# Data Science Tools and Techniques

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November 25, 2020

## What is Data Science?

- You have already experienced data science in several forms
- It has been behind resolving some of our common daily tasks for several years
- Most of the scientific methods used in data science are not new
- Statistics an old science Simon Laplace 1749 and Thomas Bayes (1701)
- Machine learning relatively new but considered well established
- Computer Science changed lives several decades ago

## Why Data Science is seen as a novel trend?

- Datafication: disruptive change in our society caused by the evolution of technology
  - personal level: list of books, films, food, physical activity, purchases
  - business level: web activity, network activity, machinery signals
- democratization of data analysis
  - large companies Google, Yahoo, IBM, SAS were only players when data science had no name
  - today the gap between companies and people is shrinking.
  - access to cloud computing allows any individual to analyze huge amounts of data in short periods of time.
  - Analytical knowledge is free
    - Crucial algorithms needed can be found
  - Open source development is the norm

## Data Science defined

- as a methodology by which actionable insights can be inferred from data.

## Objective of data science

- production of beliefs informed by data to be used as the basis of decision making
- In absence of data, beliefs are uninformed and decisions are based on best practice or intuition.

## Data Science and 4 strategies

- DS allow us to adopt 4 different strategies to explore the world using data.

1. Probing reality
2. Pattern discovery
3. Predicting future events
4. Understanding people and the world.

## Probing Reality

- Data can be gathered by
  i) passive methods
  ii) active methods: response of the world to our actions
- Analysis of these responses can be extremely valuable.
  - e.g. what is the best button size and color? best answer found by probing the world.

## Pattern discovery

- Datafied problems can be analyzed automatically to discover useful patterns.
  - e.g. user profiles an ingredient in programmatic advertising or digital marketing.

## Predicting future events

- variety of statistical techniques that analyze current and historical facts to make predictions about future events.

## Understanding people and the world

- large companies and governments are investing considerable amounts of money in research areas e.g.
  - understanding natural language
    - computer vision
    - psychology
    - neuroscience