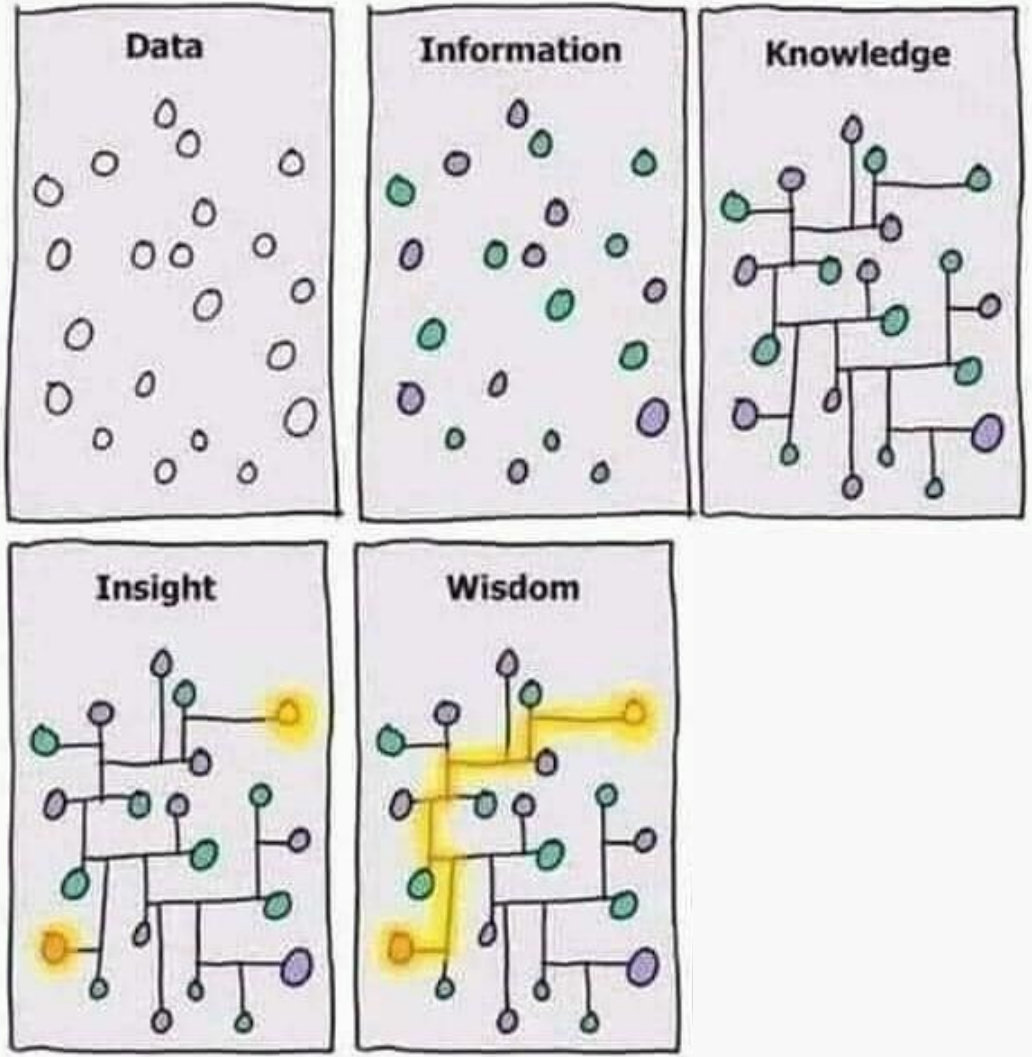
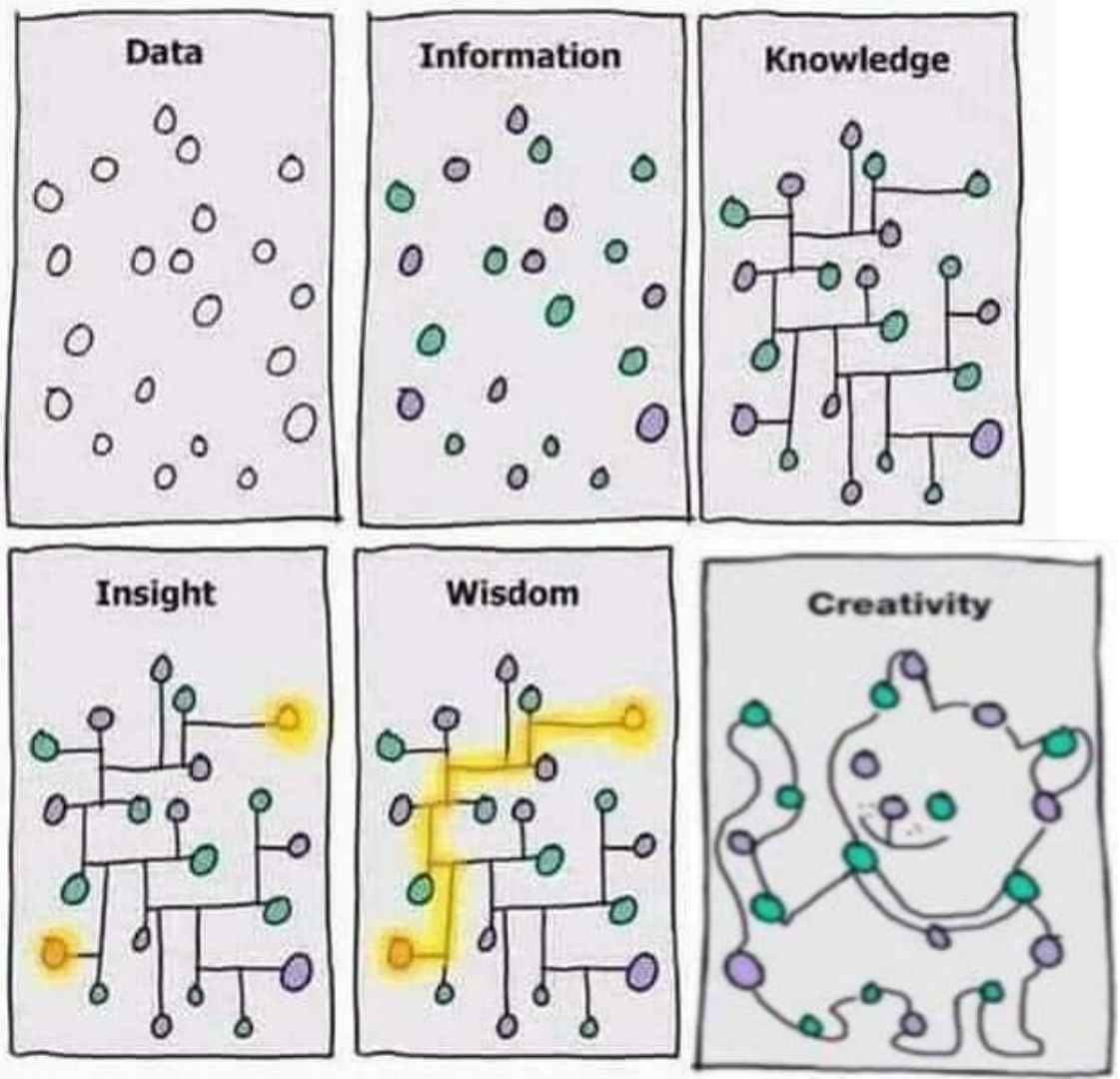

