Data Science and Big Data

Oracle Junior Program - IT technológiák és architektúrák nagyvállalati környezetben

Szakal Ádám

Miről lesz ma szó

- Fogalmak tisztázása
  - DataScience
  - Mesterséges intelligencia
  - Machine learning
  - Deep learning
  - Big Data
- Példák

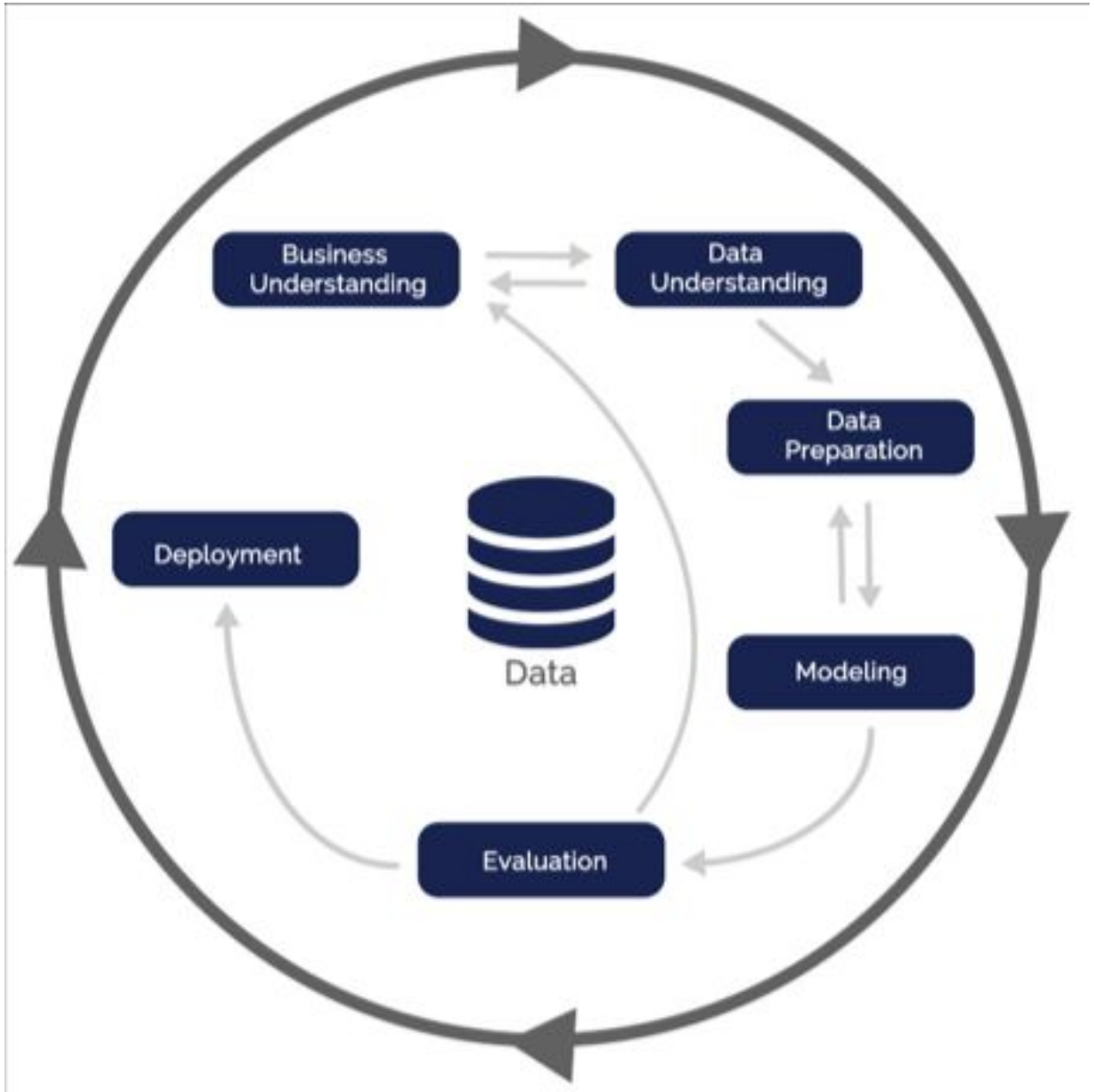
Definíciók

- “Data science provides meaningful information based on large amounts of complex data or big data. Data science, or data-driven science, combines different fields of work in statistics and computation to interpret data for decision-making purposes.” - Investopedia
- “The use of scientific methods to obtain useful information from computer data, especially large amounts of data” - Cambridge dictionary
- Fancy name for statistics?

Data Scientist

- 2020-ban is a “legszexibb” foglalkozás
- Statisztika/Matematika
- Programozás
- Domain tudás
- Machine learning algoritmusok ismerete
- Gyors tanulási képesség
- Egyetemeken info-s képzés szakirány

