

Introduction to Data Models

CPE 232: Data Models

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Welcome!

- Syllabus
- Facebook Group (*Link posted on the announcement*)
- **Remarks**: Teaching → Guiding
- Classroom
- Week #2 (next week)
- TAs' Office Hours
 - **Intl**: 13.30-15.30 of (1) Thursday or (2) Friday
 - **Reg & RC**: 13.30-15.30 of (1) Monday or (2) Tuesday

Outline

Introduction to Data Models

- Data
- Data Modeling
- Data Visualization

Data

Where data come from



Significance

The Economist



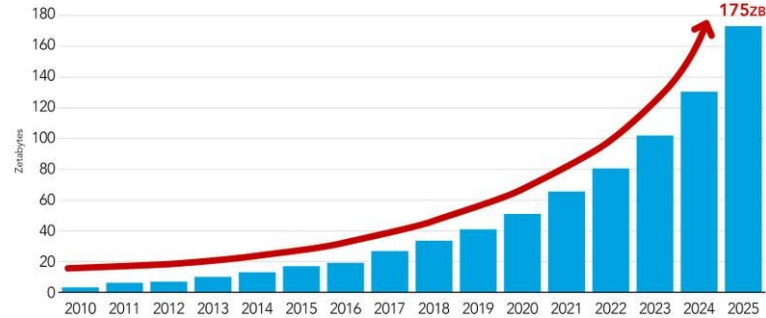
Ref: <https://www.economist.com/leaders/2017/05/06/the-worlds-most-valuable-resource-is-no-longer-oil-but-data>



Quantitatively speaking..