DSNP DJPb Kementerian Keuangan RI

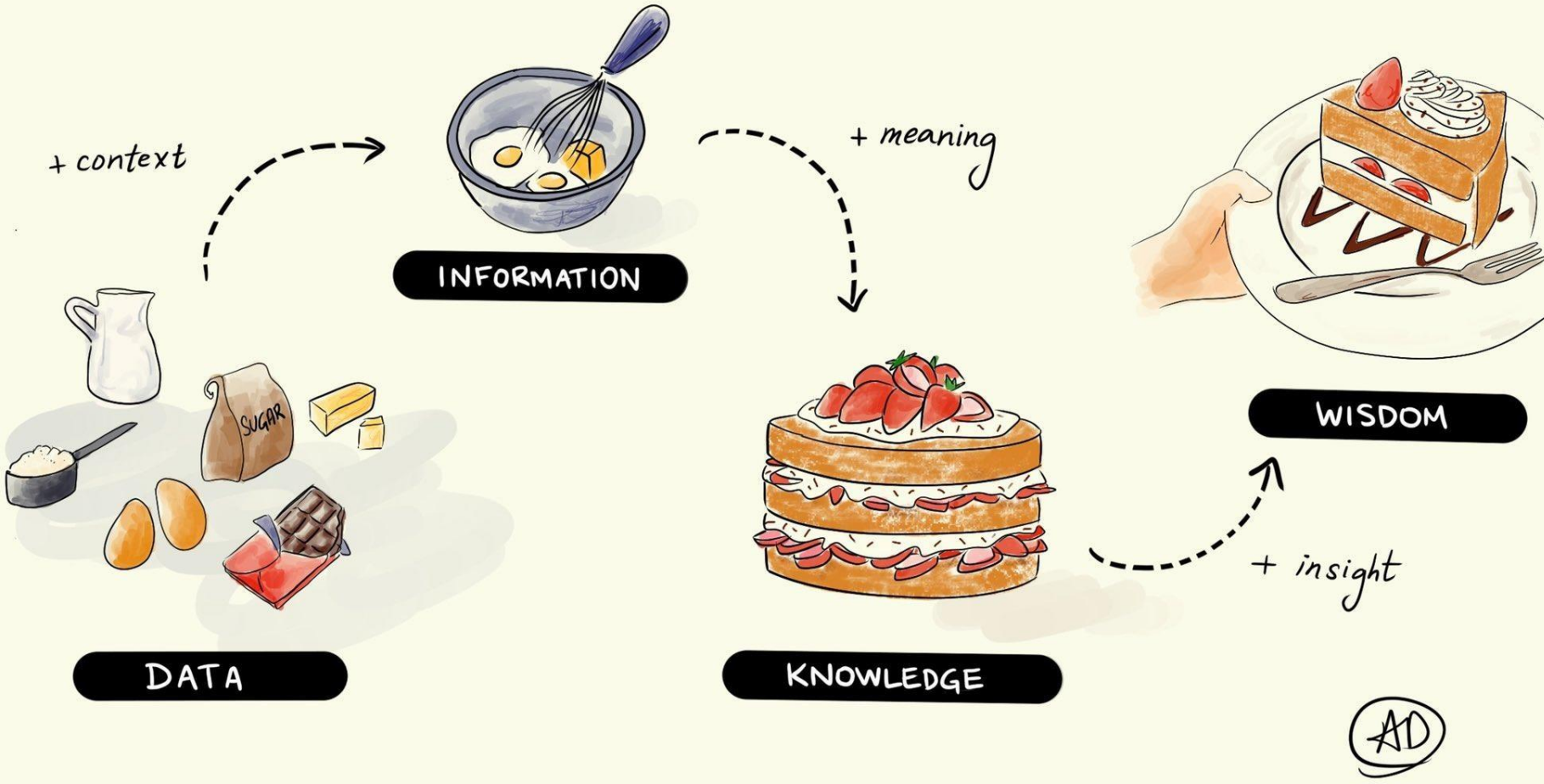
# Intro to DS: Managing Projects

**Instructor: Muhammad Hilman, Ph.D**

**Slide by Fariz Darari, Ph.D.**


Data
Information
Knowledge
Insight
Wisdom


Data
Information
Knowledge
Insight
Wisdom
Creativity


+ context
INFORMATION
+ meaning
SUGAR
WISDOM
+ insight
DATA
KNOWLEDGE

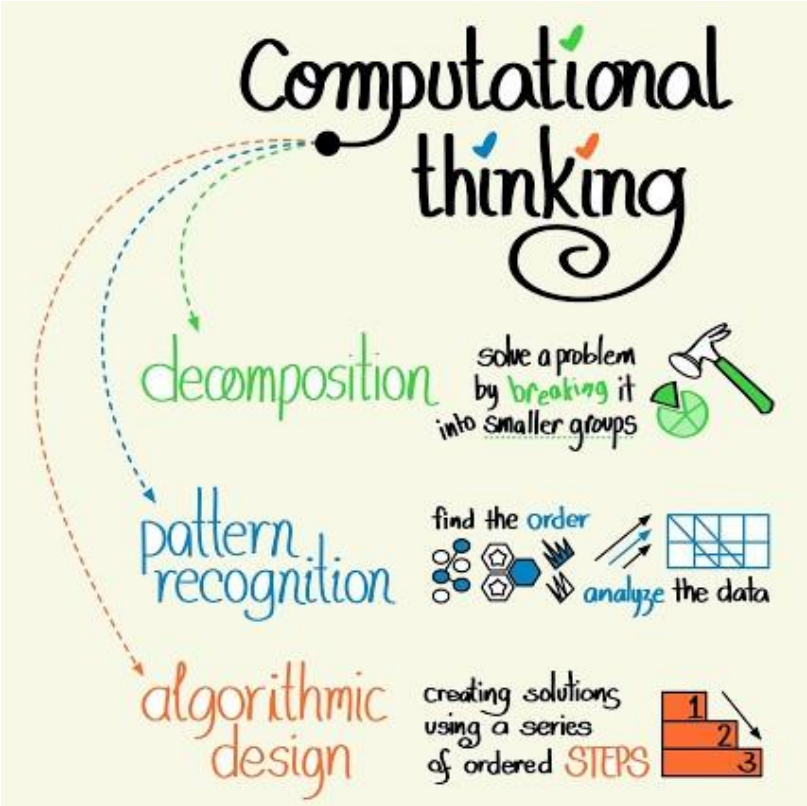
# Data-driven Decision Making

A decision-making process which involves:

- **collecting** data
- **extracting patterns** and facts from that data
- **utilizing** those facts to make inferences that influence decision-making

It's making decisions based on hard data as opposed to intuition or guesswork

# Computational Thinking



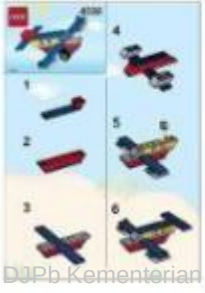
## Decomposition

Breaking the problem into smaller, more manageable parts.

## Pattern recognition

Recognising which parts are the same and the various attributes we can use to define them.

## Algorithm design



Planning the step-by-step instructions that need to be carried out to achieve the goal.