Mit csinál egy Data Scientist



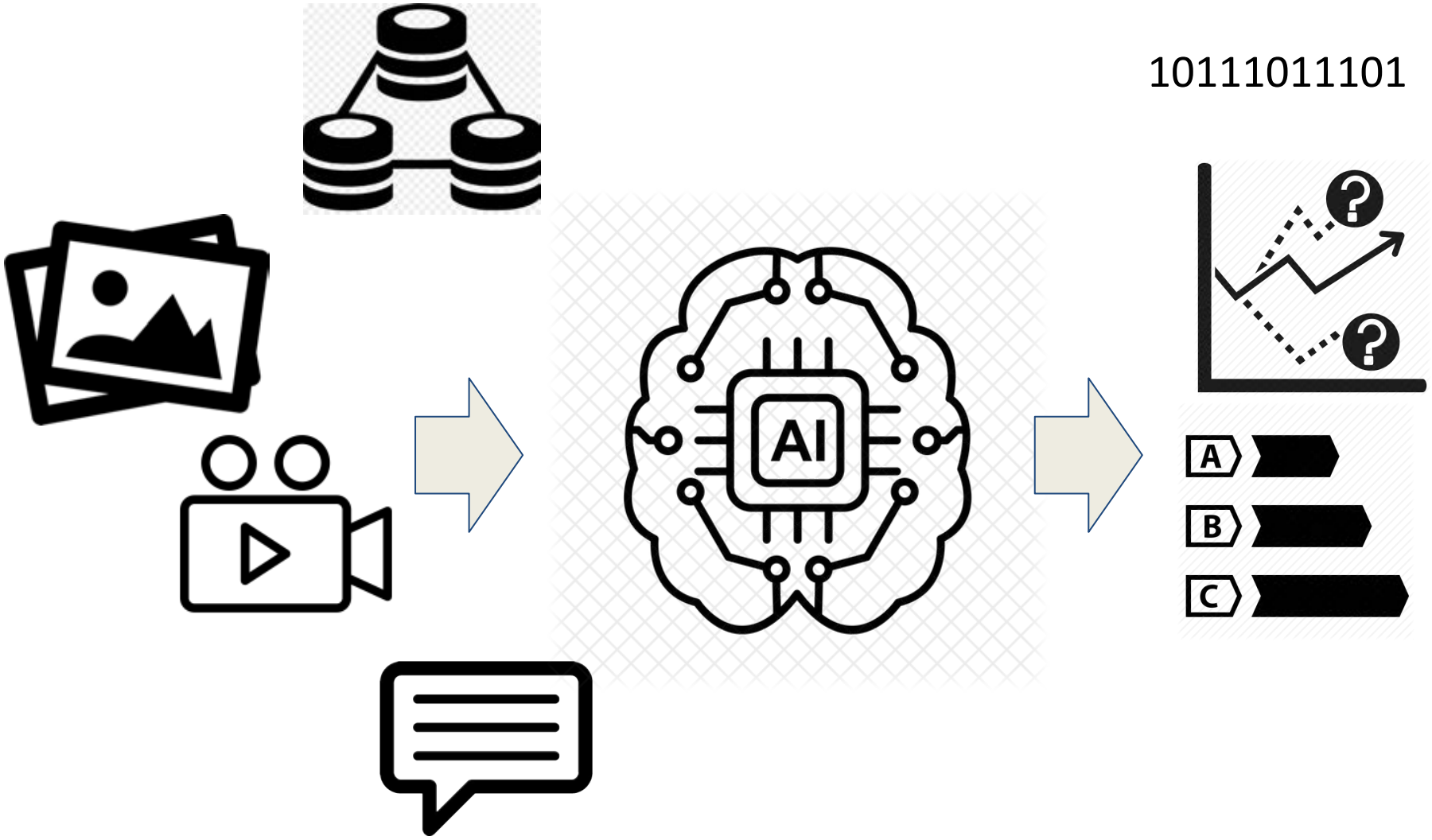
Nehézségek

- Gyorsan fejlődő tudományág -> Folyamatos tanulást igényel
- Az adattisztítás időigényes és nem túl hálás feladat
- Az eredmények prezentáláshoz jó kommunikációs, tárgyaló és tanító készségek szükségesek
- Leleményesség és önálló munkavégzés
- Nem mindig állít elő kézzelfogható terméket

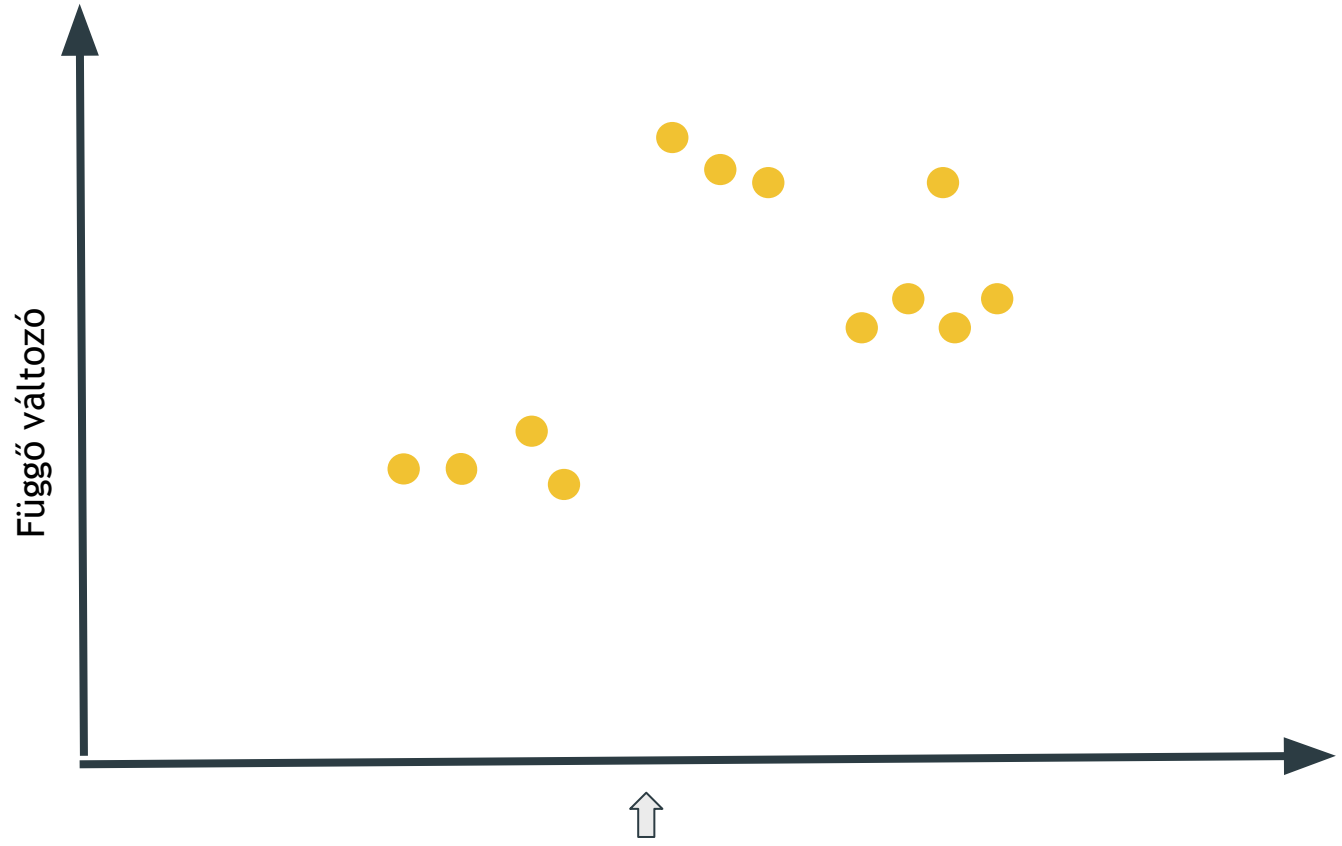
https://towardsdatascience.com/4-reasons-why-you-shouldnt-be-a-data-scientist-e3cc6c1d50e

Mesterséges intelligencia(AI)