HOW THE AMOUNT OF DIGITAL DATA IS INCREASING

Annual size of the global data sphere 2010–25



Source: IDC Global DataSphere, November 2018

accaglobal.com/machine-learning

It is estimated that around

90%

of all the digital data in the world has been created since 2016



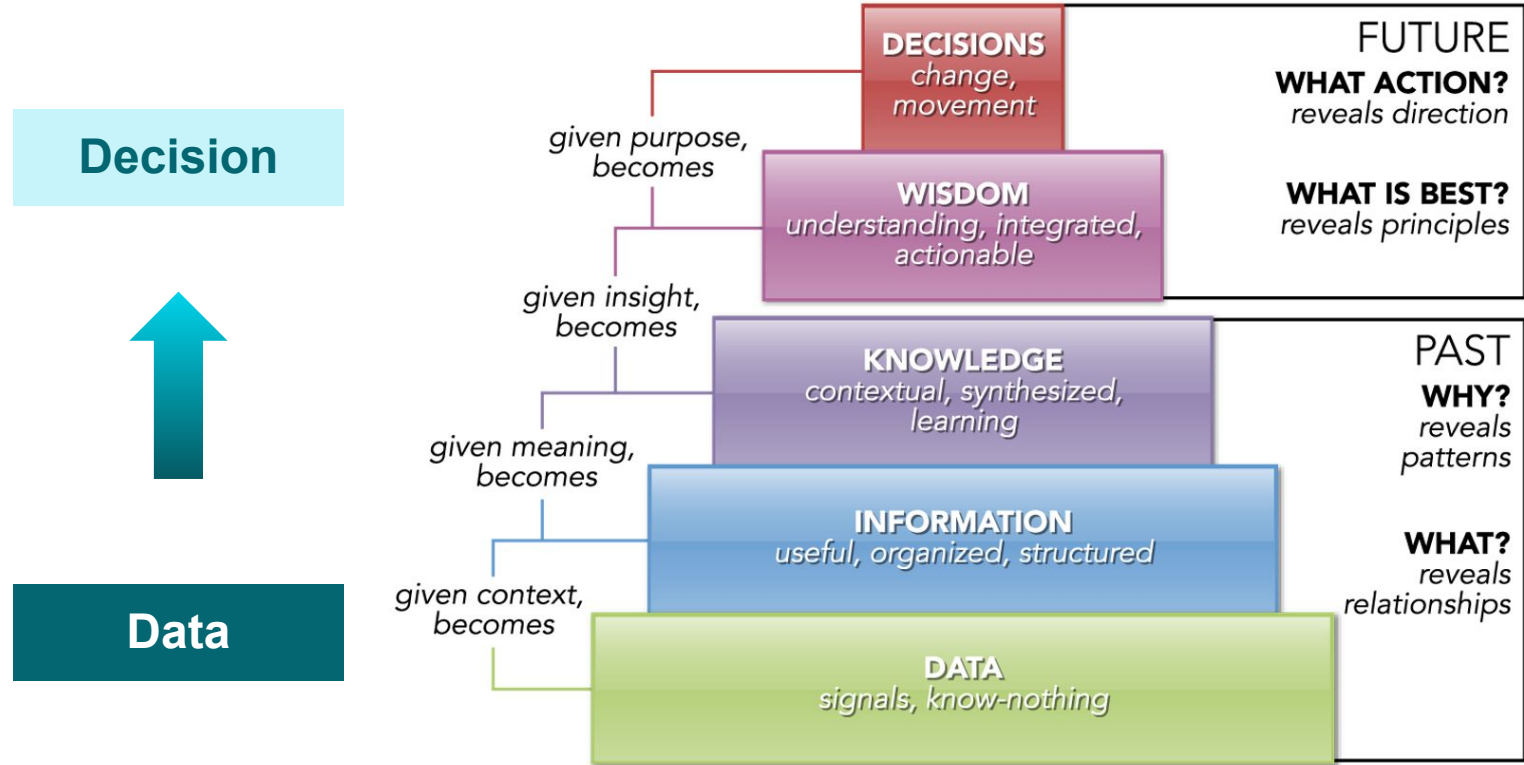
Think Ahead

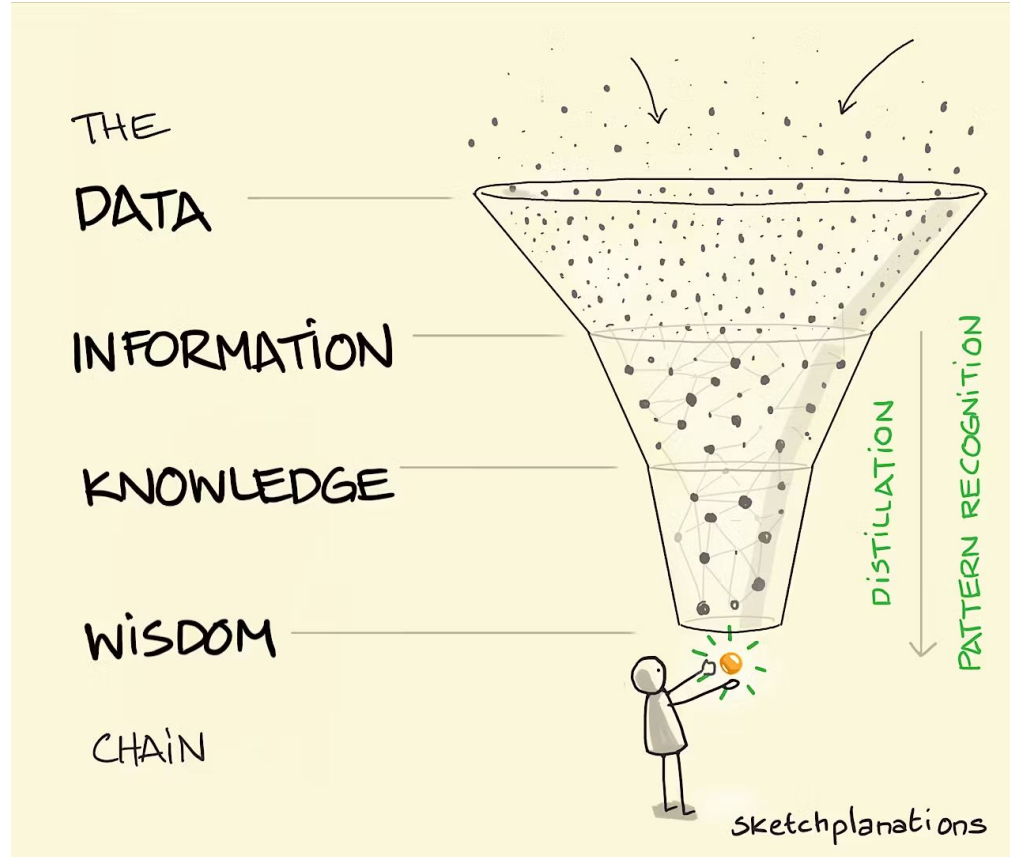
Ref (left): <https://www.domo.com/data-never-sleeps>