# Data Science: Definitions

- Data science is a field that comprises **everything related to data**, that is, it is about how to: understand data, process data, extract value from data, visualize data, and communicate data. (UC Berkeley)

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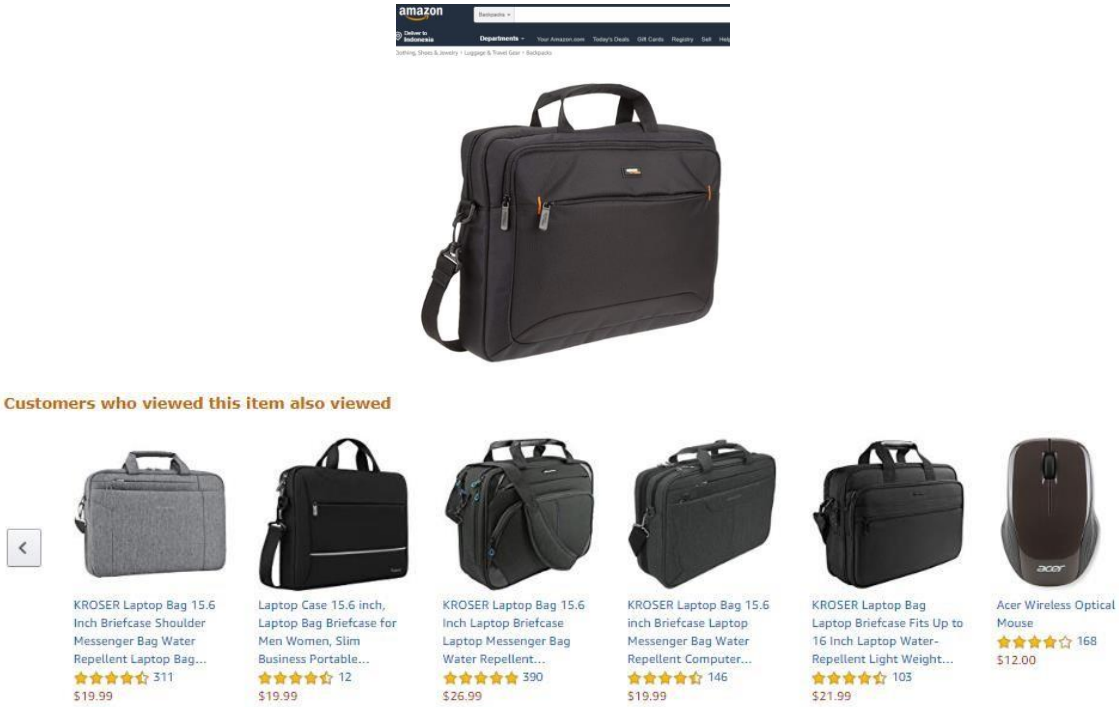
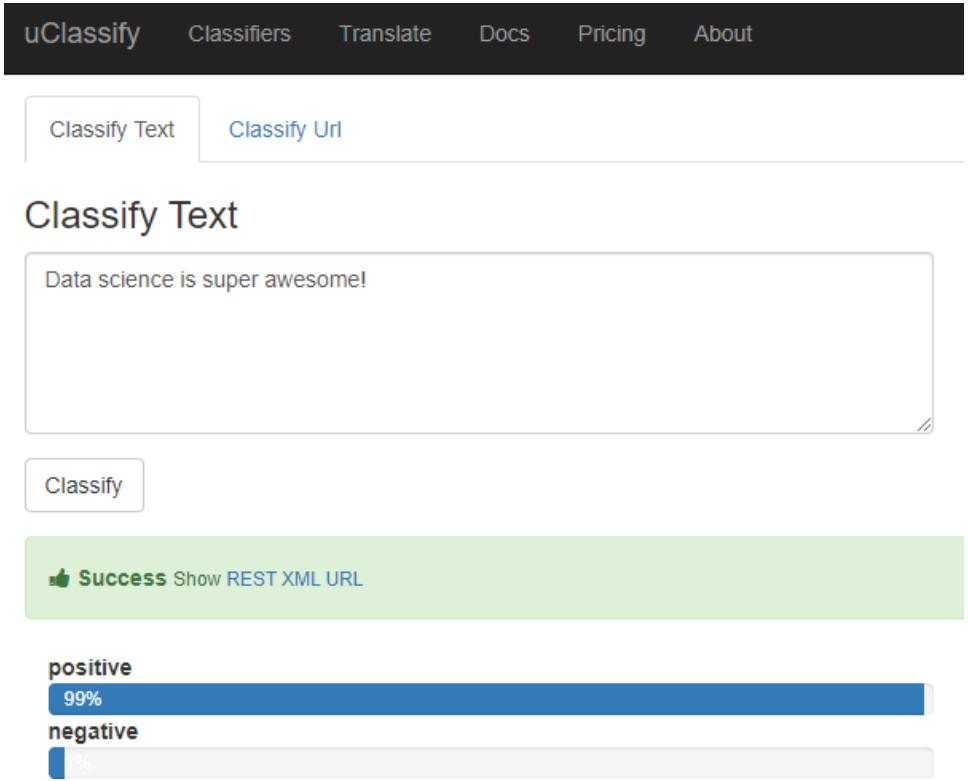
- Data science is a multidisciplinary approach to **extracting actionable insights** from the large and ever-increasing volumes of data collected and created by today's organizations. (IBM)

