# Introduction to ML

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# Do we use ML?

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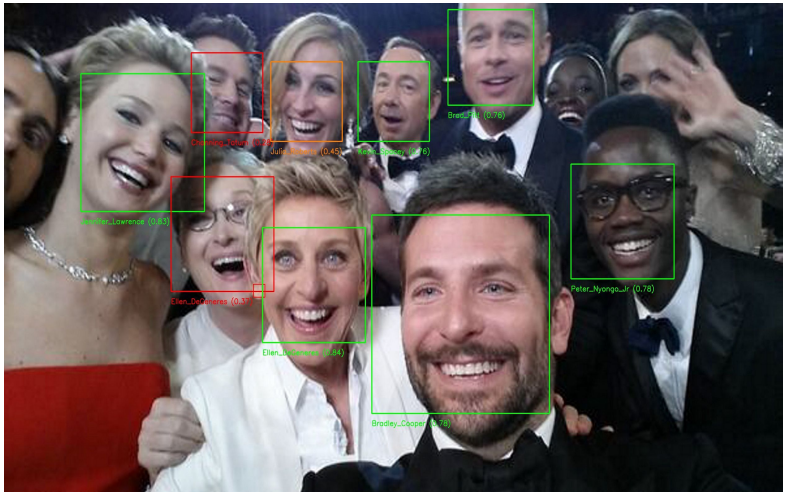
**Virtual Personal Assistants**


**Spam/not spam classification**


**Facebook recognizes your friends in photos.**



# Self-driving cars

# So what is actually Machine Learning?

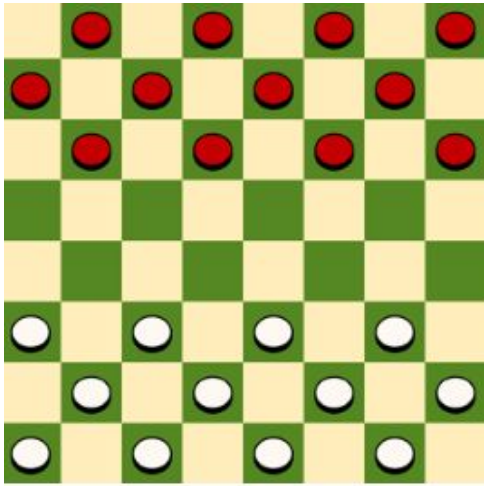
**Arthur Samuel** (1959):

Machine Learning

is the field of study that gives

the computer the ability to learn

without being explicitly programmed.



**A well-posed learning problem :** A computer program is said to learn from experience **E** with respect to some task **T** and some performance measure **P**, if its performance on **T**, as measured by **P**, improves with experience **E**.