Ref (right): <https://www.accaglobal.com/gb/en/professional-insights/technology/machine-learning.html>



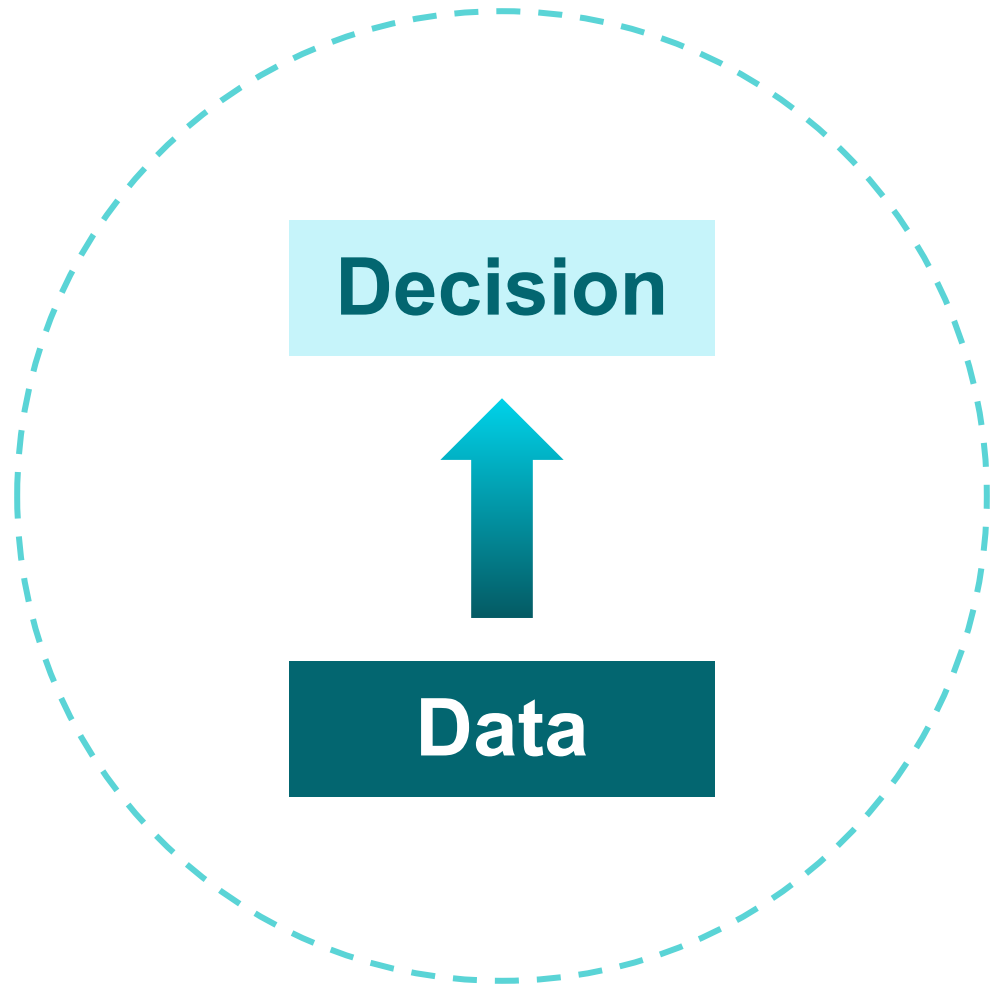
DIKW Pyramid





Ref: <https://sketchplanations.com/dikw>

Data-driven Decision Making



Types of Data

- Demographic
- Transactional
- Interaction
- Behavioral



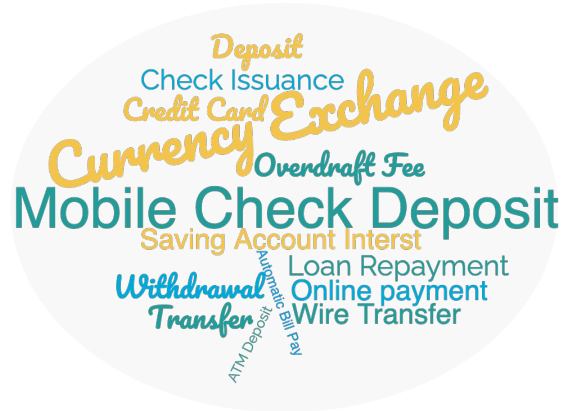
Demographic Data

- Demography is the study of human populations
- Information about groups of people according to certain attributes:
 - age, gender, and place of residence
 - **socioeconomic attributes**: occupation, family status, income
- Collected to gain a deeper insight into the target group



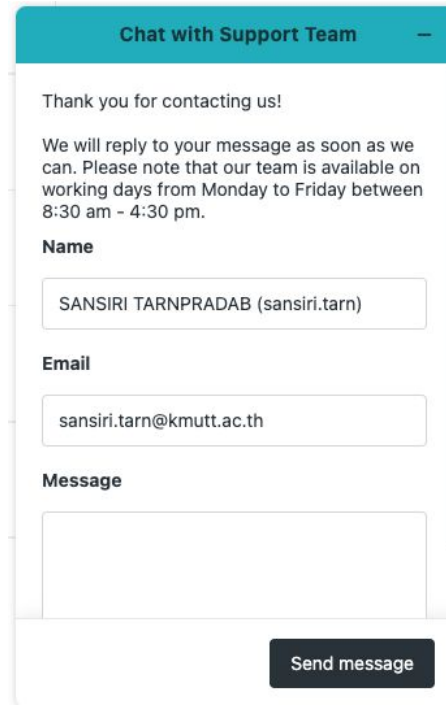
Transactional Data

- Information that is captured from transactions
- All those records, all those details..
- Help in tracking and managing operations



Interaction Data

- The record that describes an **interaction** between individuals/entities
- Examples:
 - Web click streams
 - In-person dialogs
 - Call center notes
 - Email / Chat log



The image shows a mobile app interface for a support chat. At the top is a teal header with the text 'Chat with Support Team' and a minus sign icon. Below the header, the chat content area contains a message from the support team: 'Thank you for contacting us! We will reply to your message as soon as we can. Please note that our team is available on working days from Monday to Friday between 8:30 am - 4:30 pm.' Below this message are three input fields: 'Name' with the value 'SANSIRI TARNPRADAB (sansiri.tarn)', 'Email' with the value 'sansiri.tarn@kmutt.ac.th', and 'Message' which is currently empty. At the bottom right of the chat area is a dark blue button labeled 'Send message'.

Behavioral Data

- Needs
- Desires
- Preferences
- Opinions



Ref: <https://newlifectr.org/news-and-events/support-new-life-center-though-our-amazon-wish-list/>

- Significance:
 - Strengthen organizations
 - Help to better understand your customers at the individual level
 - Transform marketing campaigns and personalized recommendations