# Data Science  Showcase: Recommenders

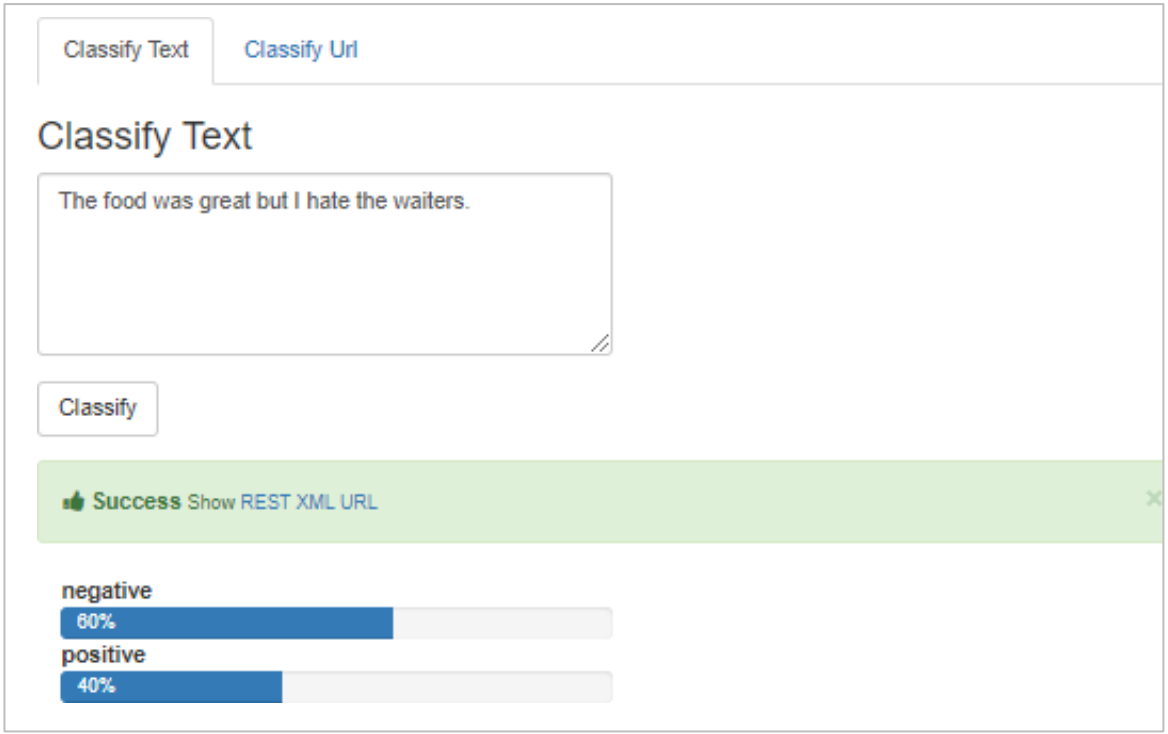


# Data Science Showcase: Sentiment Analysis




https://www.uclassify.com/browse/uclassify/sentiment?input=Text

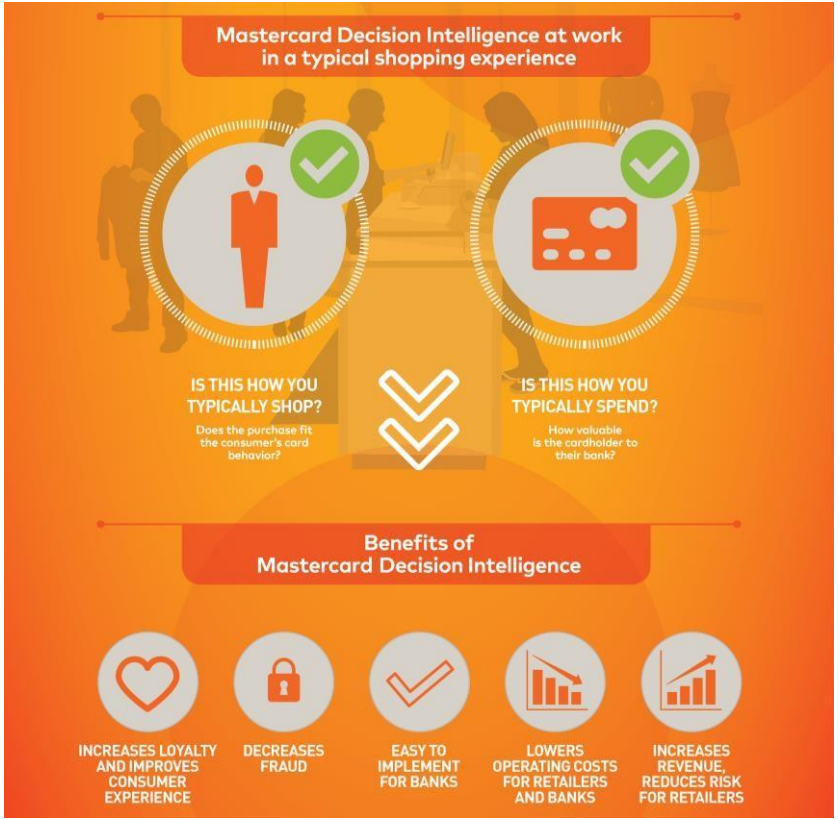
# Data Science Showcase: Sentiment Analysis (cont.)



# Data Science  Showcase: Face Recognition

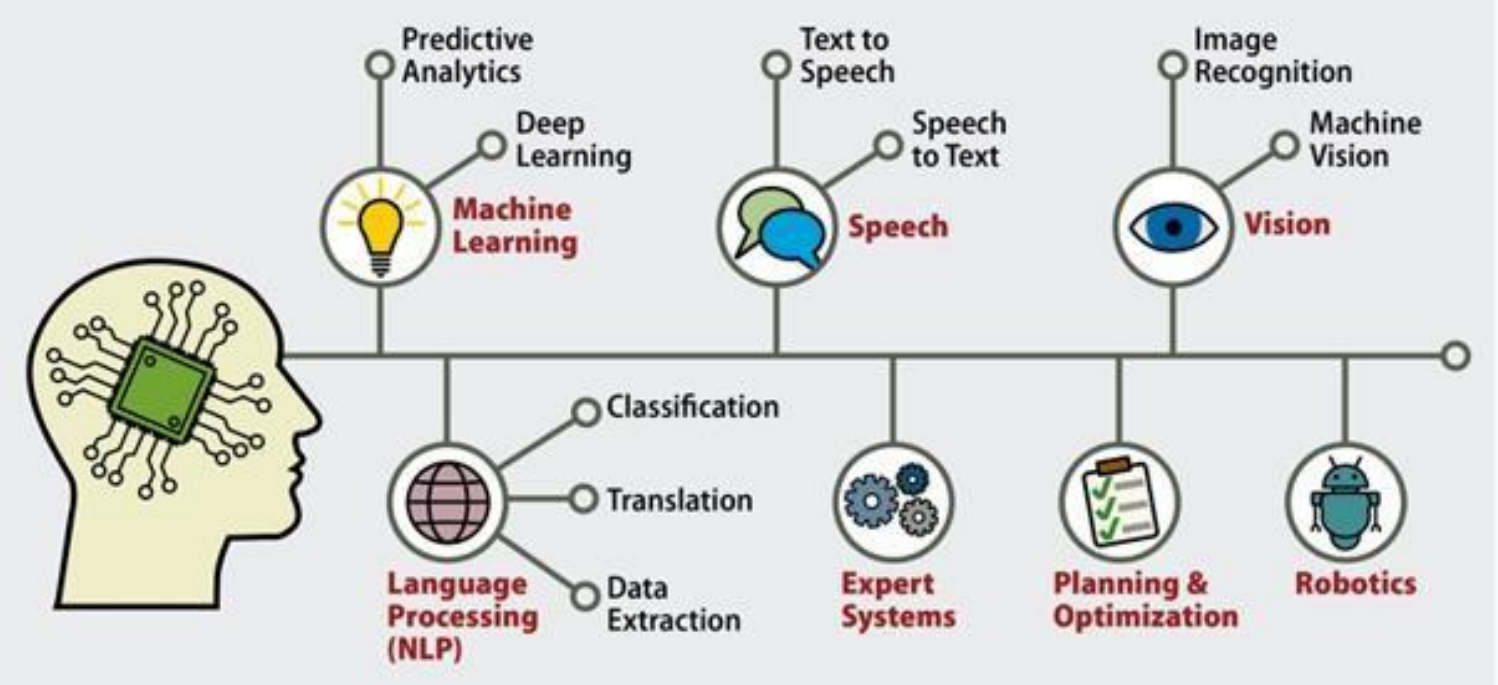
# Data Science Showcase: Genuine/Fraud Transactions

# Data Science Showcase: Genuine/Fraud Transactions (cont.)

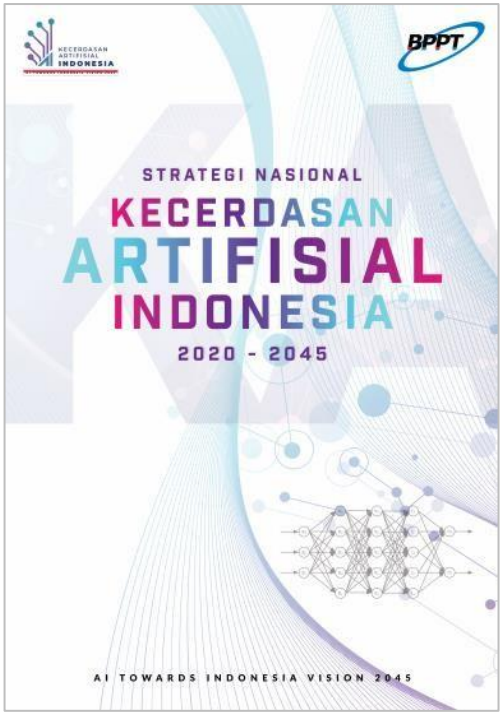


# Data Science Showcase: Usage Pattern Analysis and Prediction

# Data Science Areas



# National AI Strategy of Indonesia




# Sharing Time

Are there any data science applications you have encountered in life but not yet mentioned by the instructor?