Machine learning - Gépi tanulás

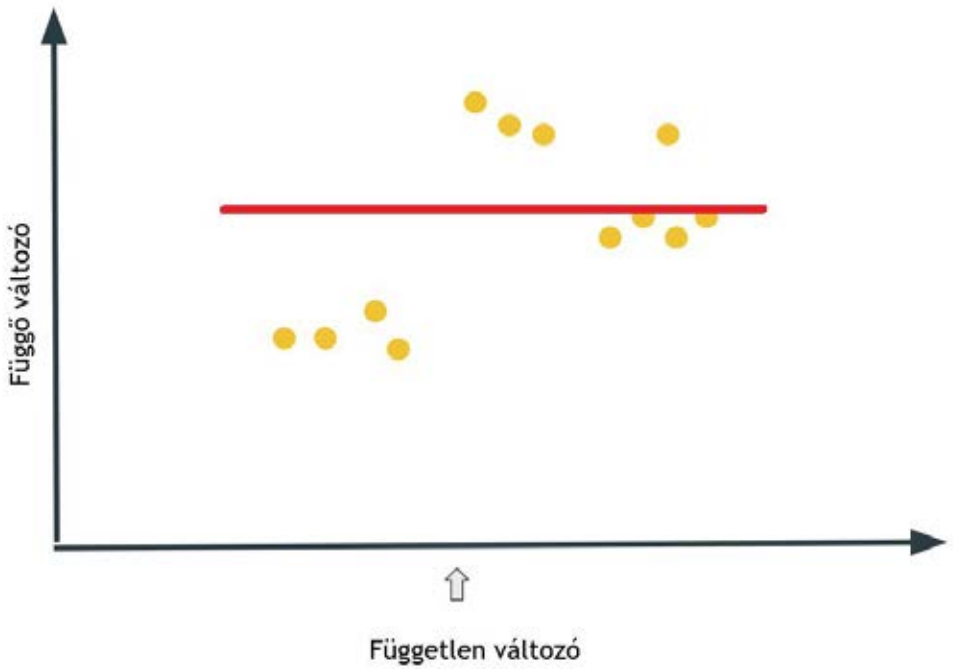


Machine learning

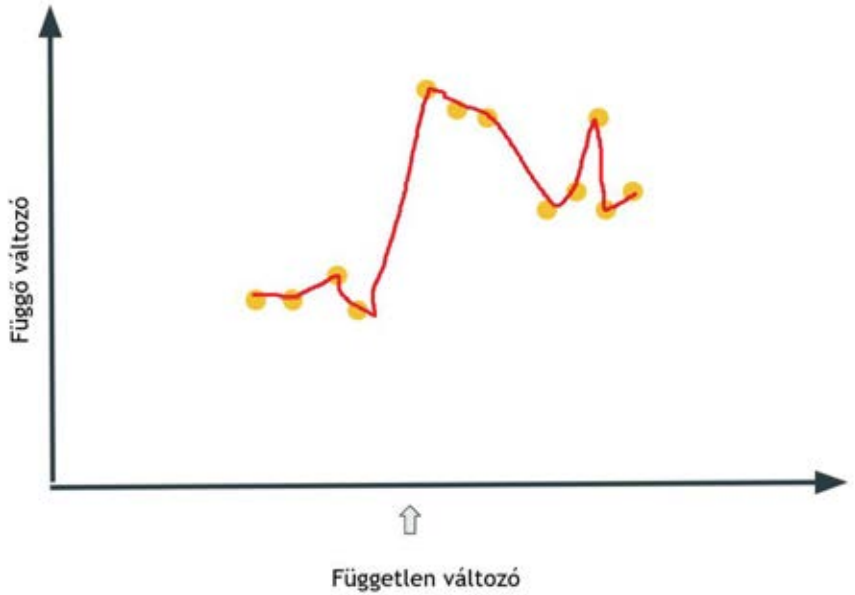


Machine learning - Bias and Variance

High bias

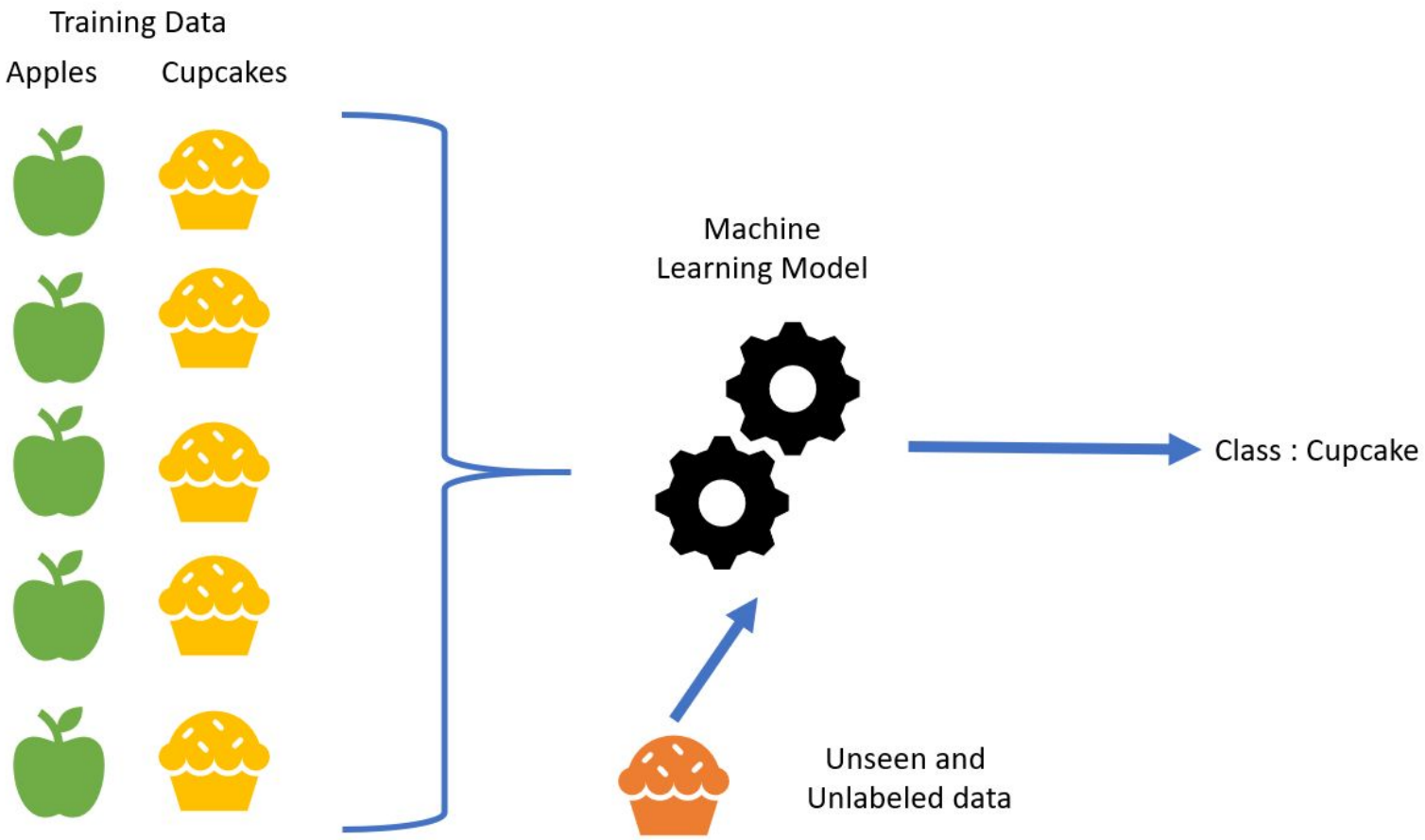


High Variance

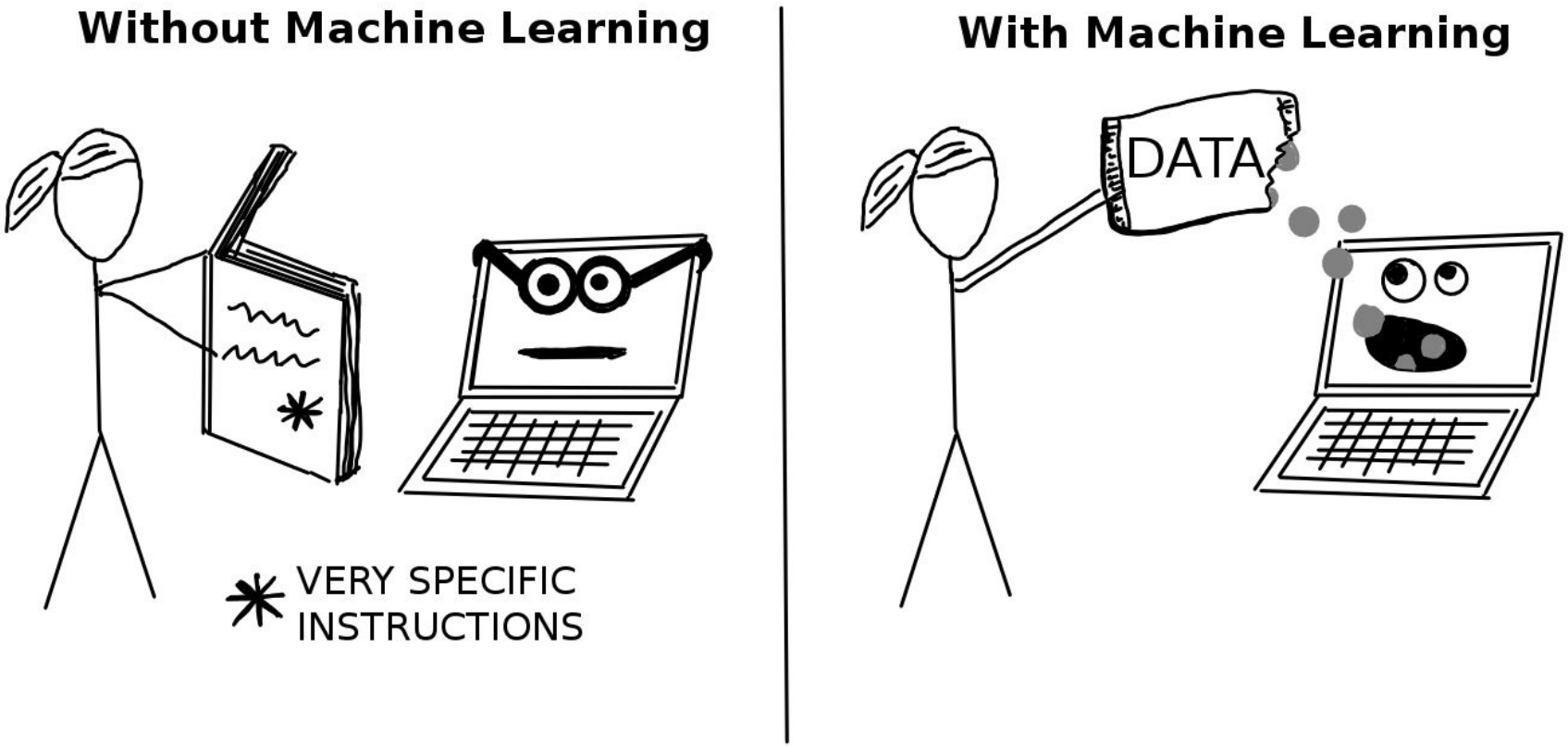