**Example: playing checkers**

**E = the experience of playing many games of checkers**

**T = the task of playing checkers**

**P = the probability that the program will win the next game**

# Taxonomy of Machine Learning

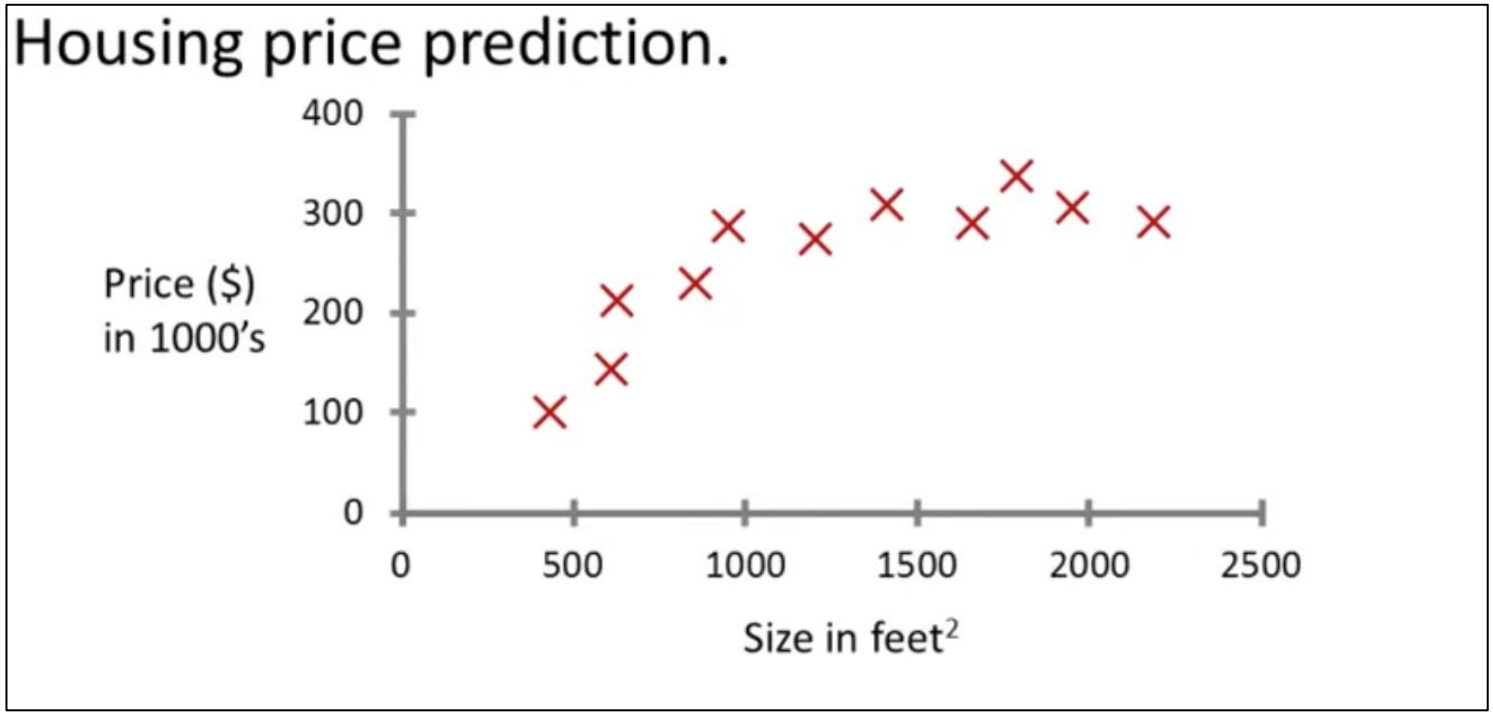
Supervised Learning

Unsupervised Learning

Semi-supervised Learning

Reinforcement Learning

# Supervised Learning




x = 750
y = ?