Types of Data

- Demographic
- Transactional
- Interaction
- Behavioral

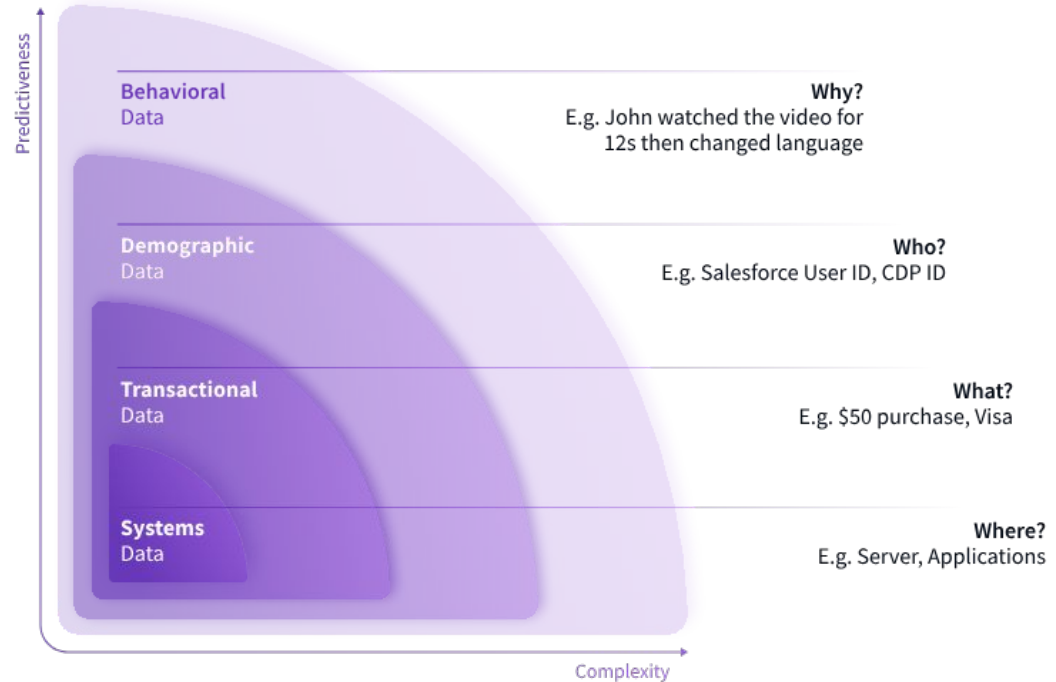
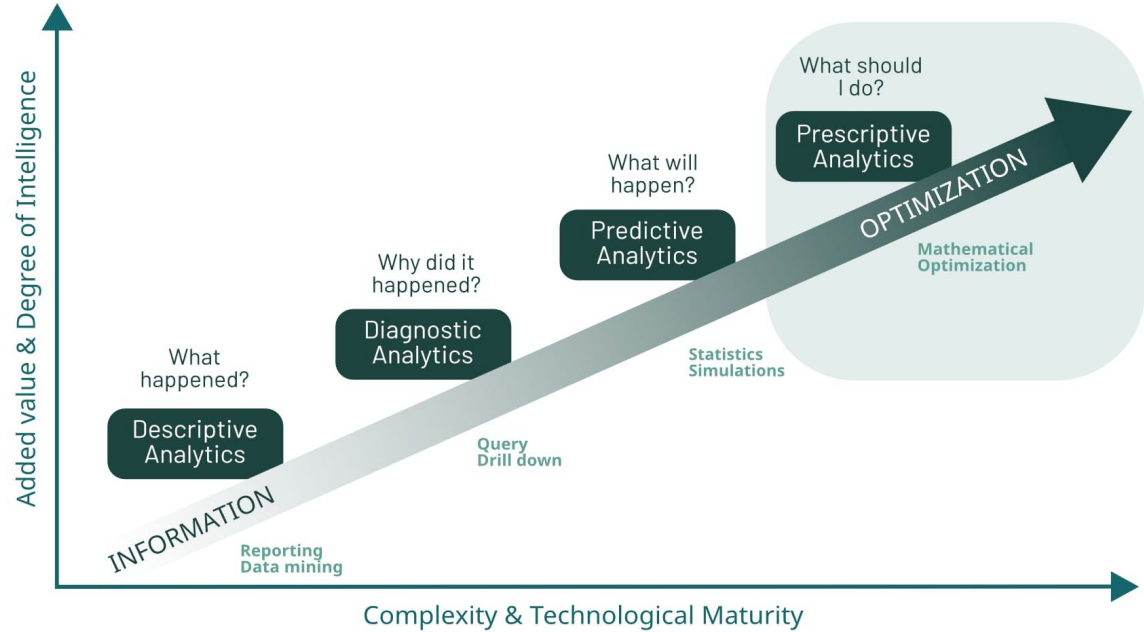