Feel free to share your thoughts and experiences!

# AI, ML, and DL

## Artificial Intelligence

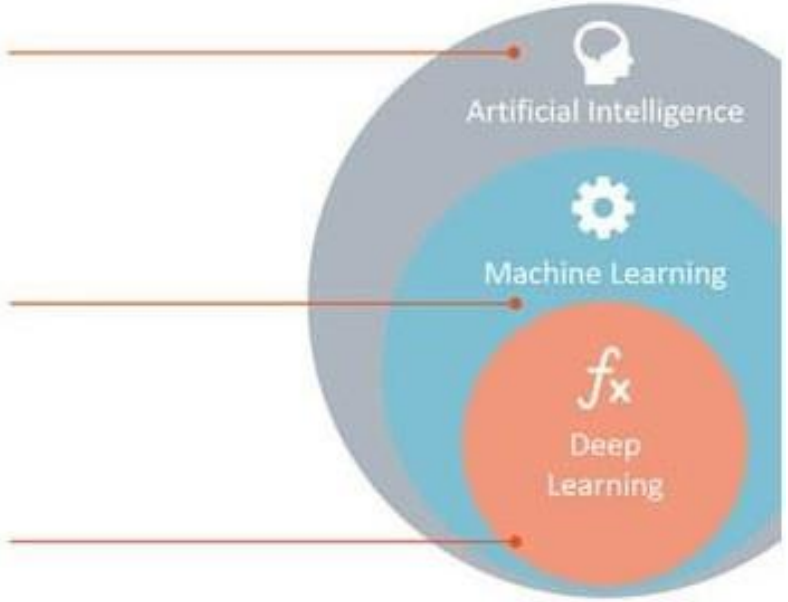
Any technique which enables computers to mimic human behavior.

## Machine Learning

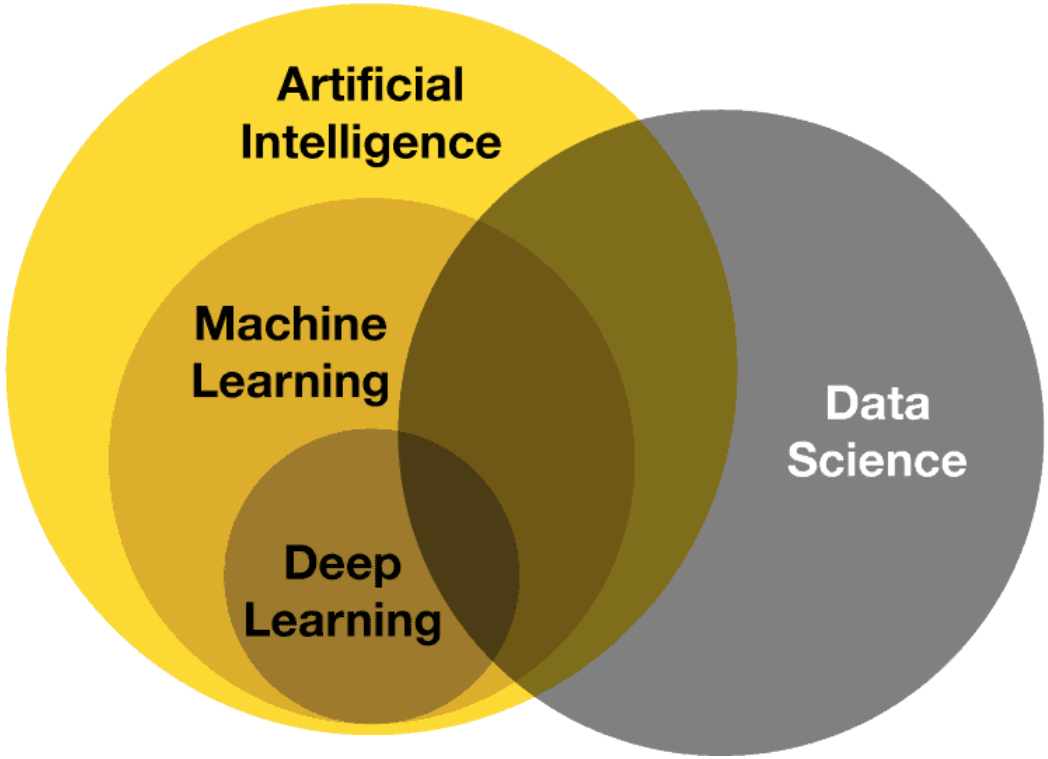
Subset of AI techniques which use statistical methods to enable machines to improve with experiences.

## Deep Learning

Subset of ML which make the computation of multi-layer neural networks feasible.



# AI, ML, DL, and DS



# ML/DS Requirements

- Exists some underlying pattern to be learned,
  so performance can be measured
- No programmable (easy) definition,
  you won't need ML/DS to compute 1+1
- There is data about the pattern,
  so machine learning/data science could have inputs to analyze and learn from

# A bit more formal

Machine Learning (ML) is the study of algorithms that:
at some **task T,**
improve their **performance P,**
with **data or experience E**

A well-defined ML task is given by: **(T, P, E)**

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T: Driving on four-lane highways using vision sensors
P: Average distance traveled before a human-judged error
E: A sequence of images and steering commands recorded while observing a human driver.

T: Categorize email messages as spam or legitimate.
P: Percentage of email messages correctly classified.
E: Database of emails, some with human-given labels

# Types of Learning

- **Supervised learning**

  Given: Training data + desired outputs (labels)

