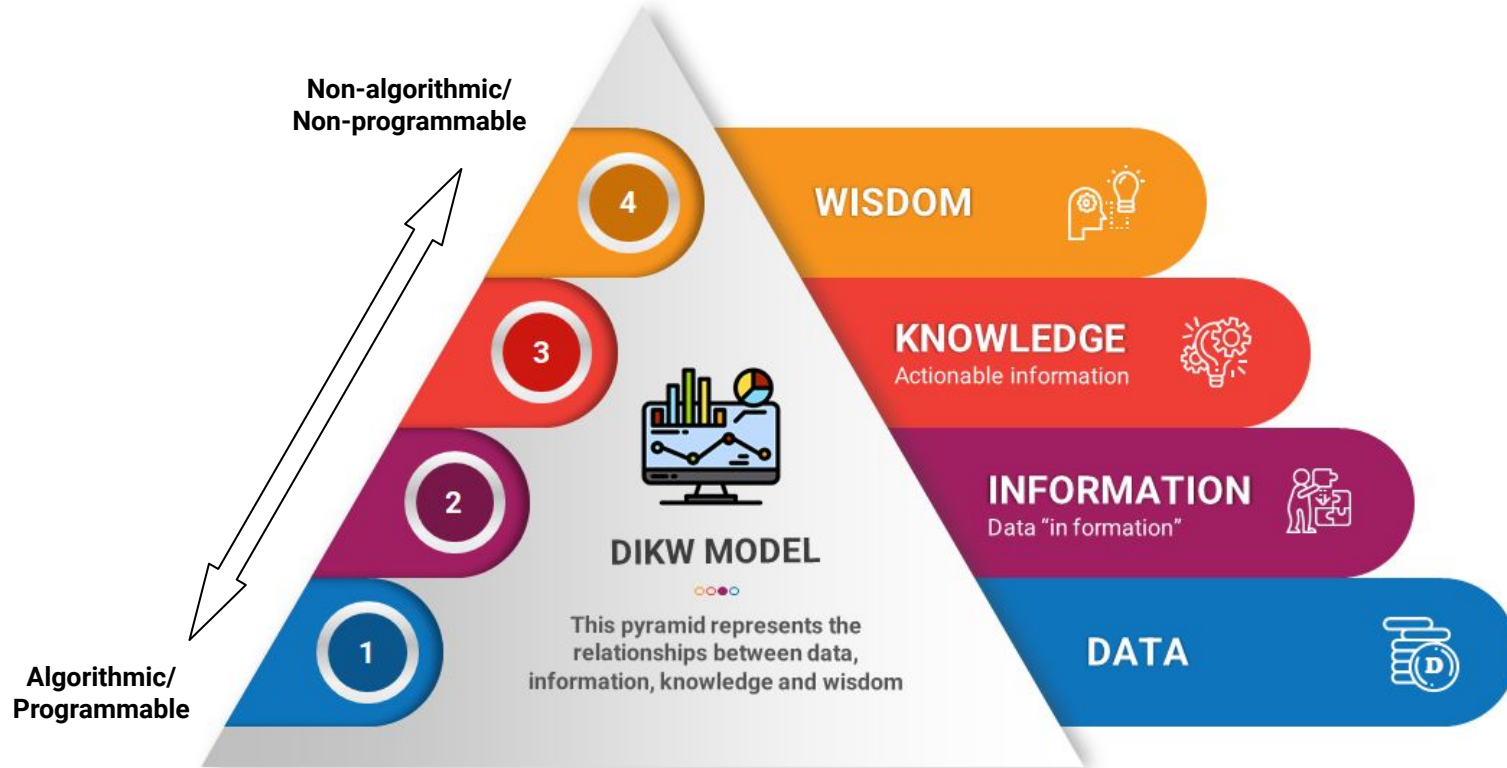


Basic Concepts of AI

Concepts and Terminologies in AI

Data, Information, Knowledge & Wisdom Model



Source: Rowley, J.E. (2007). The wisdom hierarchy: representations of the DIKW hierarchy. Journal of Information Science, 33, 163 - 180.

Differences between Data, Information and Knowledge

Term	Definition	Example
Data	<ul style="list-style-type: none"> • A physical entity without any meaning and context (Baskarada & Koronios, 2013). • Element of analysis (Amidon, 1997). 	<ul style="list-style-type: none"> • Consider the number 097. • Meaningless when standalone.
Information	<ul style="list-style-type: none"> • A byproduct when data are cognitively processed (Baskarada & Koronios, 2013). • Data with context (Amidon, 1997). 	<ul style="list-style-type: none"> • Consider 097 in the context of ASCII code. • 097 means “a” in ASCII.
Knowledge	<ul style="list-style-type: none"> • An actionable body of information (Tiwana, 2001; Horibe, 1999). • Information with meaning (Amidon, 1997). 	<ul style="list-style-type: none"> • Consider “a” as a character in alphabet. • The character “a” can be acted on to produce an outcome.