Figure 1. How behavioral data compares to other data types

Ref: <https://snowplow.io/what-is-behavioral-data/>

Data Analytics

Make the most out of
DATA



Ref: https://atoptima.com/blog/prescriptive_analytics_improve_decision_making/

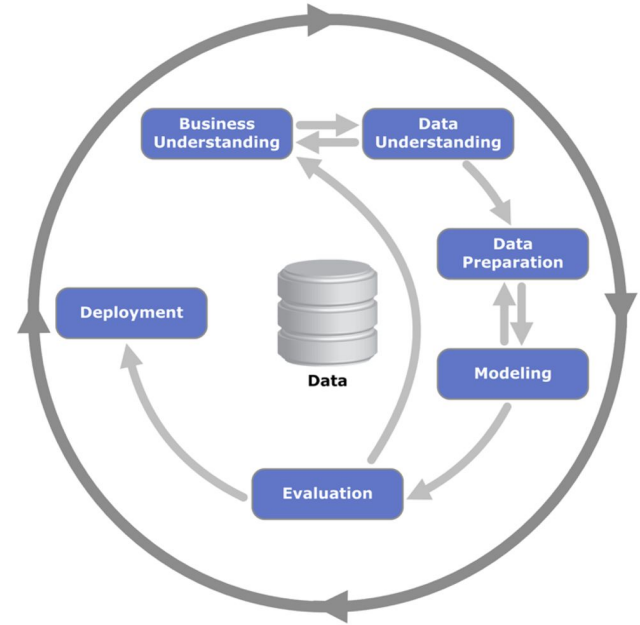


Data Modeling

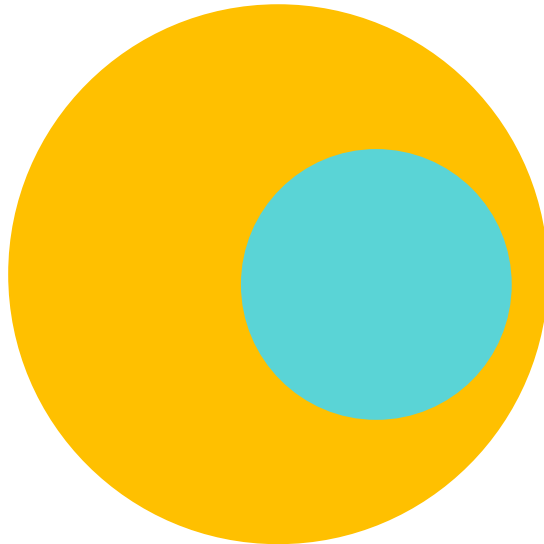
What is Data Modeling?

A process of:

- Creating an abstract representation of a structure in a dataset or a system.
- Analyzing and defining all the different data types, as well as the relationships among them.
- Involves creating a visual representation to communicate connections between data points and structures.



