Outline

1. What is Machine Learning??
2. The Wonders of Machine Learning
3. **Data, Models and ML Tasks**
4. Supervised Learning
    1. Regression
    2. Classification
5. Unsupervised Learning
    1. Dimensionality Reduction
    2. Density Estimation

What is Data?

Data is a collection of vectors.

E.g.

3	9	1.9	5.0	House 1
2	7	2.1	3.2	House 2
4	12	2.8	6.6	House 3
5	16	0.9	9.8	House 4
5	15	3.1	8.5	House 5
4	11	1.6	6.9	House 6

Metadata is information on the data.

E.g. : (# rooms, Area in 100 sq.ft, Distance to metro in km, Price in 10 lakhs)

What is a Model?

A model is a mathematical simplification of reality.

Some examples:

The Ideal Gas model

Inverse square law for gravitational attraction

Moore's Law for semiconductors

Cobb–Douglas model in Economics

"All models are wrong, but some are useful"

George Box

Types of Models in ML

- Predictive Model
  - Regression Model
  - Classification Model
  - …
- Probabilistic Model
  -

Predictive Models

Regression Model

Model the price of a house based on its area and distance to metro.

Example good model:

Price = 0.5*Area - Distance

Predictive Models

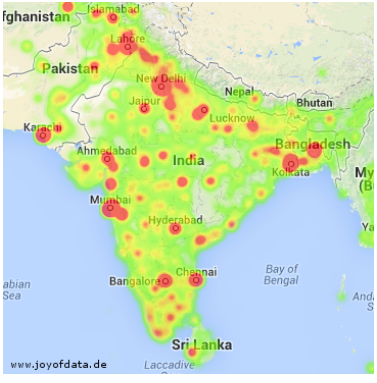
Classification Model

Model whether a house is closer than 2kms to a metro based on price and area

Example good model:

Answer = Close if 2*ROOMS-PRICE < 1
Far otherwise

Probabilistic Models



What is the probability that a randomly chosen person is in lat-long : (25N,30E) ?

"A formless void transforms total mysteries"

RECEIVE MORE WISDOM...

Tweet the wisdom

What is the probability that a given tweet was generated by Mr. Chopra?

Learning Algorithms

Learning Algorithms: Data → Models

Choose from a collection of models, with same structure but different **parameters**.

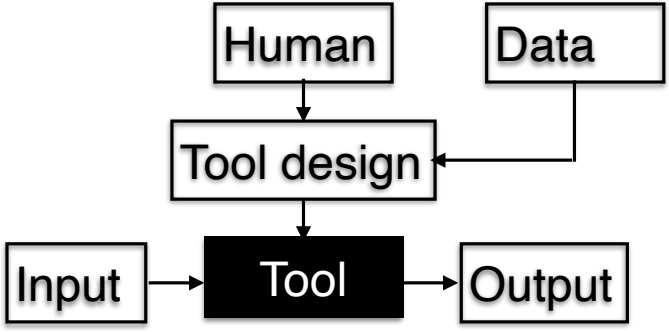
E.g.
Price = a*(area) + b*(# rooms) + c*(distance to metro)

Parameters: a,b,c

Use data to get the "**best**" parameters

Machine Learning Tasks Revisited

Machine Learning



Machine Learning