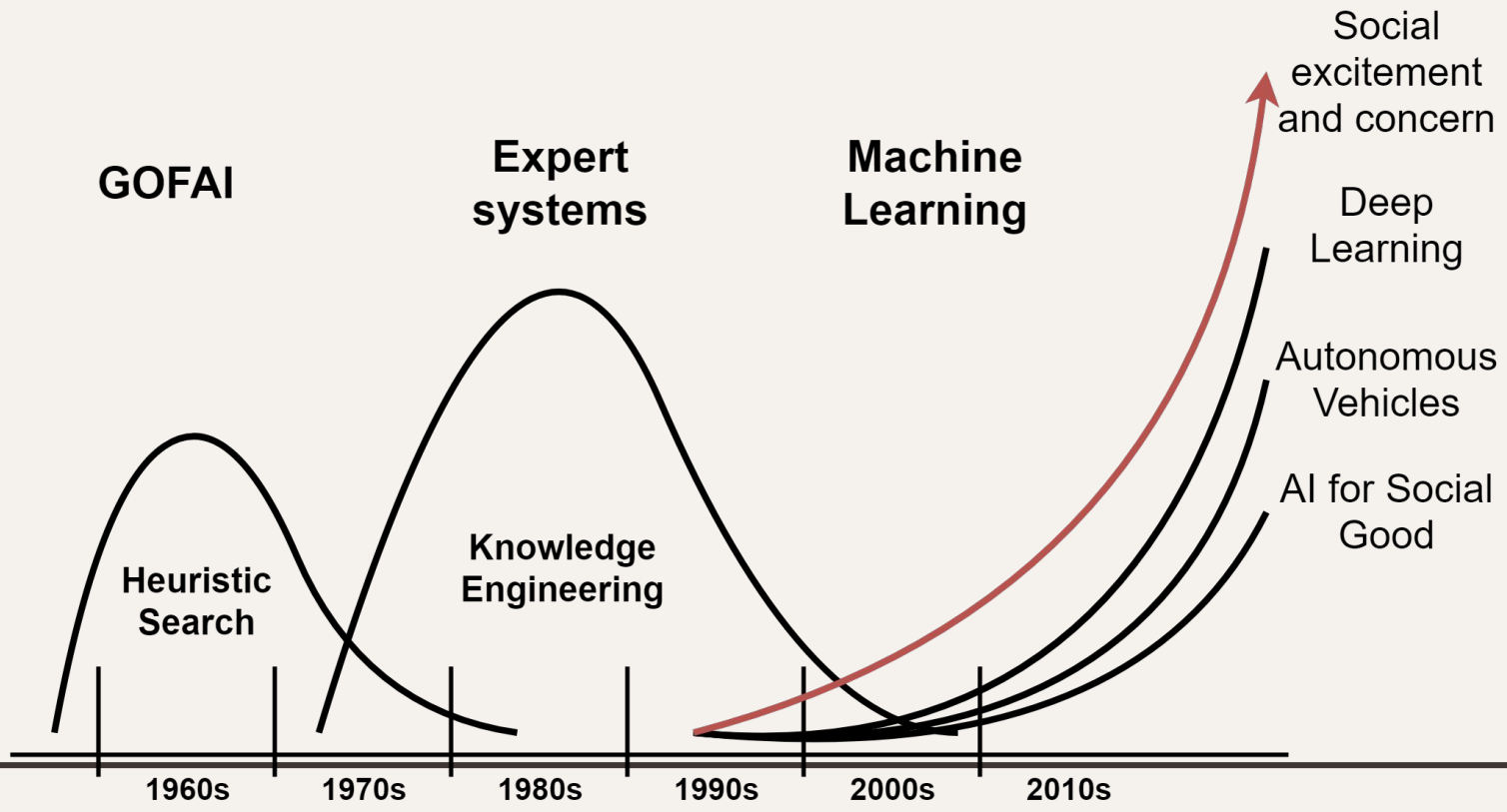
Machine Learning

Refresher

About Me

- Masters and PhD on Artificial Intelligence and Machine Learning
- Researcher at IT Aveiro
- Areas of interest: Artificial Intelligence, Machine Learning, text mining, stream mining, IoT, M2M