Data-driven modeling	Machine learning
<p>The process of using data to derive the functional form of a model or the parameters of an algorithm.</p>	<ul style="list-style-type: none">• The process of fitting parameters to data to minimize a cost function when the model is applied to the data.• Parameters are updated through learning

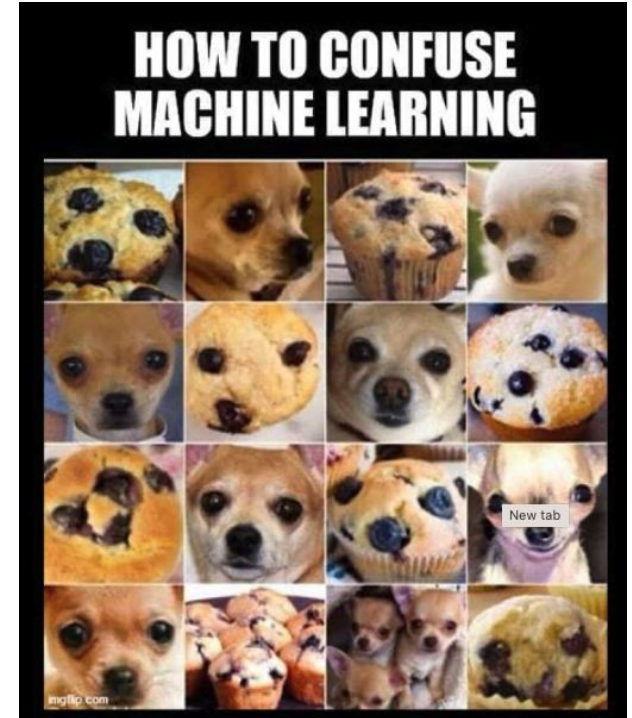


A Glimpse of Machine Learning

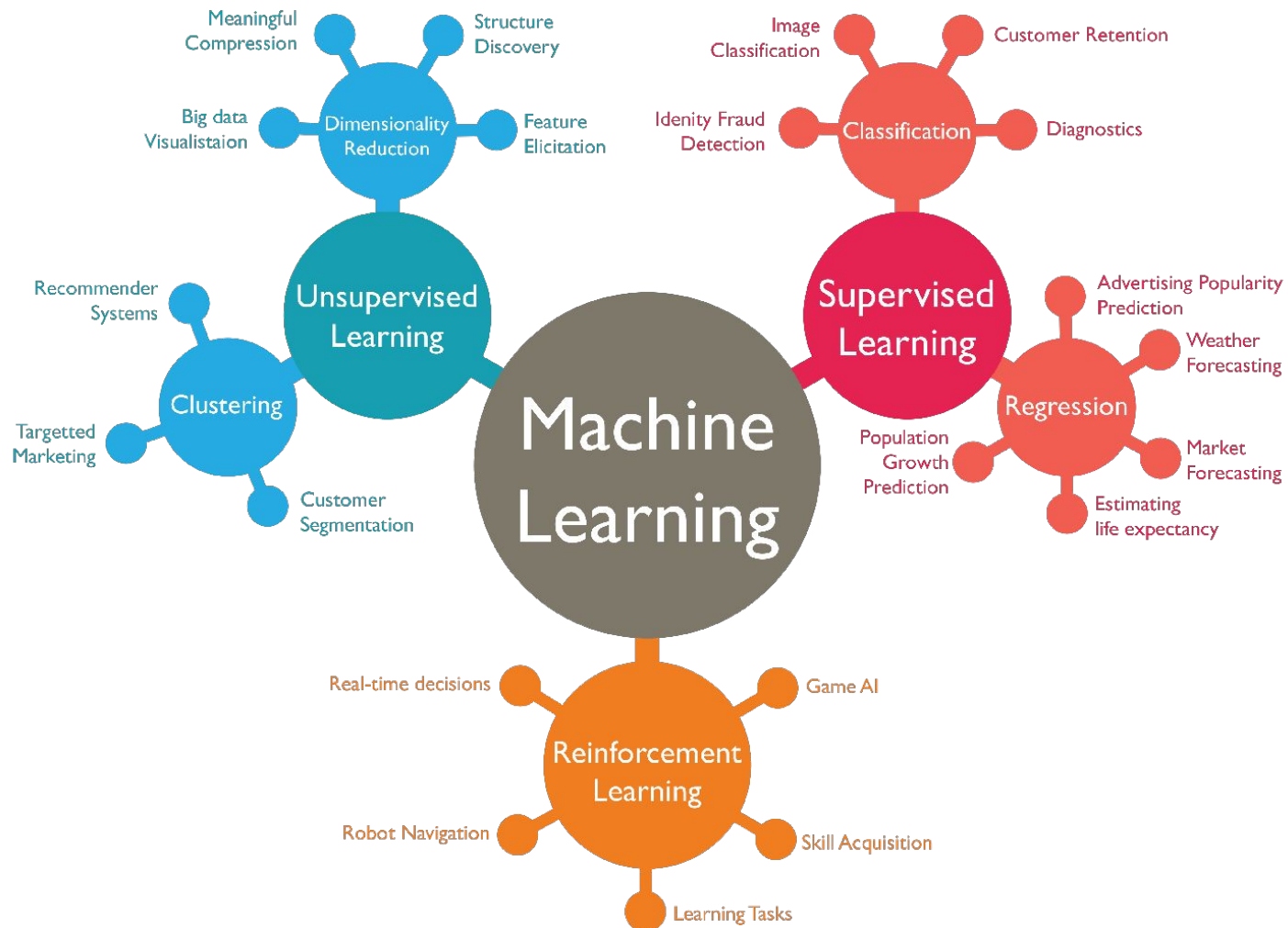
*“The science of getting computers to learn from data
without having to be explicitly programmed by humans.”*