Source:

Horibe, F. (1999). Managing Knowledge Workers – New Skills and Attitudes to Unlock the Intellectual Capital in Your Organization. John Wiley & Sons.

Tiwana, A. (2001), The Essential Guide to Knowledge Management – E - Business and CRM Applications. Prentice – Hall.

Source:

Baskarada, S. & Koronios, A. (2013). Data, Information, Knowledge, Wisdom (DIKW): A Semiotic Theoretical and Empirical Exploration of the Hierarchy and its Quality Dimension. Australasian Journal of Information Systems, Vol 18-1, p5-24.

Amidon, D.M. (1997). Innovation Strategy for the Knowledge Economy: The Ken Awakening. Butterworth-Heinemann.

Knowledge Representation and Reasoning

- Knowledge representation (KR) is the study of what information can be extracted, in a computationally dependable way, in order to form a represented knowledge
- In other words, researchers find ways to **represent** knowledge in a way that a computer can use it to **reason** or predict consequence
- A system using knowledge representation and reasoning is known as a knowledge-based system (KBS)
- Based on the predicament that intelligent systems can be constructed from a knowledge base which can be operated on by general reasoning mechanisms
- This field is based on Leibniz's knowledge representation hypothesis

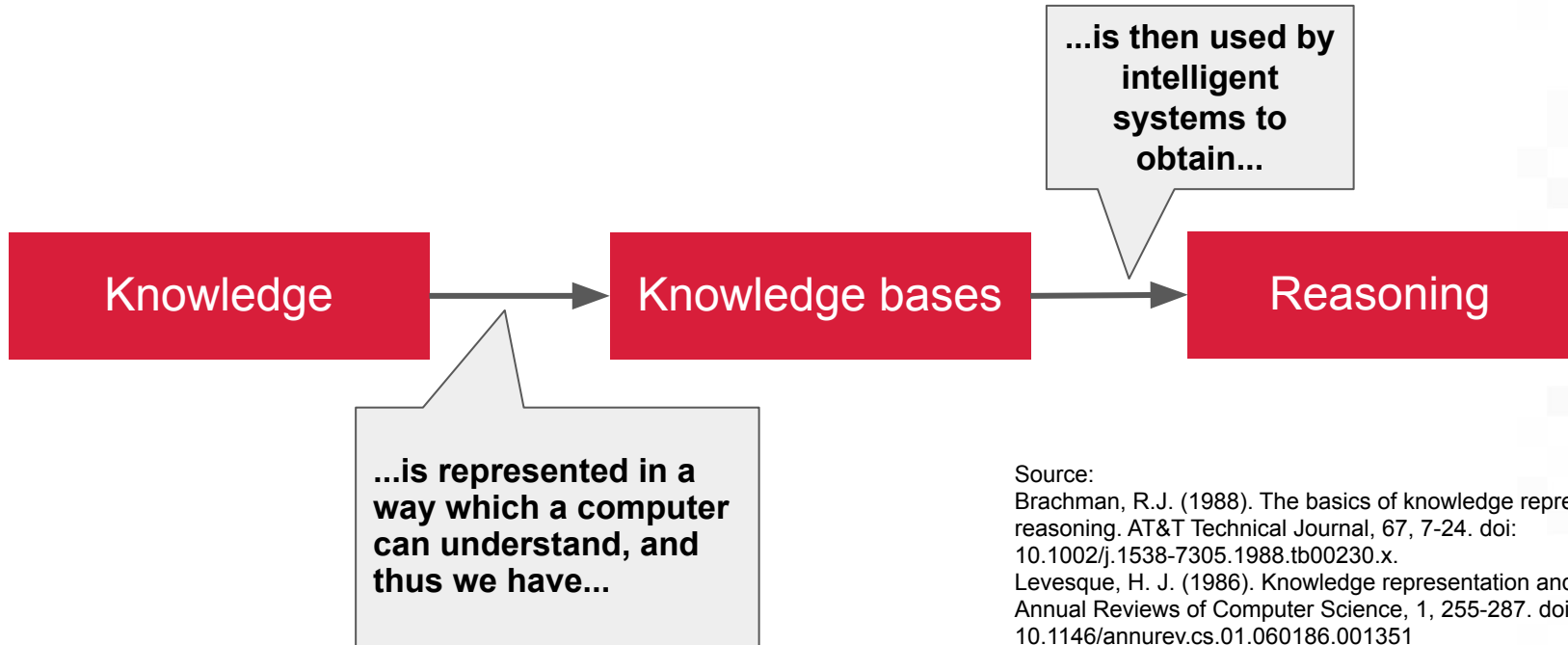


Source:

Brachman, R.J. (1988). The basics of knowledge representation and reasoning. AT&T Technical Journal, 67, 7-24.