Machine learning - Minimize error

Machine learning



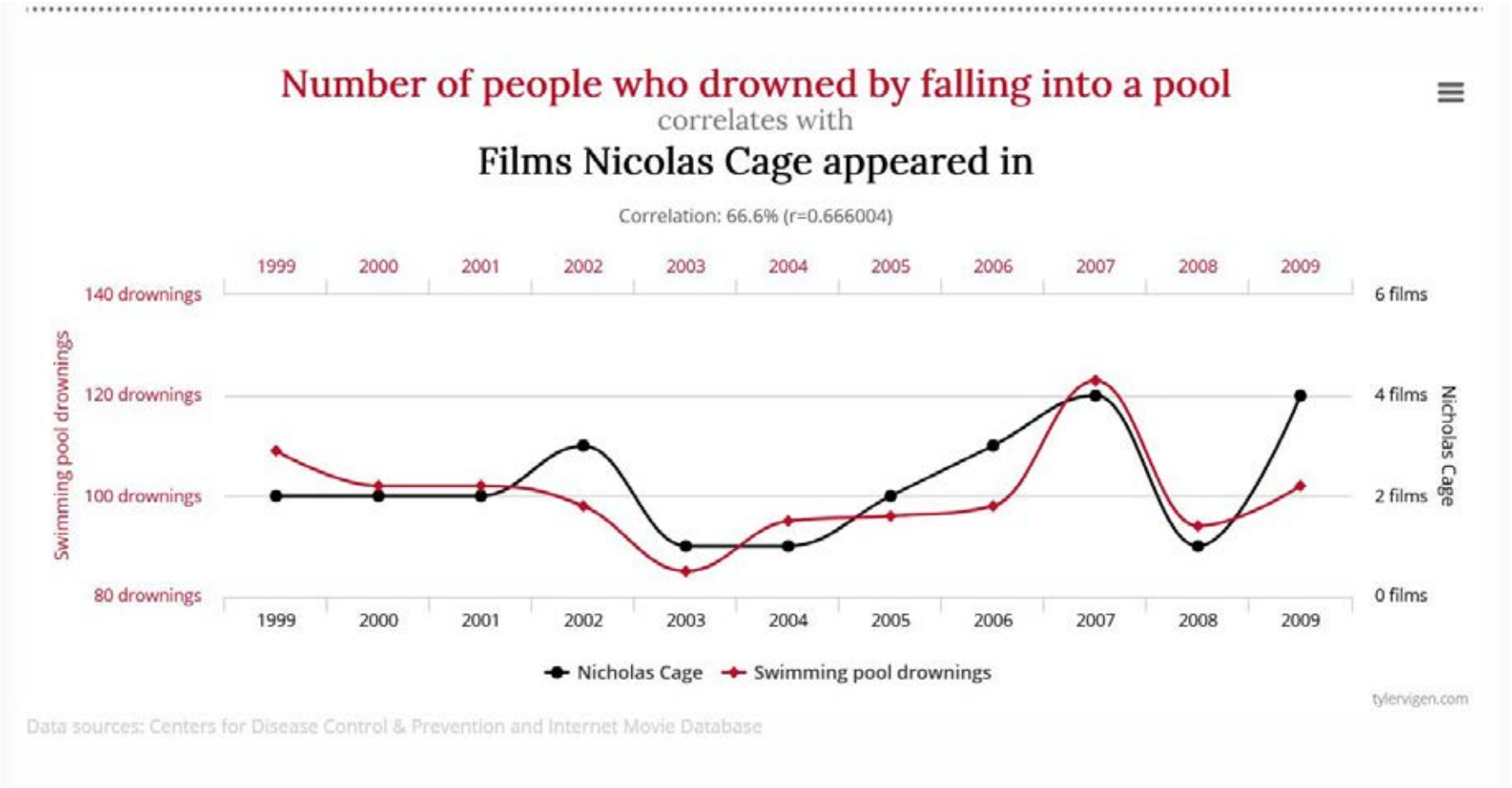
Machine learning



Data Preparation

- Outlier filtering
- Handling missing values
- Dependency - correlation
- Multiple correlation
- Transform data