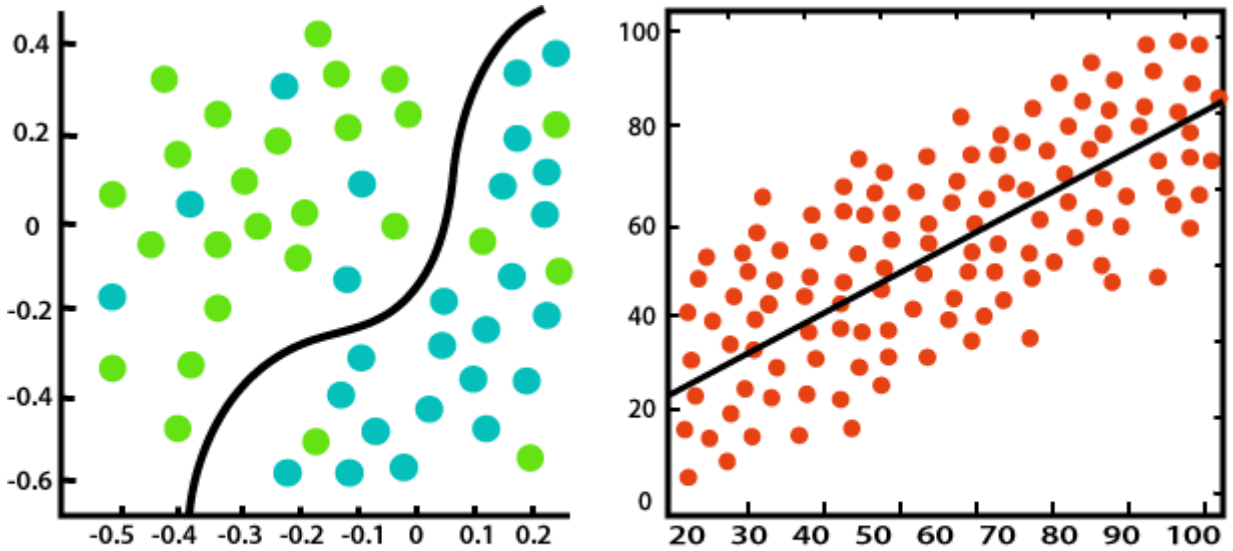
  Learn: How to predict the label of new data

- **Unsupervised learning**

  Given: Training data (without desired outputs)

  Learn: The inherent pattern of data

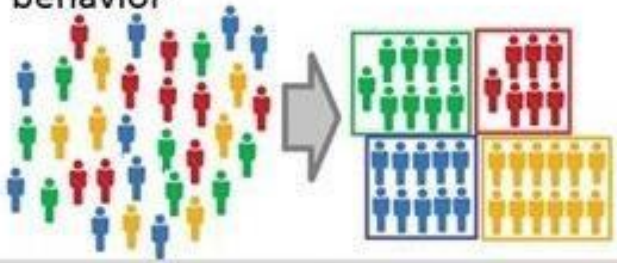
# Supervised Learning



# Unsupervised Learning

**Clustering**

Grouping customers by purchasing behavior

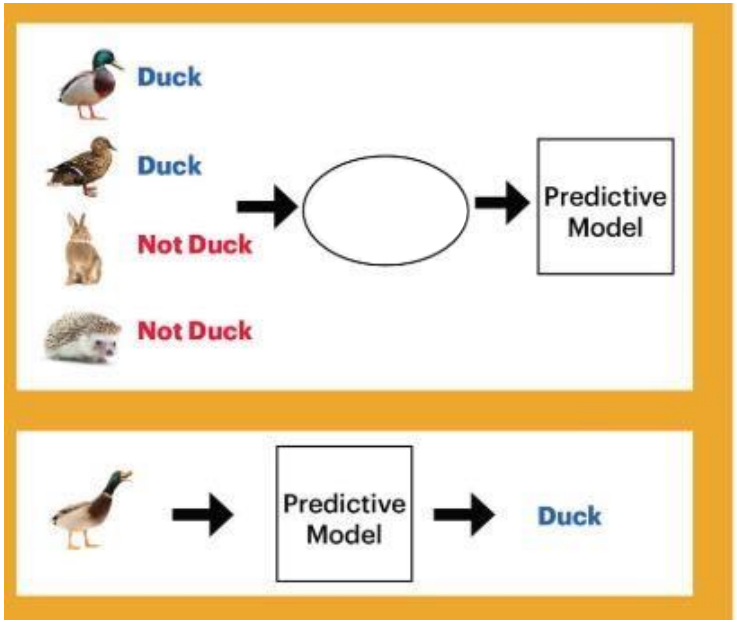


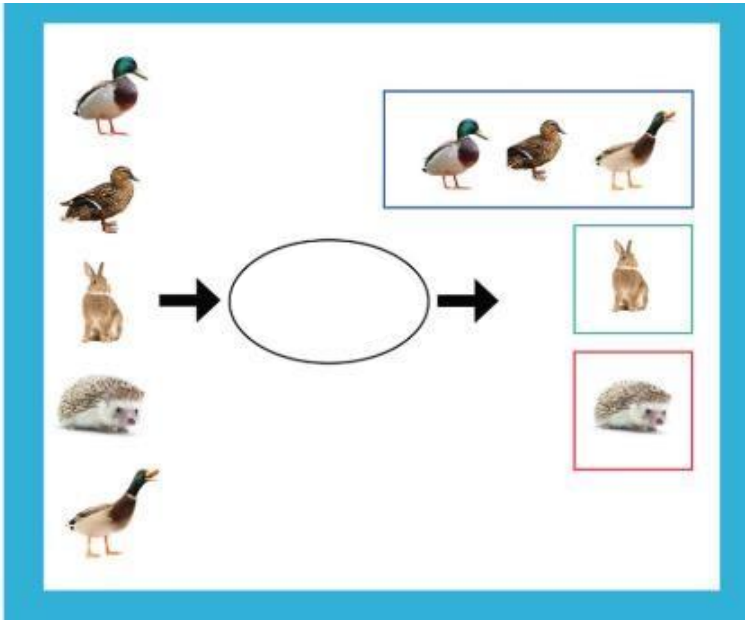
**Association**

People that buy X tend to buy Y

People that buy A+B tend to buy C

# Quiz Time: Which one is unsupervised vs. supervised?



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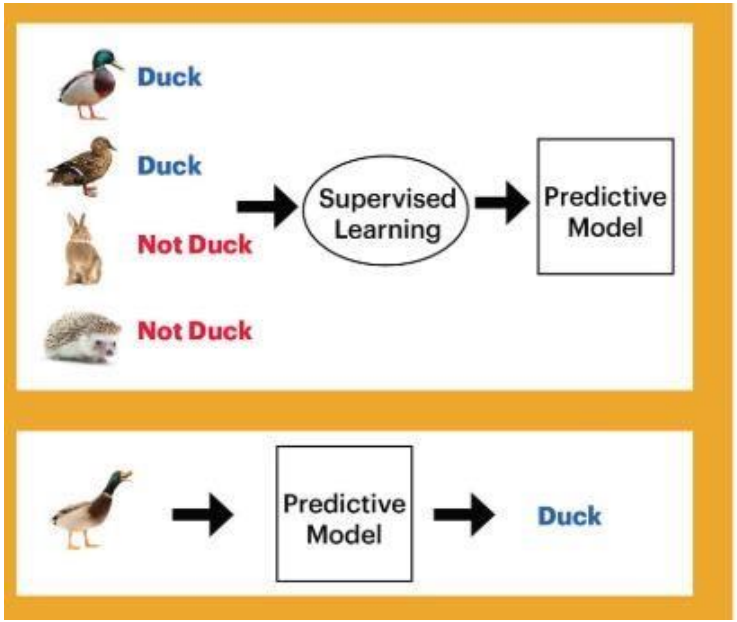
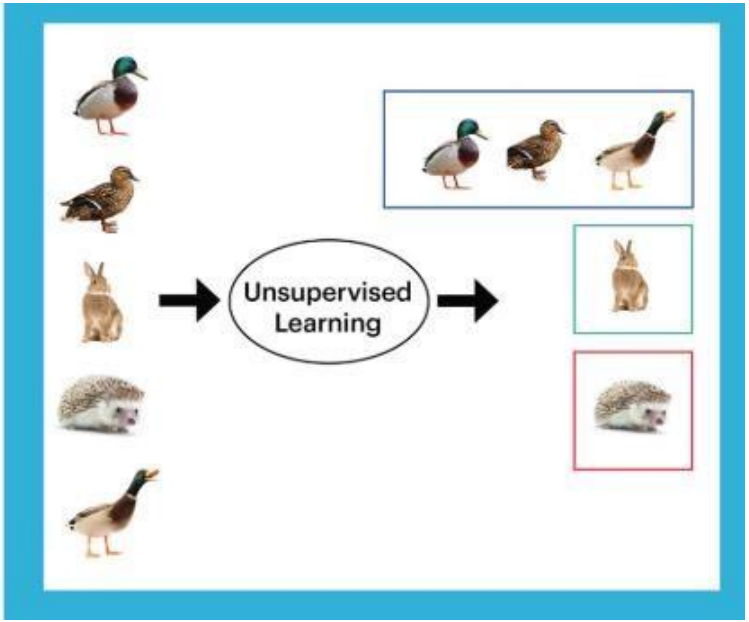