# Supervised Learning

**Supervised learning algorithms try to model relationships and dependencies between the target prediction output and the input features such that we can predict the output values for new data based on those relationships which it learned from the previous data sets.**

**X -> y**

# Regression

- Type of problem, when we want to predict **continuous valued output.**

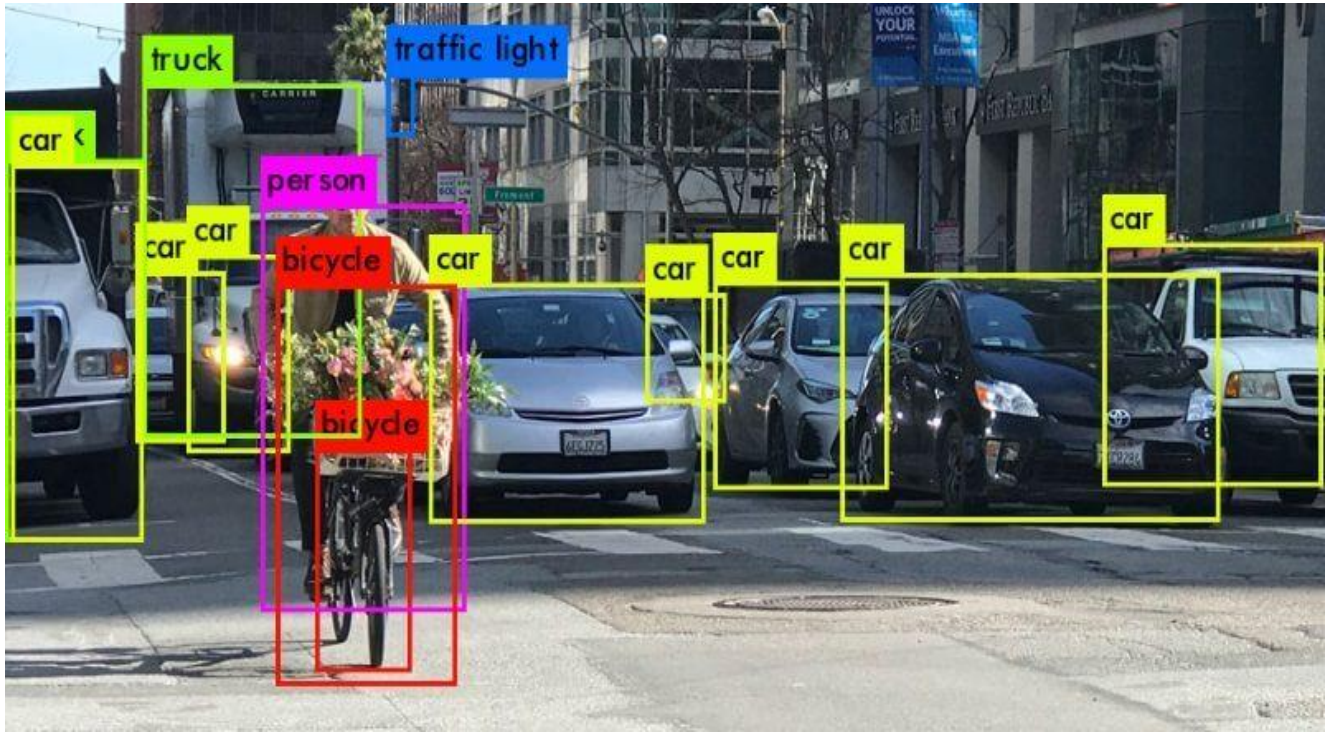
# Cat or Dog?