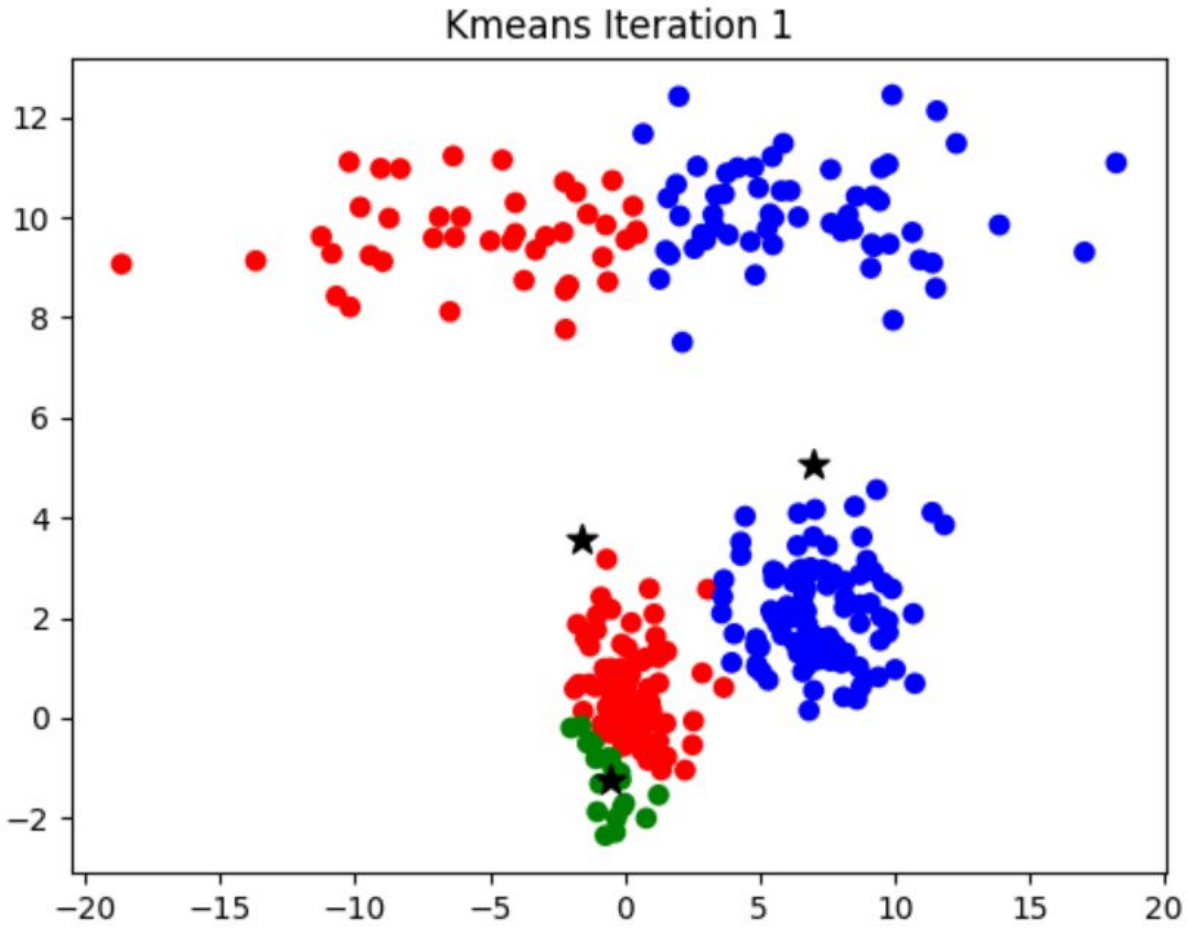
Correlation is not causation



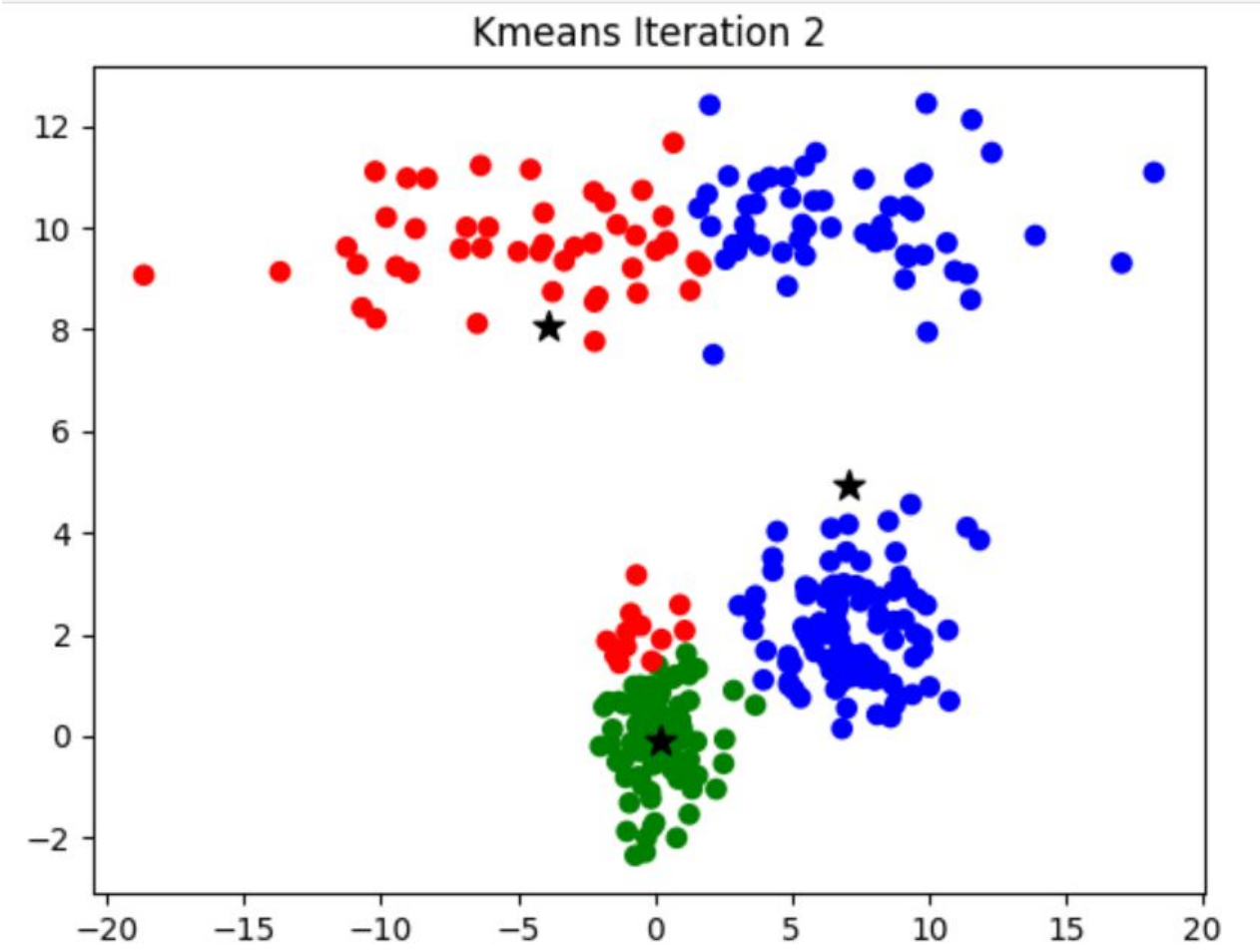

MACHINE LEARNING
UNSUPERVISED LEARNING
SUPERVISED LEARNING
REINFORCEMNET LEARNING
DIMENSIONALLY REDUCTION
CLUSTERING
CLASSIFICATION
REGRESSION
Structure Discovery
Feature Elicitation
Meaningful compression
Big data Visualisation
Image Classification
Customer Retention
Fraud Detection
Diagnostics
Recommended Systems
Targetted Marketing
Customer Segmentation
Forecasting
Predictions
Process Optimization
New Insights
Real-Time Decisions
Robot Navigation
Game AI
Skill Aquisition
Learning Tasks