AI & ML

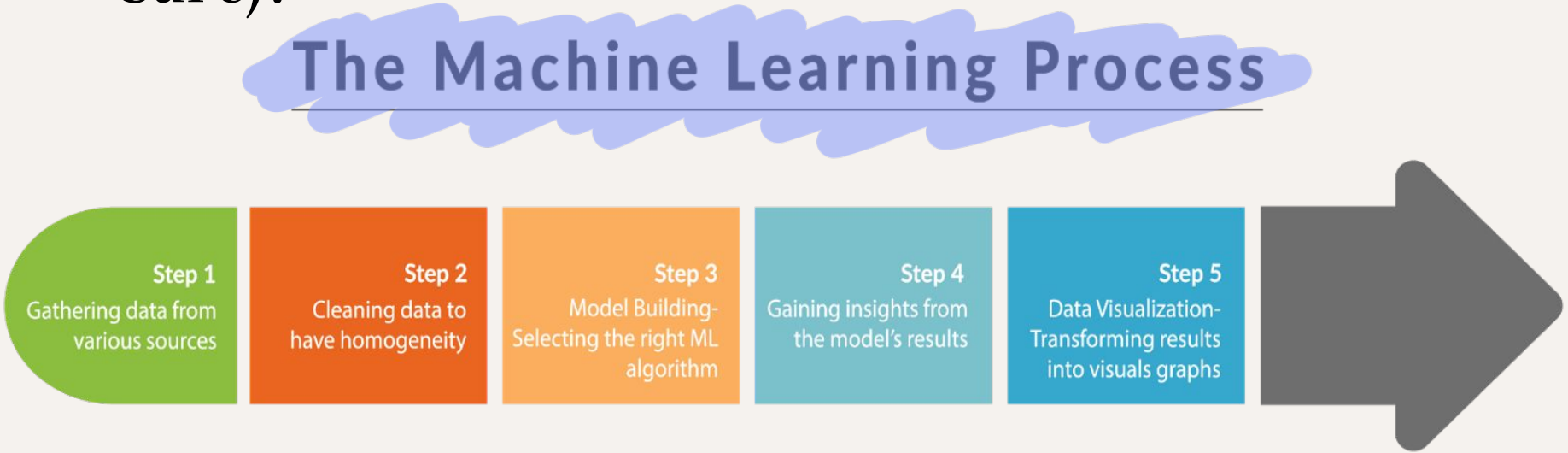

GOFAI
Expert systems
Machine Learning
Social excitement and concern
Deep Learning
Autonomous Vehicles
AI for Social Good
Heuristic Search
Knowledge Engineering
1960s
1970s
1980s
1990s
2000s
2010s

What is ML (Why should i Care)?

What does machine learning mean?

The term machine learning (abbreviated ML) refers to the capability of a machine to improve its own performance. It does so by using a statistical model to make decisions and incorporating the result of each new trial into that model. In essence, the machine is programmed to learn through trial and error.

What is ML (Why should i Care)?