ML Examples

- Speech & Image Recognition
- Traffic alerts (Google Map)
- Chatbot (Online Customer Support, ChatGPT)
- Google Translation
- Prediction
- Extraction
- Auto-Friend Tagging Suggestion
- Self-driving Cars
- Ads Recommendation
- Email Filtering



Ref: https://www.youtube.com/watch?v=dWmP7_l1rFo



Data Visualization

What is Data Visualization?

What:

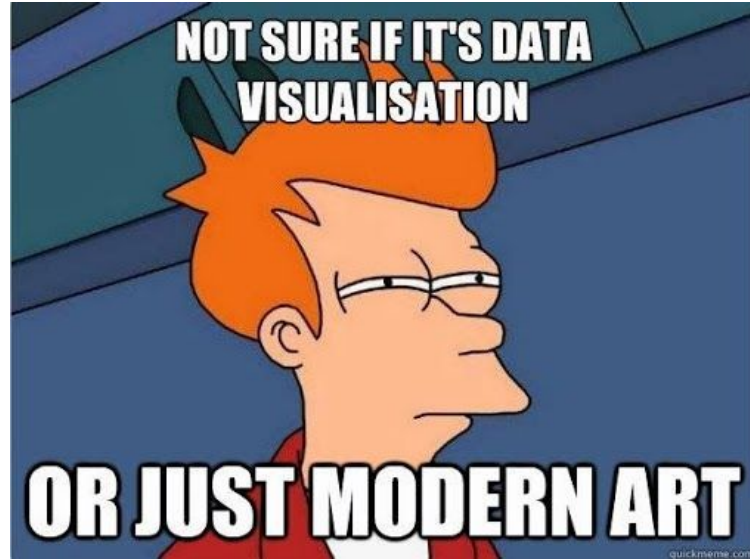
- Technique to present data in a pictorial/graphical format

Significance & Benefits:

- Gain insights into an information space by mapping data onto graphical primitives
- Provide qualitative overview of large data sets
- Search for patterns, trends, structure, irregularities, relationships among data
- Help find interesting regions and suitable parameters for quantitative analysis
- Simplification

Examples

- Scatterplot
- Heatmap
- Bar chart
- Line chart
- Pie chart
- Histogram
- Clustering
- Dashboard
- ... and more



Ref: https://hackmd.io/@cs1951a/HJ_Q25wio

In Summary

Introduction to Data Models

- Data
 - Significance
 - Decision Making
 - Types of Data
- Data Modeling
- Data Visualization



Ref:

<https://medium.sqldbm.com/database-modeling-relational-vs-transformational-be7b131ec73b>

Q & A