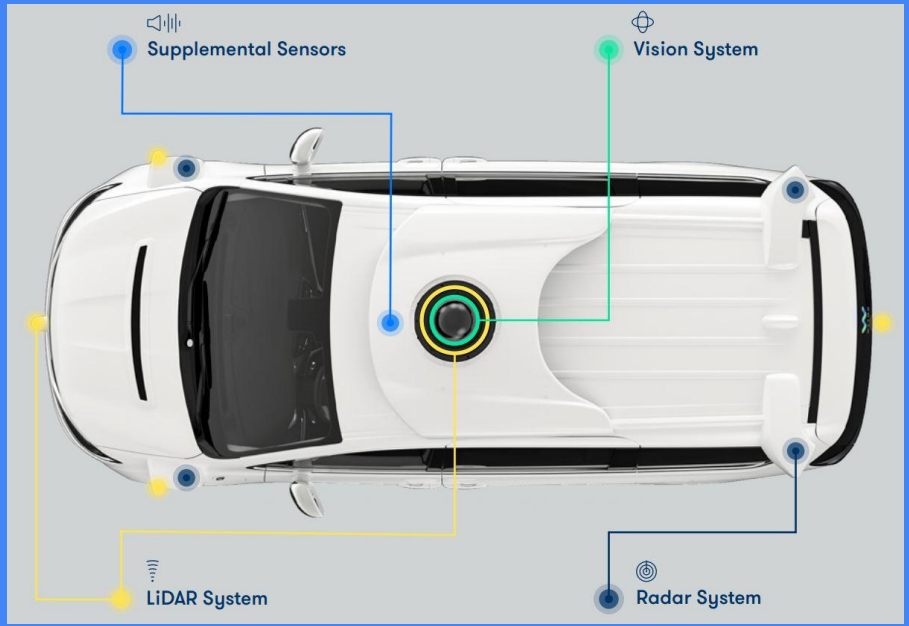
Artificial Intelligence: a modern approach by Stuart J. Russell, Peter Norvig

Intelligent Agent: Self-driving Car

- Agent
- Environment
- Events, Signals (State)
- Sensors, Perception
- **Agent Function (Policy)**
- Actuators (Effectors)



Waymo Self-driving Car Sensory System

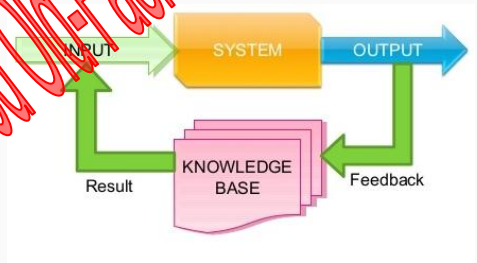


WAYMO

Agent Function (Policy)

- Implement the explicit knowledge as a logic-based algorithm (Symbolic AI)

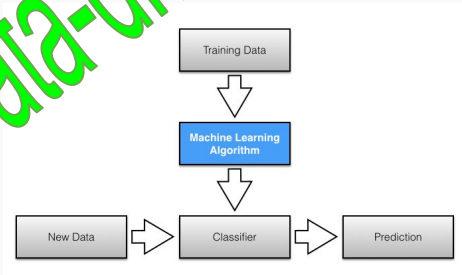
(Expert Systems)



"Good Old-Fashioned Artificial Intelligence"

- Learn a model of knowledge implicitly from experience (Connectionist AI)

(Machine Learning)



Data-driven Approach

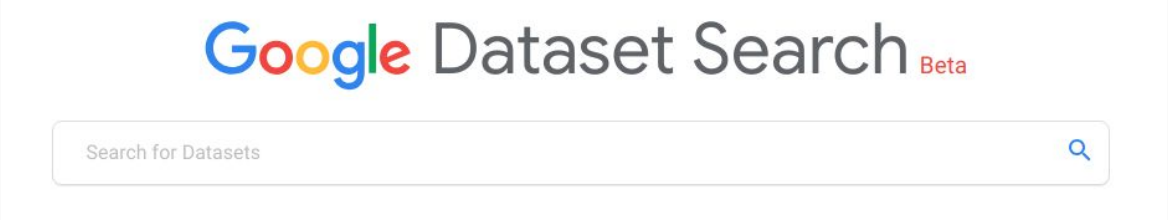
Machine Learning (Learning from Experience)