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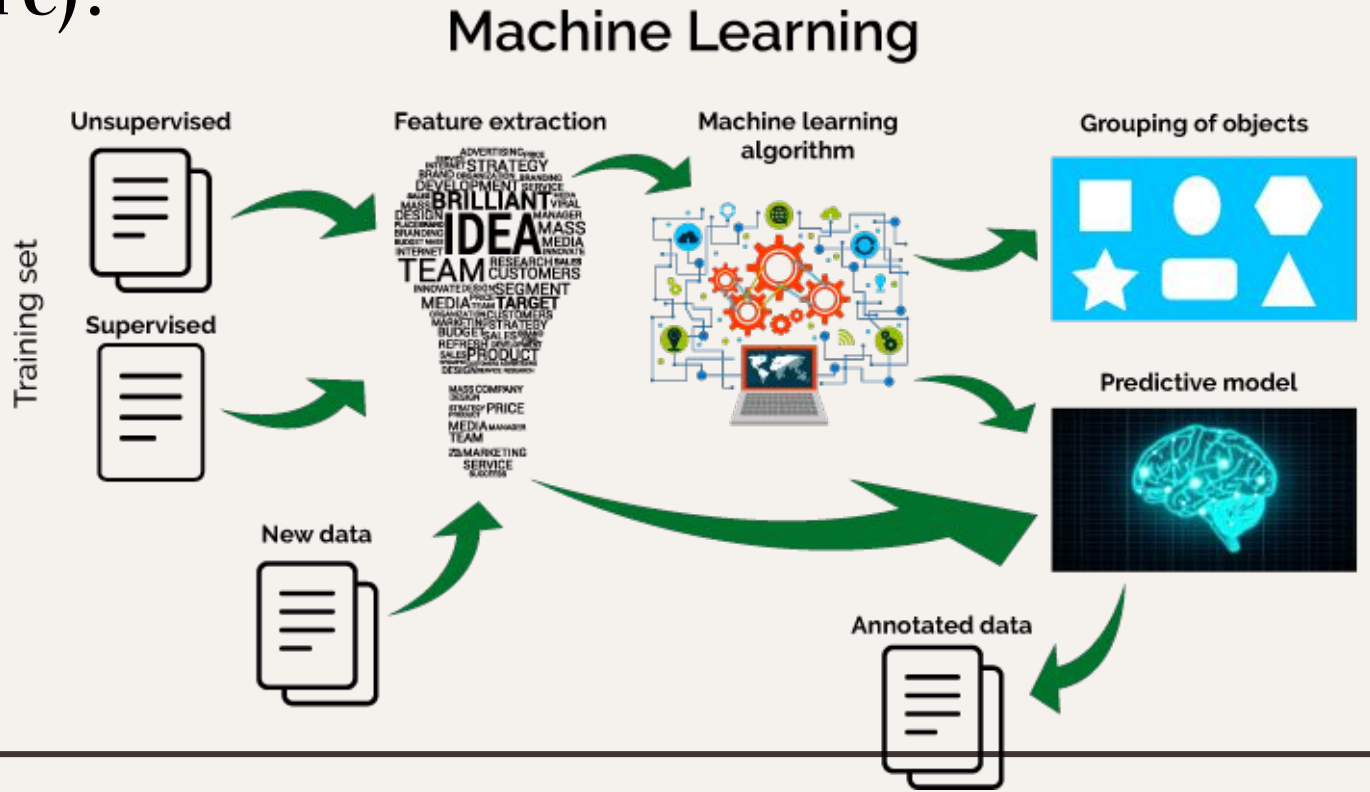