Reinforcement learning

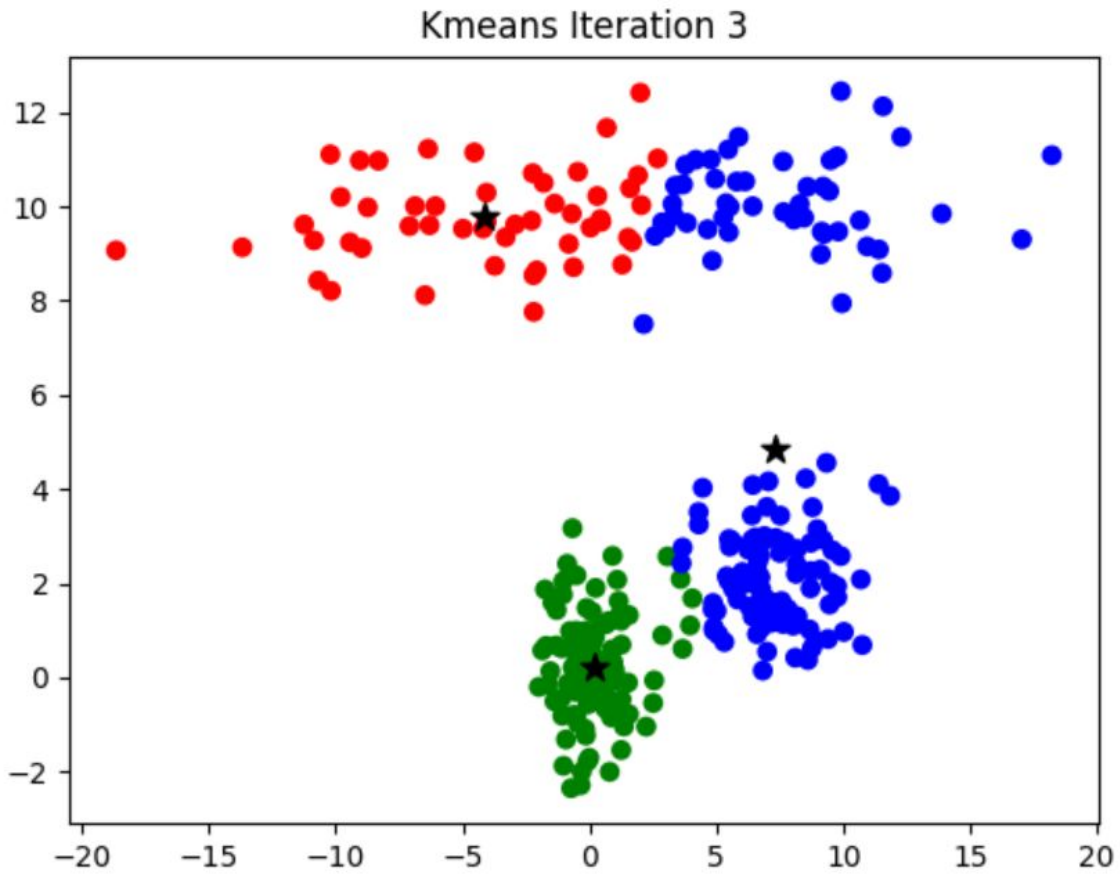
Clustering - Kmeans



Clustering Kmeans



Clustering Kmeans



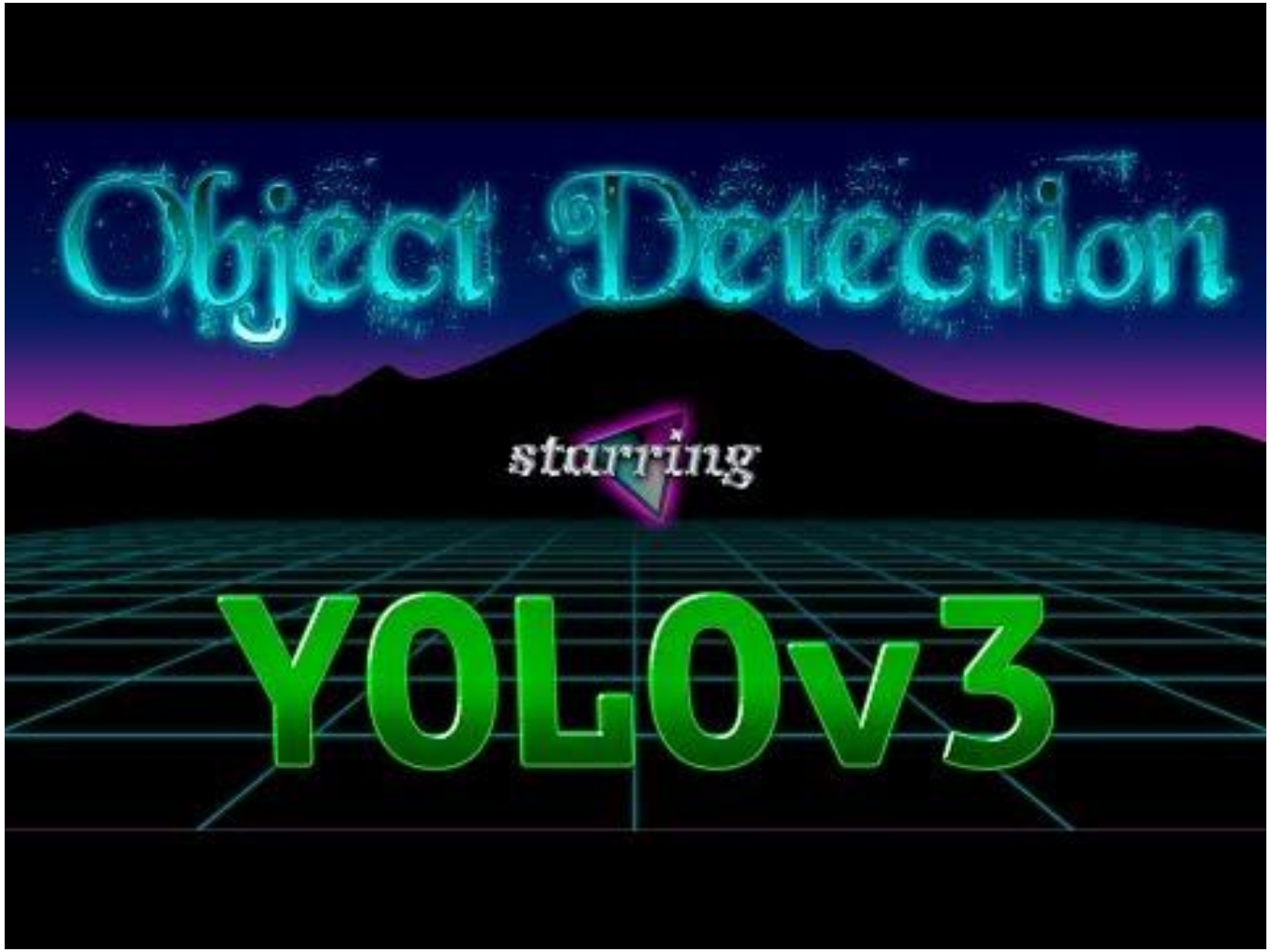
Clustering Kmeans

Hogyan definiáljuk a távolságot?

Hány klasztert válasszunk?

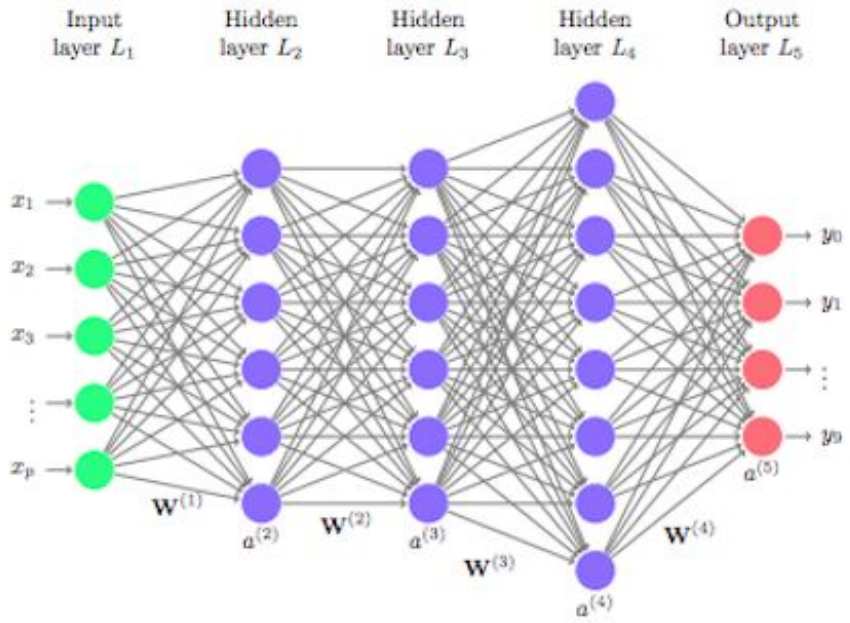
Mi a klaszterek jelentése?

Classification



Deep learning

- Fancy név a többszintű neurális hálóra
- Layerek lehetnek különböző típusúak
- Teljesítmény / bemenő adatok összefüggés jobban skálázódik



Python

- Python is an open source script language
- High-level, general purpose
- Dynamic type system, automatic memory management
- Interpreted
- Fields of application
  - Numeric computation
  - Simulation
  - Data analysis
- It’s popular because:
  - It’s easy to learn and use
  - It’s fast (like really fast)
  - It’s resource-friendly
  - It’s almost limitless (there’s a Python library for almost everything)

További lehetőségek

- R
- SAS
- Matlab
- Húzogatós programok
- PL/SQL

Big data

Egyszerűen megfogalmazva

- „Olyan adatmennyiség, amitől az Excel már crash-el.”

Oxford dictionary

- „data sets that are too large and complex to manipulate or interrogate with standard methods or tools”

Dictionary.com

- „data sets, typically consisting of billions or trillions of records, that are so vast and complex that they require new and powerful computational resources to process

O’Reilly Media (M. Loukides)

- „As storage capacity continues to expand, today’s “big” is certainly tomorrow’s “medium” and next week’s “small.” The most meaningful definition I’ve heard: “big data” is when the size of the data itself becomes part of the problem.”