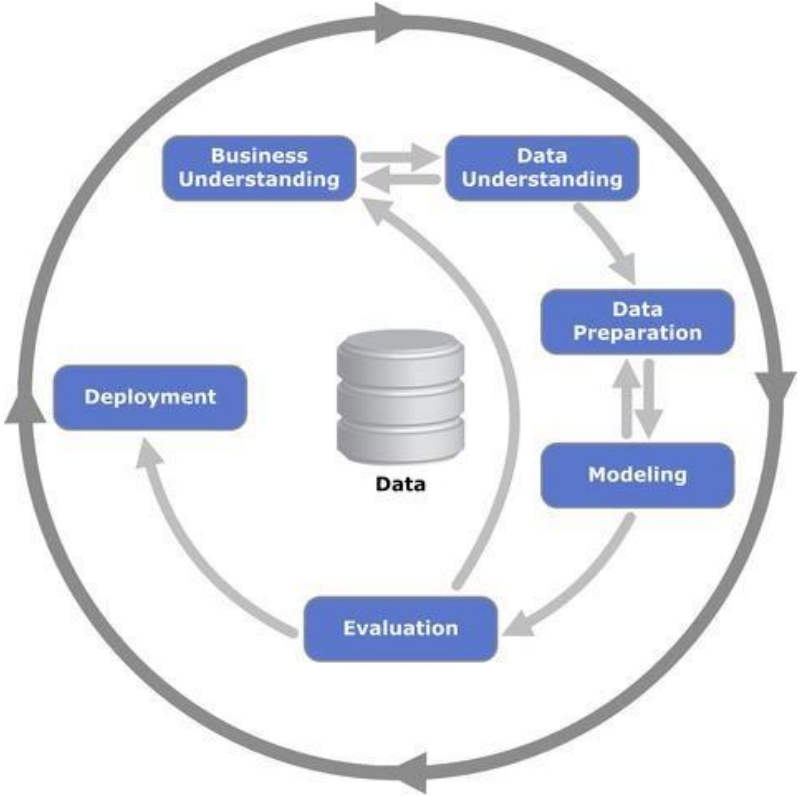
# CRISP-DM Methodology

- Cross-Industry Standard Process for Data Mining
- European community funded effort to develop framework for data mining/data science tasks
- Has been around since 1999
- Goals:
  - > Encourage interoperability
  - > Clearer breakdown of data science tasks

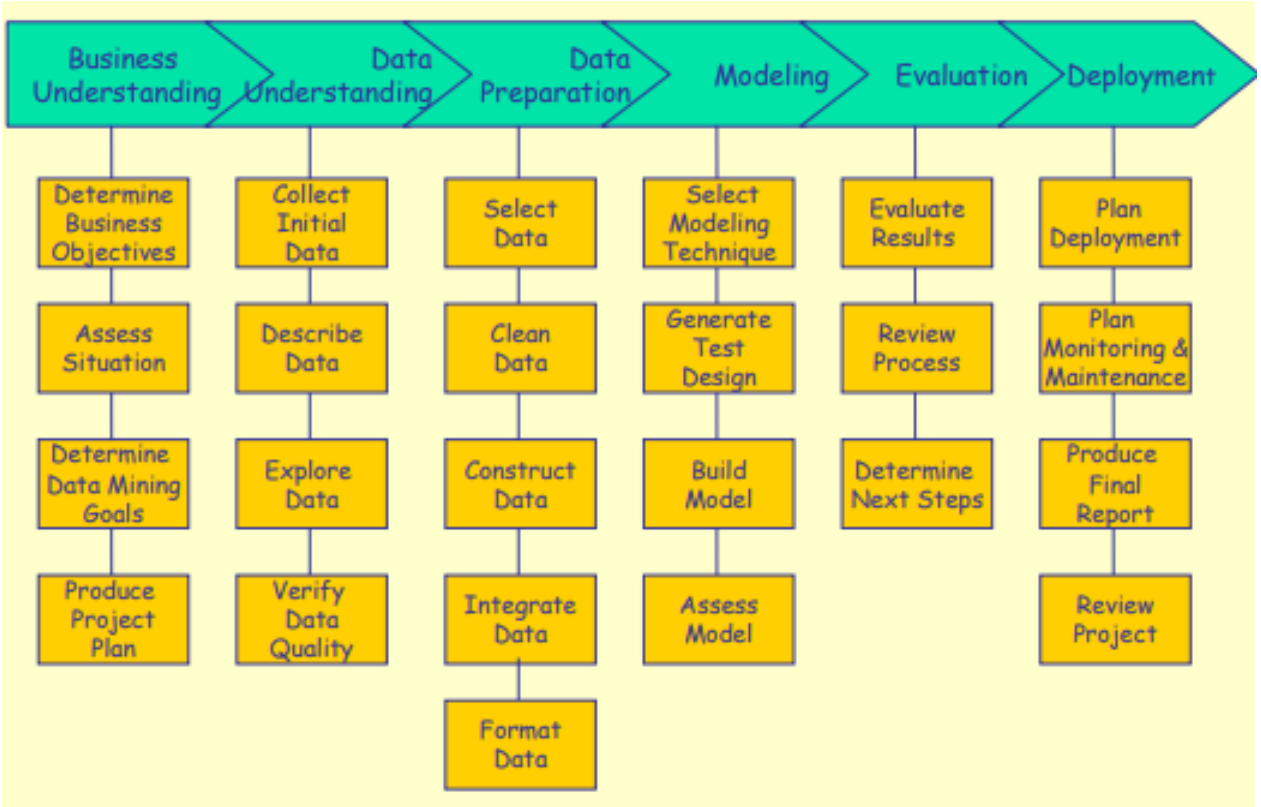
# CRISP-DM Methodology Characteristics

- Non-proprietary
- Application/industry neutral
- Tool neutral
- Focus on business issues and technical analysis
- Industry-proven way to guide your data science efforts