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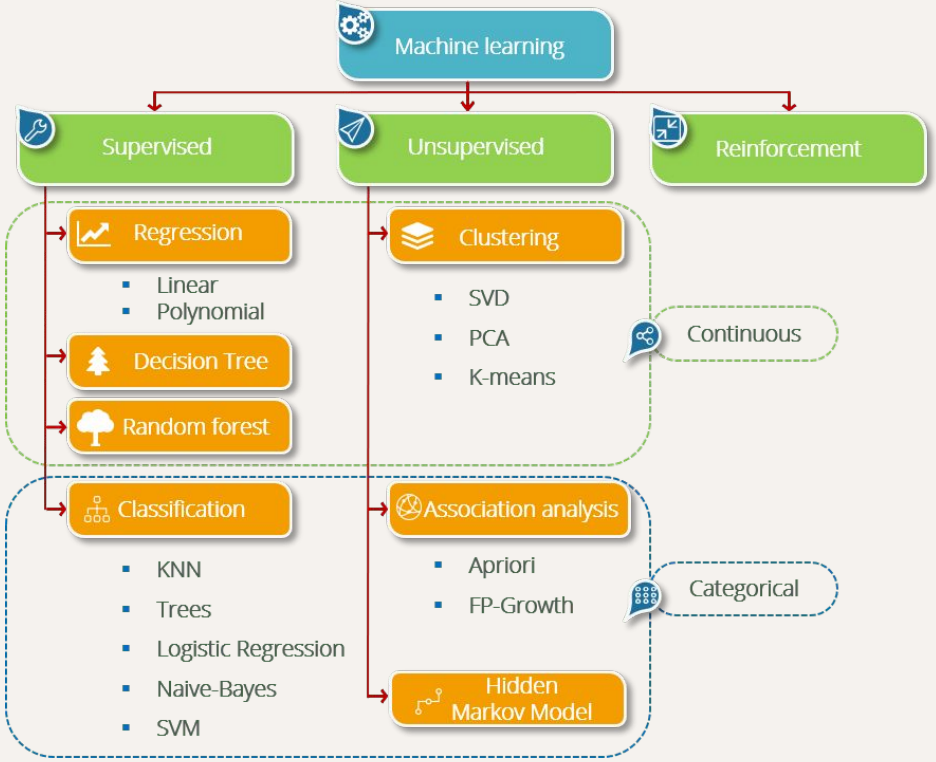