Big data

Gartner definíció (D. Laney):

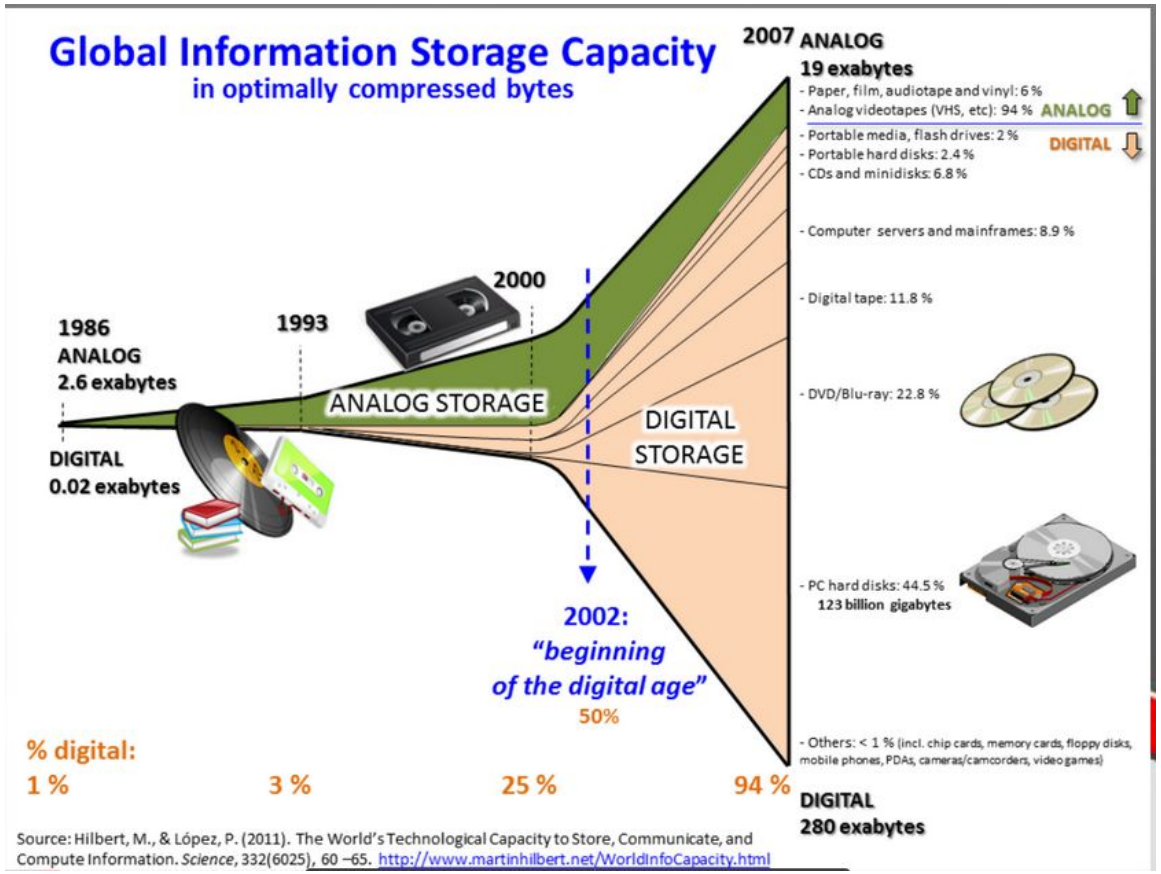
- „Big data are high **volume**, high **velocity**, and/or high **variety** information assets that require new forms of processing to enable enhanced decision making, insight discovery and process optimization.”

Fentit szokás 3-10V-nek is nevezni:

- Volume – méret
- Velocity – adatsebesség
- Variety – sokféle típusú adat
- …
  - Veracity – igazságtartalom, tisztaság; Validity – helyesség; Variability – egyre rugalmasabb struktúrák; Value – nagy értékű; Visualization – vizualizálhatóság; …

Big data - Volume

- The capacity to store information doubles roughly every 3.5 years
- Roughly 2,5 exabytes of data are generated every day



Big data - Variety

- Different data types are used: text, pictures,videos
- The capability to process important information is crucial
- Data come from different sources

Big data Velocity

- So much so that the MetLife executive stressed that: “Velocity can be more important than volume because it can give us a bigger competitive advantage. Sometimes it’s better to have limited data in real time than lots of data at a low speed.”
- Standard relational databases are not capable of handling this amount of data
- Parallel computation
- Exmaples?

Big data - Veracity

- Data veracity, in general, is how accurate or truthful a data set may be
- The actual data makes sense based on business needs
- Data source trustworthy
- The only measure that decreases over time

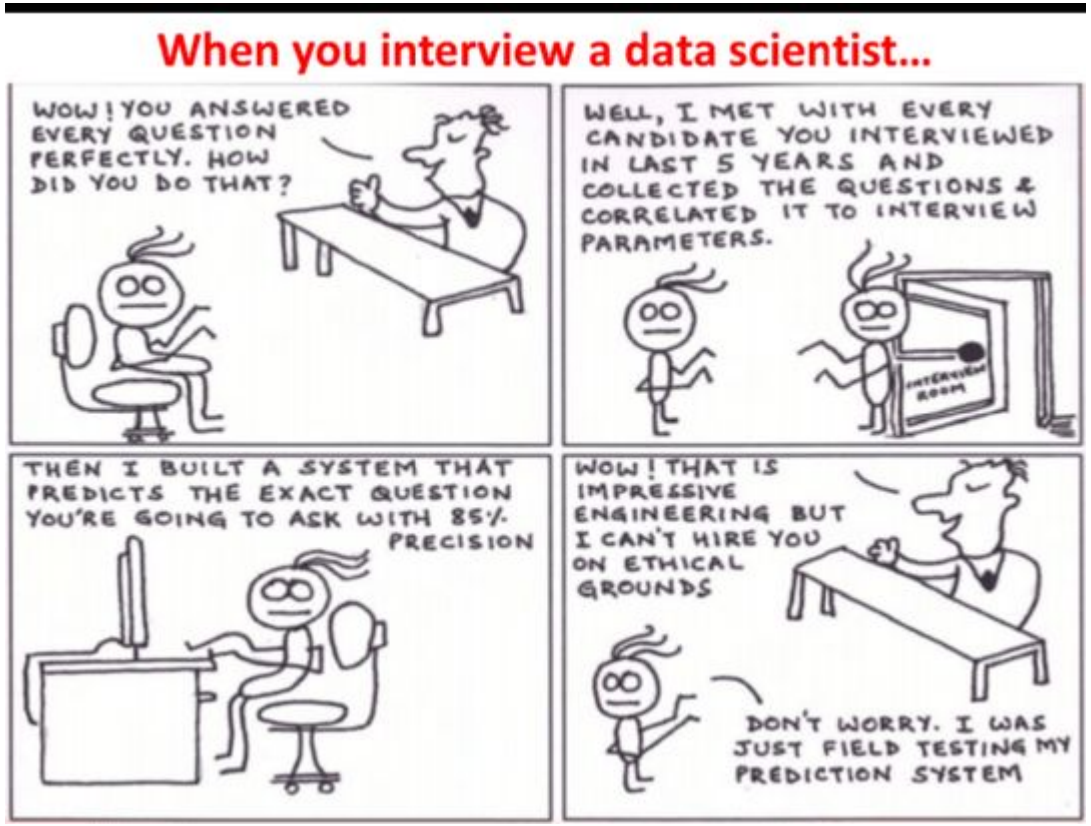
Map reduce

Data Science akcióban

NETFLIX

Magyar Posta

PEOPLE COME FIRST
INFORMATIKAI SZAKÉRTŐK EGYESÜLETE



Köszönöm a figyelmet!