# Classification

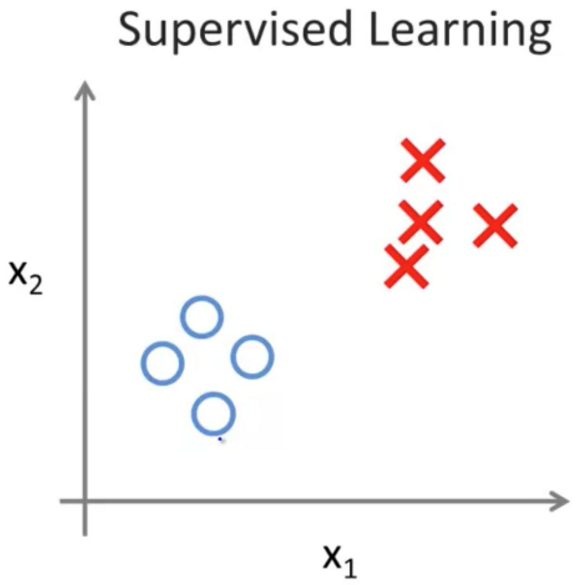
- Type of problem, when we want to predict **discrete valued output.**

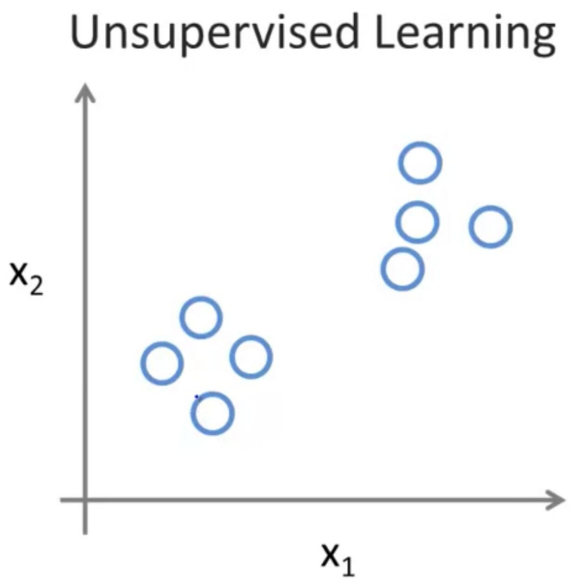
# Supervised in Computer Vision

Object Detection

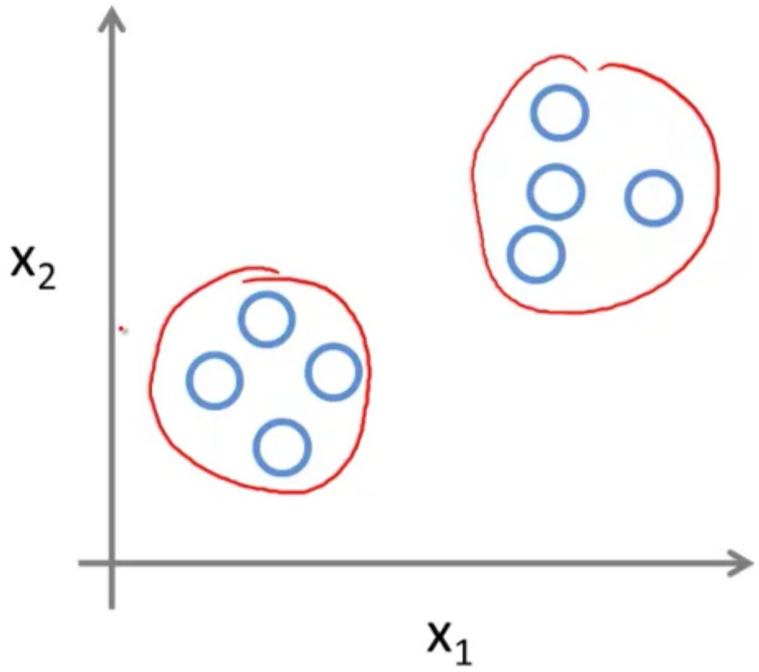


# Unsupervised Learning



- **We can derive this structure by clustering the data based on relationships among the variables in the data.**



# Unsupervised Learning

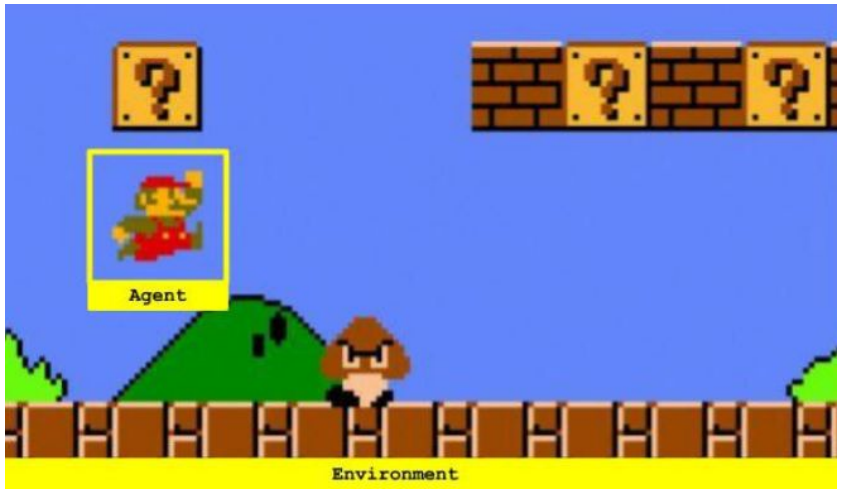
- The computer is trained with ***unlabeled data***.
- Here there's no teacher at all : these algorithms a particularly useful in cases, where the human expert doesn't know what to look for in the data.
- These algorithms try to use techniques on the input data to ***mine for rules, detect patterns***, and ***summarize and group the data points*** which help in deriving meaningful insights and describe the data better to the users.

# Semi-supervised learning

- Semi-supervised learning falls in between supervised learning and unsupervised learning.
- Labels are present for only a part of the dataset.
- These methods exploit the idea that even though the group memberships of the unlabeled data are unknown, this data carries important information about the group parameters.

# Reinforcement Learning

- Method aims at using observations gathered from the interaction with the environment to take actions that would maximize the reward or minimize the risk.
- It allows machines and software agents to automatically determine the ideal behavior within a specific context, in order to maximize its performance.