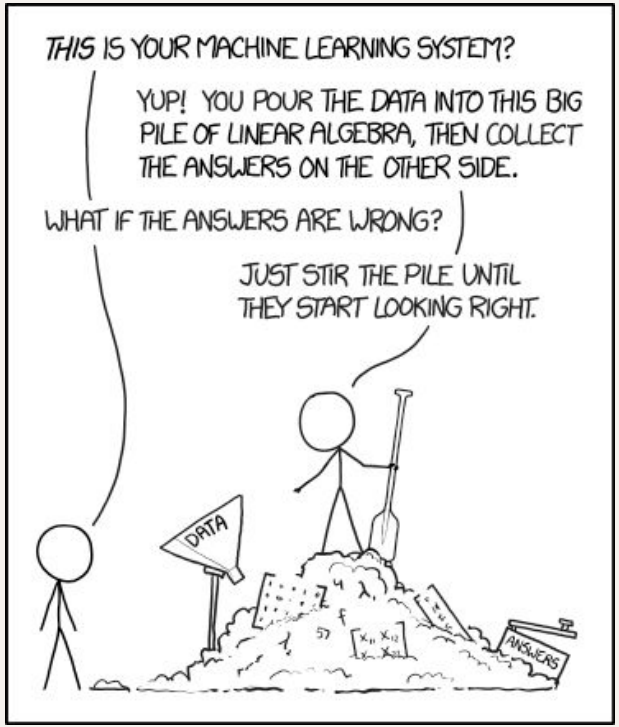
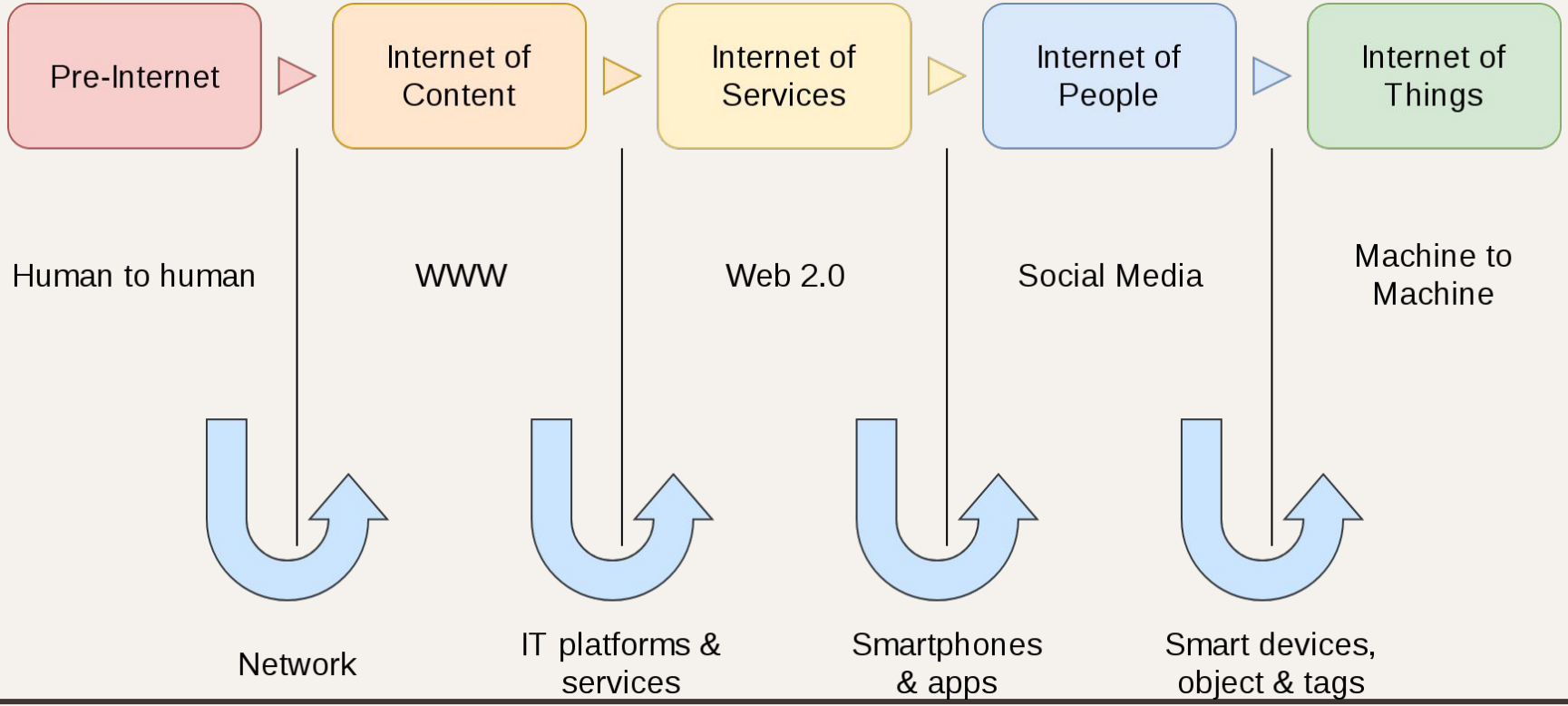