- Experience -> Dataset
- Massive Dataset, Big Data, Data Mining

Machine Learning (Learning from Experience)

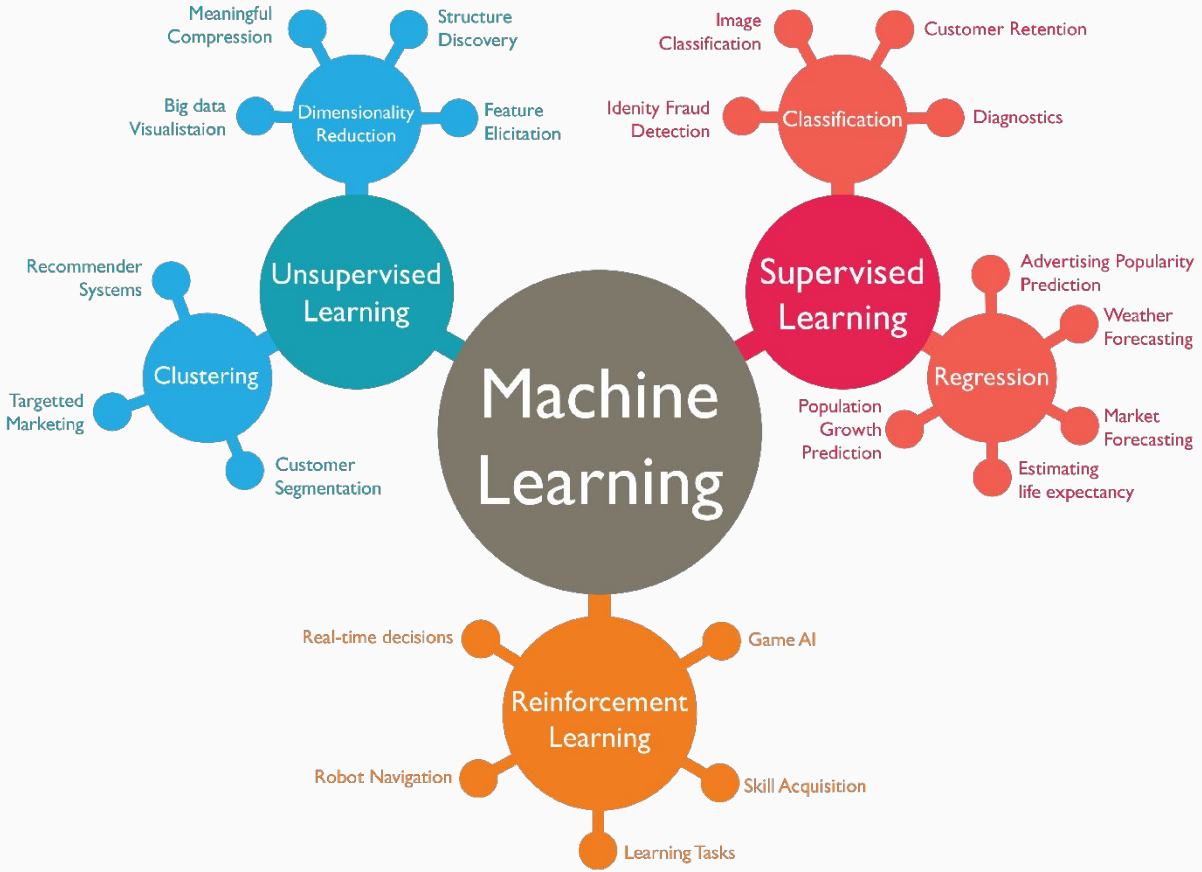
- Where can I find large datasets open to the public?

  https://toolbox.google.com/datasetsearch



ML tasks based on the shape of the dataset

- Supervised Learning
- Unsupervised Learning
- Semi-supervised Learning
- Reinforcement Learning