# Some interesting applications of DL

**Music generation**

# Some interesting applications of DL

# Showing some generated verses in english and armenian :D

Armenian:

Մերթ հոգին հանգիստ է հեռում
Մեռած օրերի հարկավոր անհուն
Եվ մենք անգամ քայլերն են դարում
Եվ այս օրերի հետ մահով
Մի օր էլ են անում անում
Եվ այն մեր հանդիպում է ինձ հետ
Որ հարցավում է այս ամենին անհուն
Եվ մեր անգամ խոսքի հանդուստ ենք հանում
Եվ այս օրերում այն անգամ հոգին
Որ մեր հայրանա առուն տարի վրա
Եվ մի հարցրու անհունում ես ինձ
Եվ ամեն մի կանչի հեռուն մի բուռ
Ու մենք անում է ինձ հեռու եմ ես
Եվ այդ մեռան արտասուք չենք
Եվ այս աշխարհին այն աշխարհում

Եվ այդ անգամ որ դառ չարող
Եվ անդերձ անհունով
Եվ մերթ անցավ արդար հոգում
Եվ այս օրերի մեջ անհայտ հույսը
Մերթ հոգու մարդ է միշտ հուշում
Մի թե մինչև անգամ քեզ համար
Եվ մենք անգամ քարին մահին
Մի թե մինչև անգամ քե սին բուորը
Եվ մի օր էլ լաց եմ ասում

English:

Will You Are For You

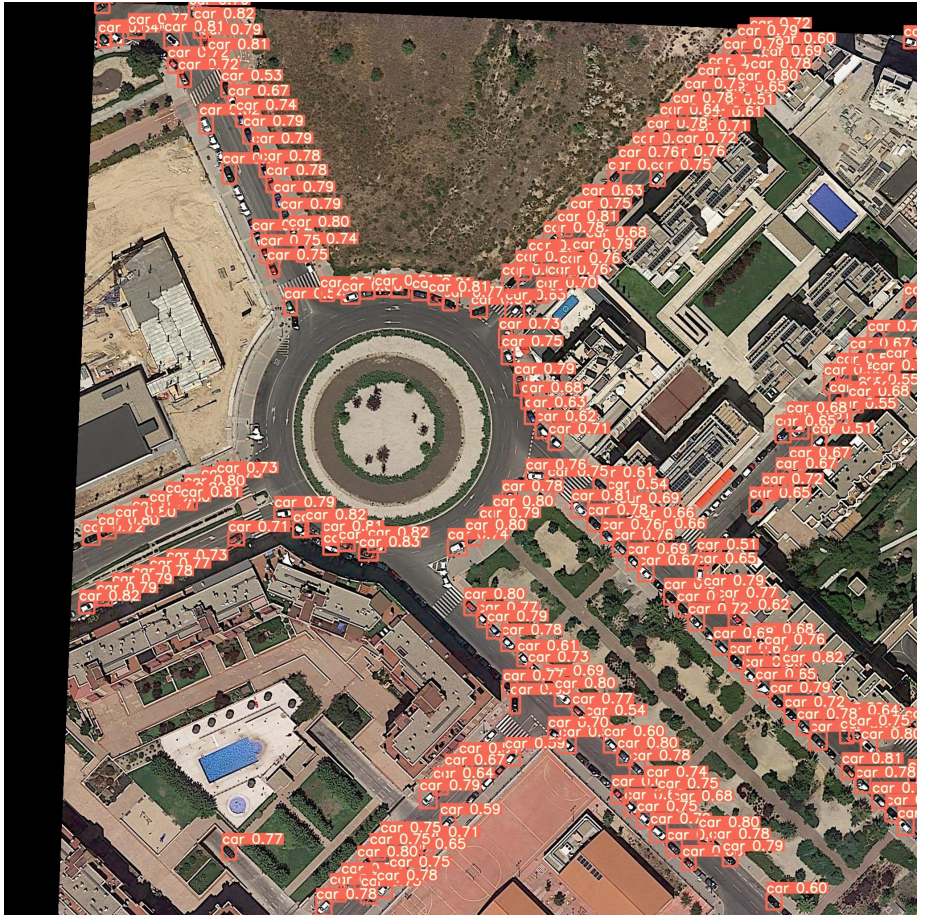
It was love you as a friend in my life.
I will be there to be there to be apart.
You will always be there than I feel you to me.
I will always be here to be a fairy's day.

You said the treasure is the person I want to be.
I try in the people will never ever feel.

You are the sun and so much that I'm sorry I found you.
You'll be there to stay that you were there.

You are the one who shells learn to feel that I was so strong.
You always be my feals and true.
I will never tell you with you to me and touched my life for me.
You make me love me you so much.
My life is something you see.
You will always be hope, I will always be here to be a friend.

# Car detection (my own project results)



# Thank You