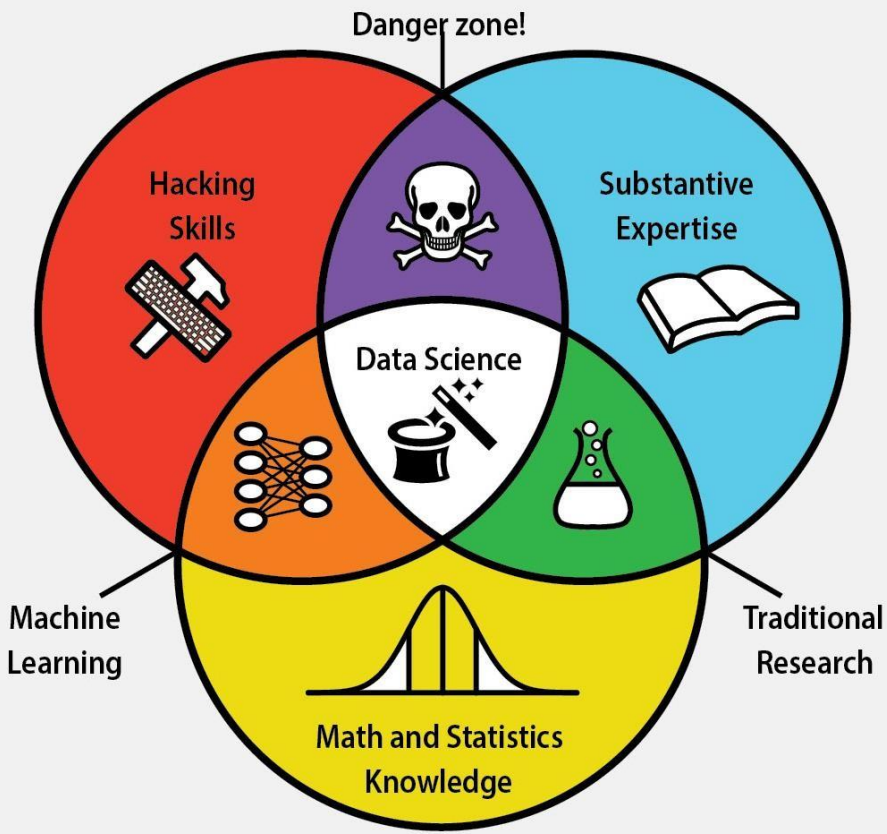
# CRISP-DM Methodology Phases



# CRISP-DM Methodology Phases and Tasks



# DATA SCIENCE SKILLSET




Data science, due to its interdisciplinary nature, requires an intersection of abilities: **hacking skills**, **math and statistics knowledge**, and **substantive expertise** in a field of science.

**Hacking skills** are necessary for working with massive amounts of electronic data that must be acquired, cleaned, and manipulated.

**Math and statistics knowledge** allows a data scientist to choose appropriate methods and tools in order to extract insight from data.

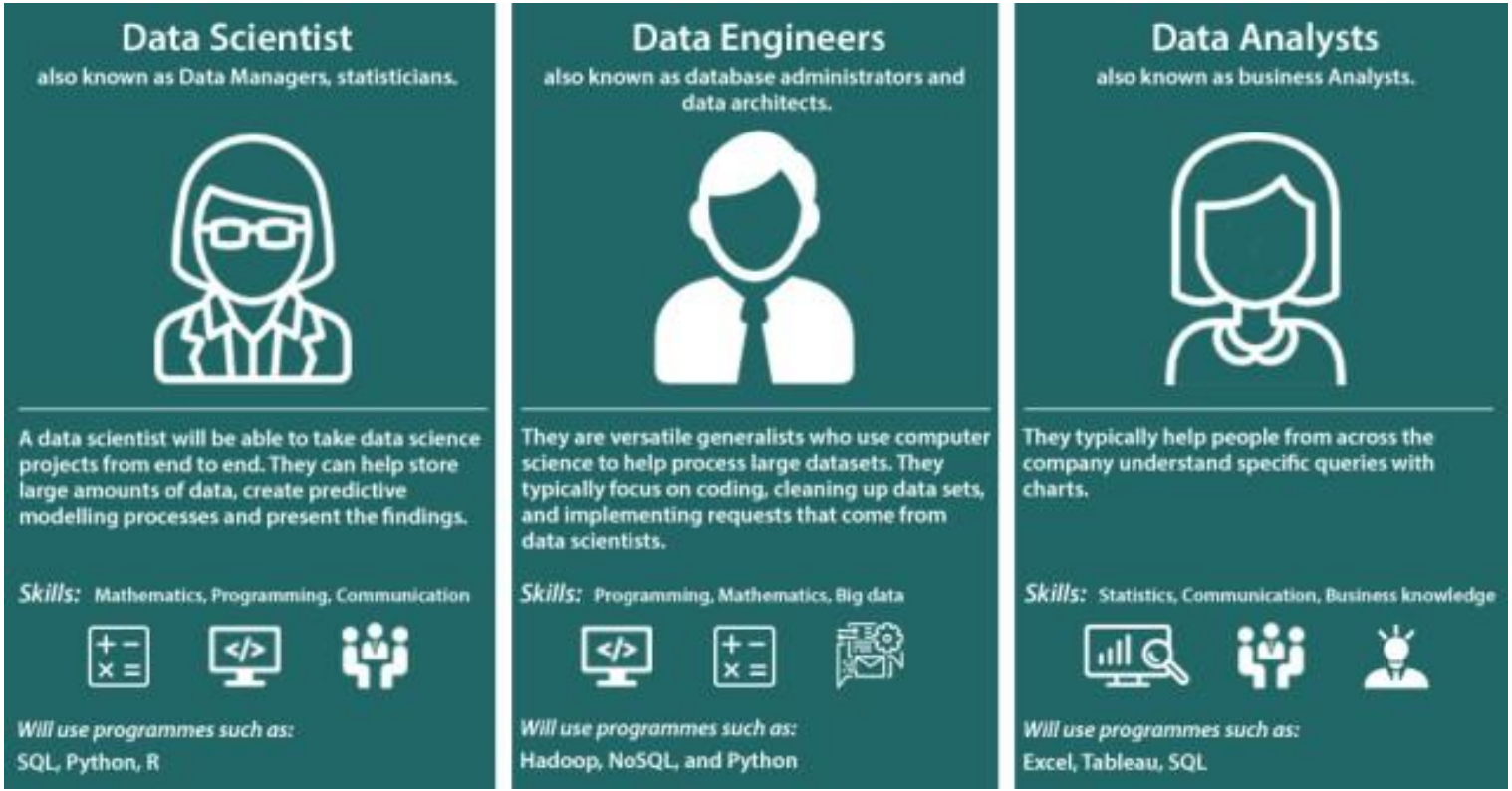
**Substantive expertise** in a scientific field is crucial for generating motivating questions and hypotheses and interpreting results.

**Traditional research** lies at the intersection of knowledge of math and statistics with substantive expertise in a scientific field.

**Machine learning** stems from combining hacking skills with math and statistics knowledge, but does not require scientific motivation.

**Danger zone!** Hacking skills combined with substantive scientific expertise without rigorous methods can beget incorrect analyses.

# Roles in Data Science



# 5+1 Tips on Starting a Data Science Career

1. Data science is a big field: You can't know everything about everything
2. Solve for efficiency
3. Data is never clean: Deal with it
4. Data science is more than machine learning
5. Don't tell me your worth, prove it!
6. Be kind and help others


Thank You