What is ML?

- A body of knowledge related with learning methods for machines (computers)
- Research area
- Opportunities for something useful

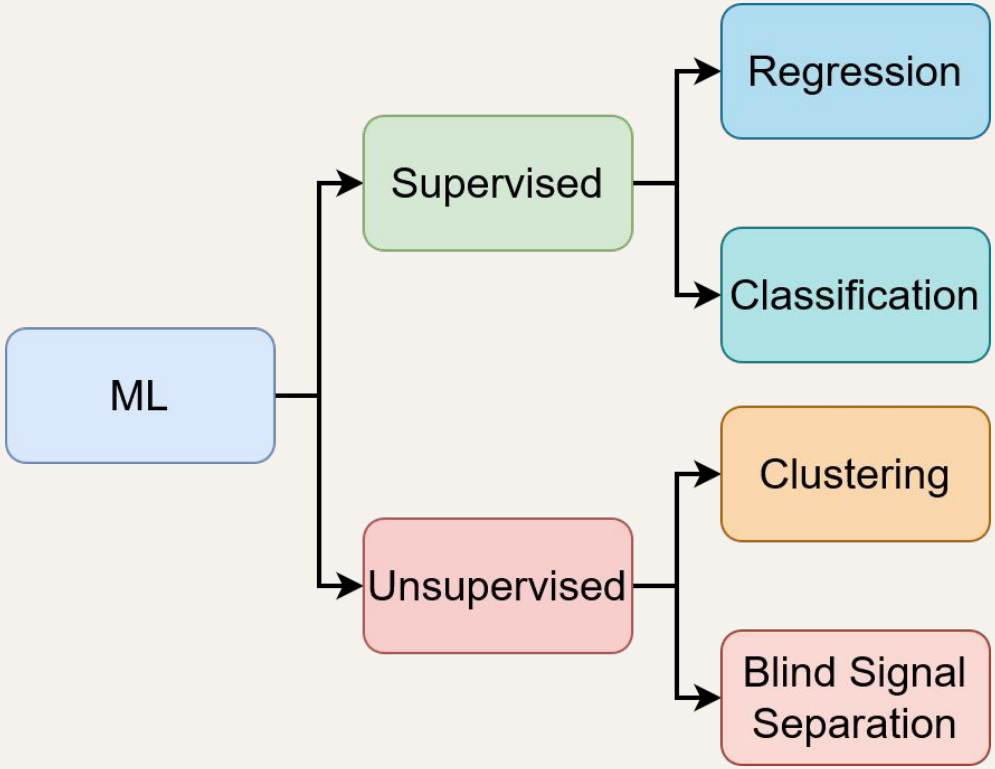


Why Should You Care?

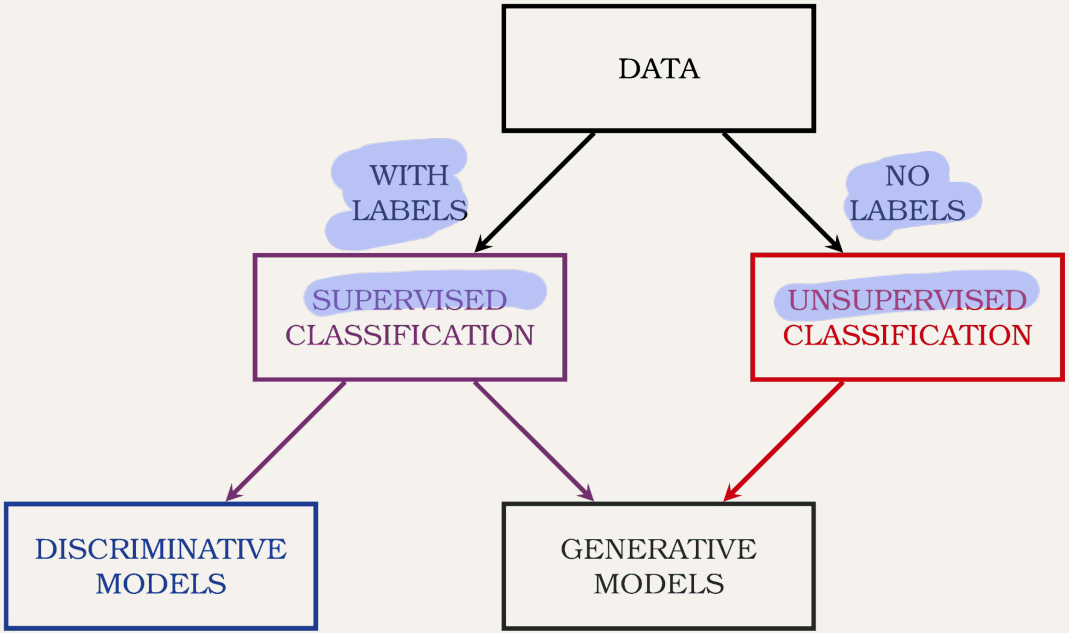


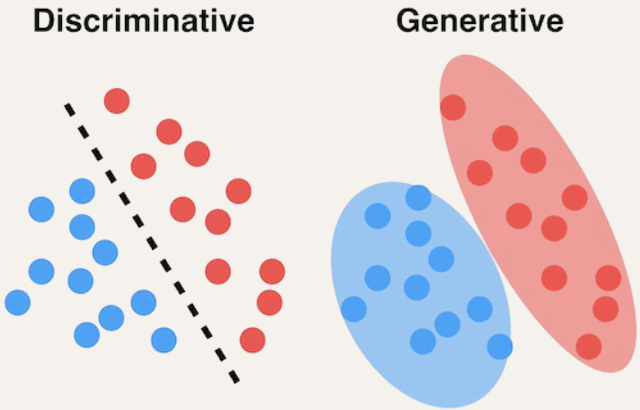
Taxonomy

Taxonomies...