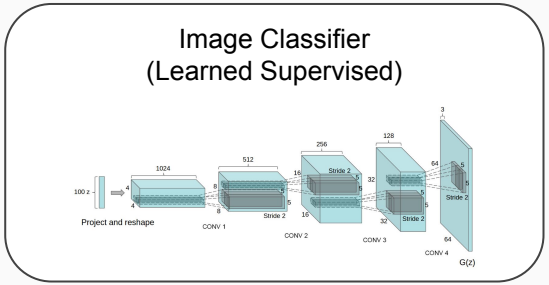


Supervised Learning

The dataset contains states (signals, features) and corresponding actions (for example labels)

The task is to use dataset to learn a general model that can predict desired action for any unseen data. (for example image classification, spam detection, weather forecast, etc)

State	Desired Action
	select class “CAT”
	select class “DOG”
	select class “CAT”



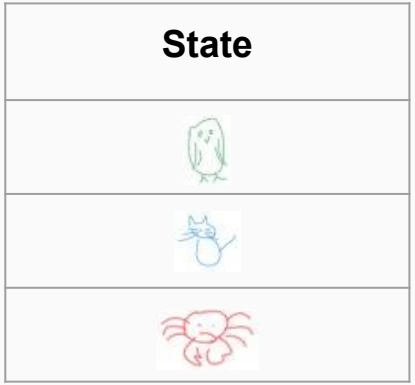
DOG

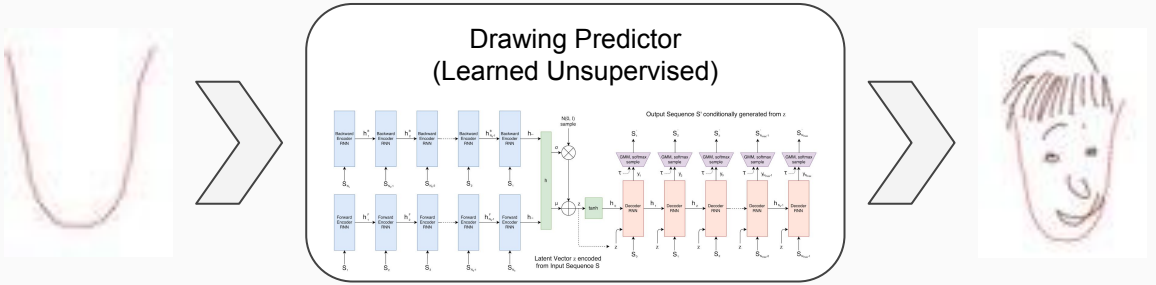
https://ai.googleblog.com/2016/03/train-your-own-image-classifier-with.html

Unsupervised Learning

The dataset contains states (Signals) but there is not any corresponding action.

The task is to find some meaningful relationships between these data (for example find similar users in a social network, find anomalies, etc).





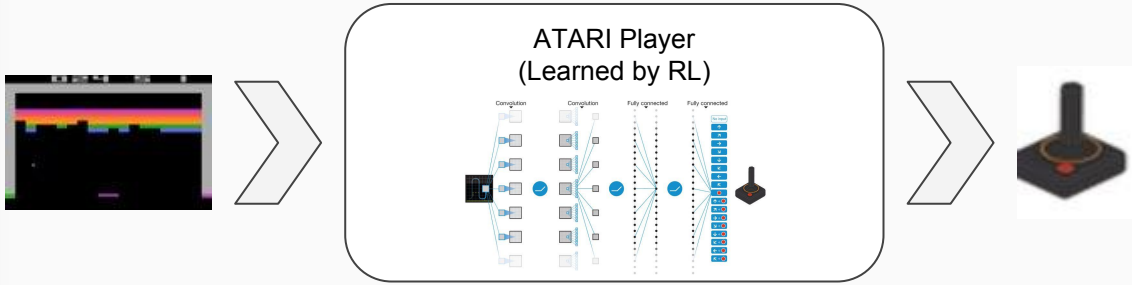
https://ai.googleblog.com/2017/04/teaching-machines-to-draw.html

Reinforcement Learning

The dataset contains states (signals), but the exact desired actions are unknown (for example when the environment is changing during the time). However, there is a good-ness measure (reward) per any possible action in each state.

The task is to build a model that can choose a good action in each state (for example game player, self-driving car, etc).

State	Action	Reward
	←	0.78
	→	0.56
	.	0.25



https://ai.googleblog.com/2015/02/from-pixels-to-actions-human-level.html

Thank You!