ML
Supervised
Unsupervised
Regression
Classification
Clustering
Blind Signal Separation

Taxonomies...


DATA
WITH LABELS
NO LABELS
SUPERVISED CLASSIFICATION
UNSUPERVISED CLASSIFICATION
DISCRIMINATIVE MODELS
GENERATIVE MODELS


Discriminative
Generative

Taxonomies...

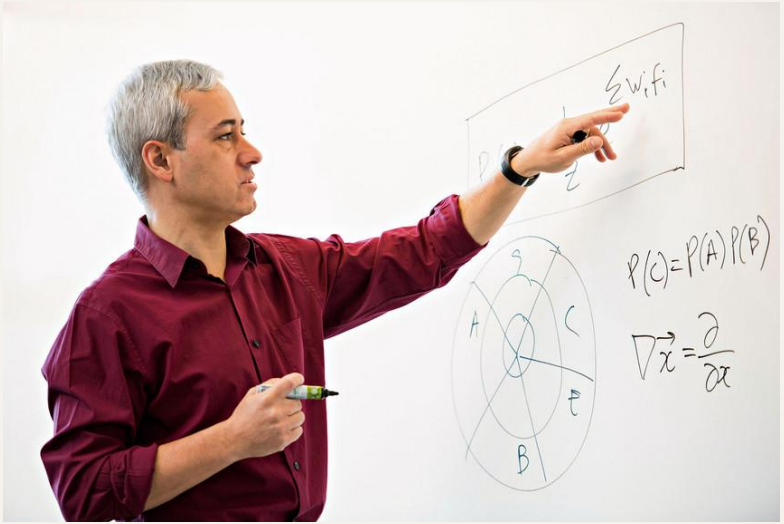
Induction symbolic reasoning

Neural Networks connections modelled on brain's neurons

Evolutionary algorithms learn from random generations (genetic algorithm)

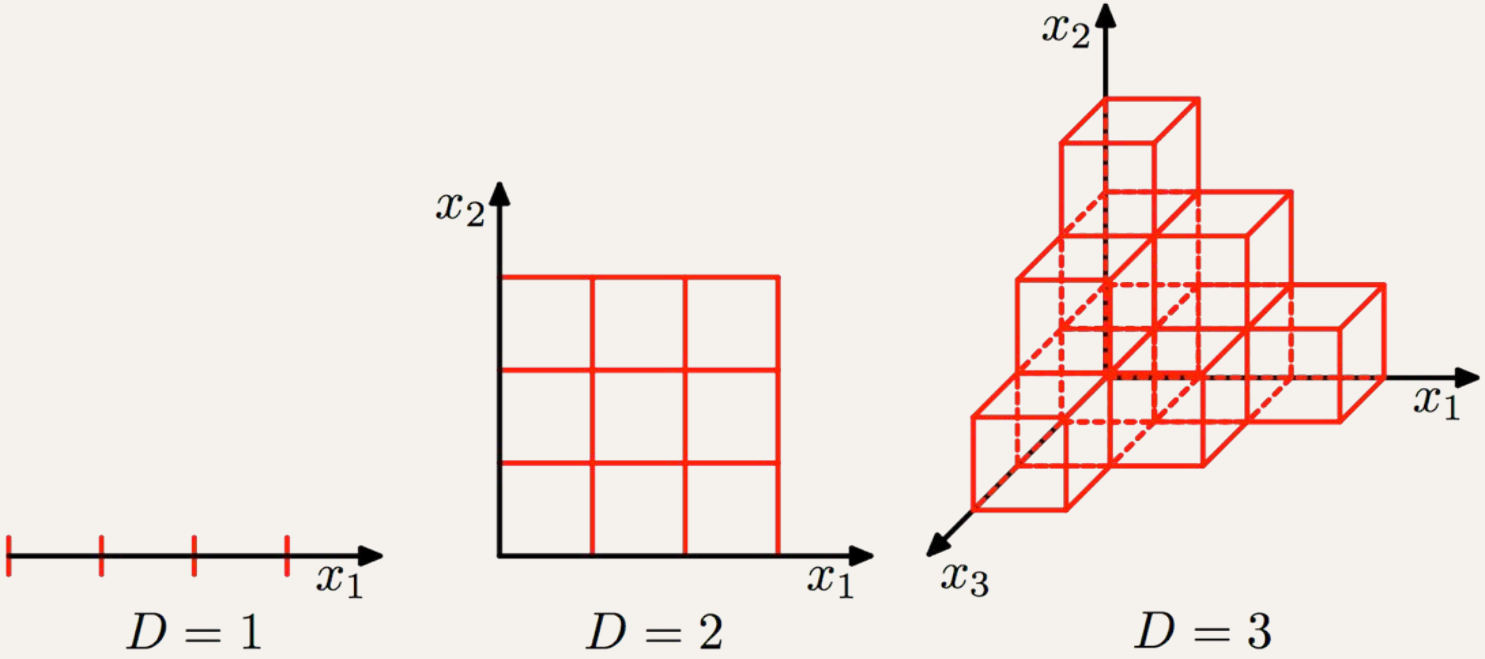
Bayesian inference probabilistic models based on bayes' theorem

Analogy learns by finding similar examples



Limitations

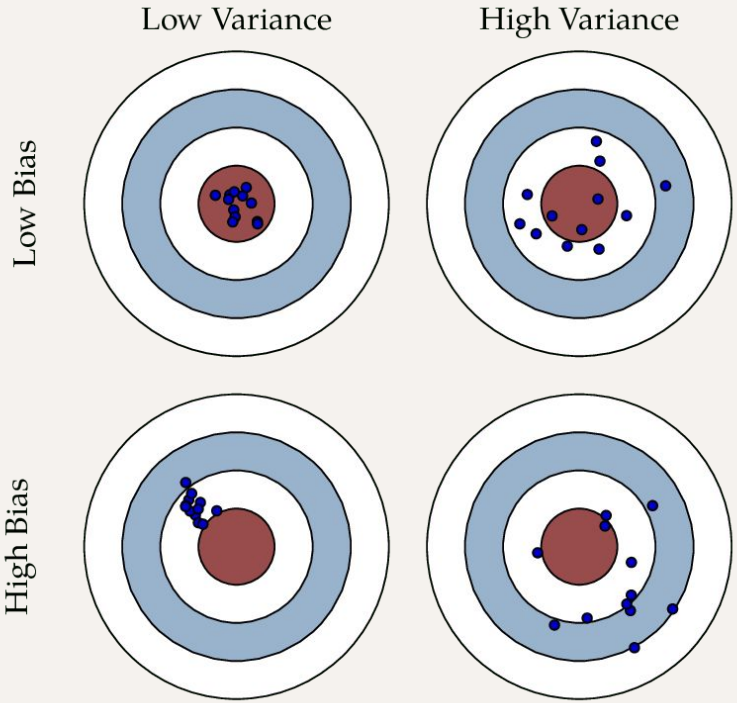
Limitations...



Limitations...

- Our model is a simplification of reality
- Simplification is based on assumptions (model bias)
- Assumptions fail in certain situations

Bias and Variance



Terminology

Terminology

Dataset: organized set of examples, typically composed of features and labels

Feature: single property of an example (input variable)

Label: classification category of an example (output variable)

Example: single instance of a dataset