Levesque, H. J. (1986). Knowledge representation and reasoning. Annual Reviews of Computer Science, 1,

How knowledge representation and reasoning works



Source:

Brachman, R.J. (1988). The basics of knowledge representation and reasoning. AT&T Technical Journal, 67, 7-24. doi: 10.1002/j.1538-7305.1988.tb00230.x.
 Levesque, H. J. (1986). Knowledge representation and reasoning. Annual Reviews of Computer Science, 1, 255-287. doi: 10.1146/annurev.cs.01.060186.001351

Big Data



500M

of tweets are sent



4PB

*of data created by
Facebook Including
350m photos & 100m hours
of video watch time*



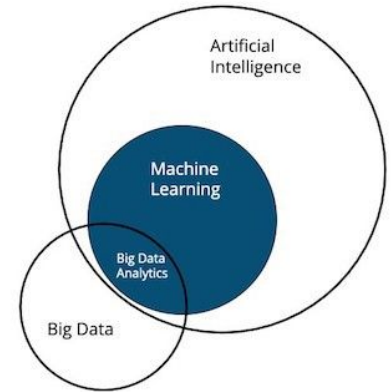
65BN

*of messages
sent over Whatsapp*



3.5BN

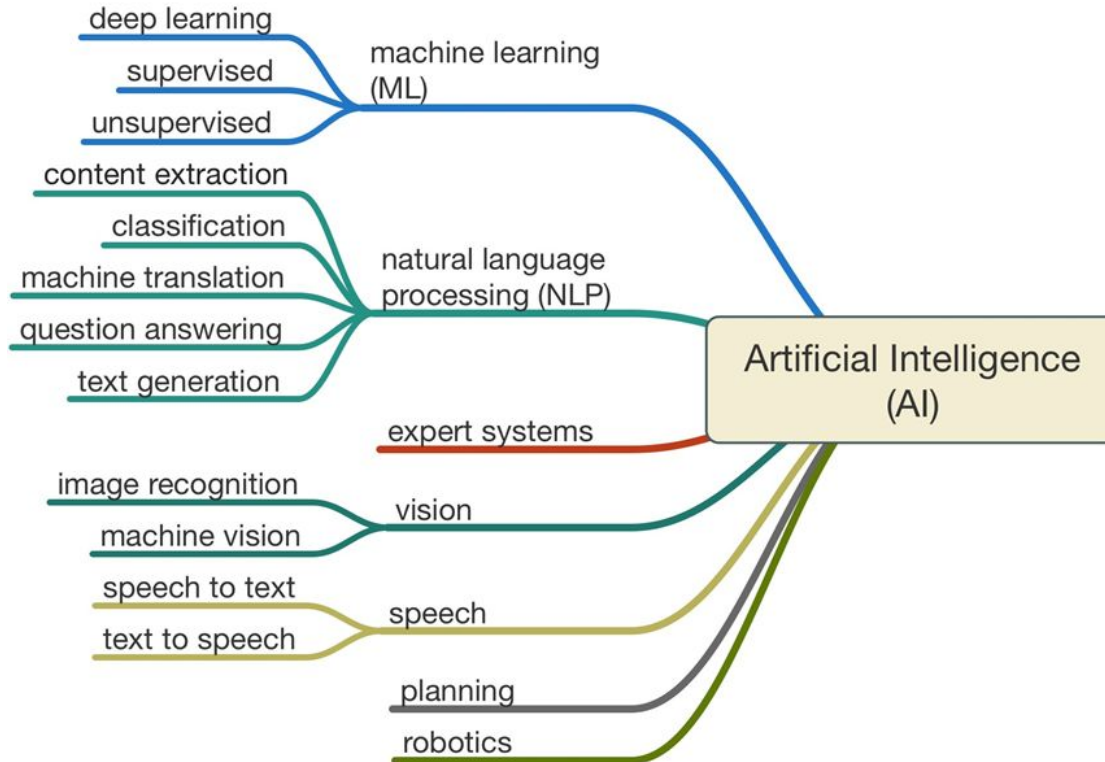
*Searches made
a day from Google*



Basic Concepts of AI

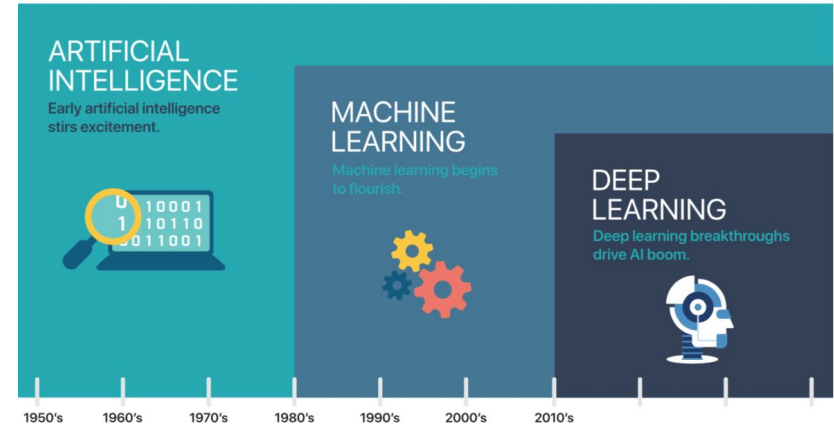
Branches of AI: Machine Learning

Branches of AI

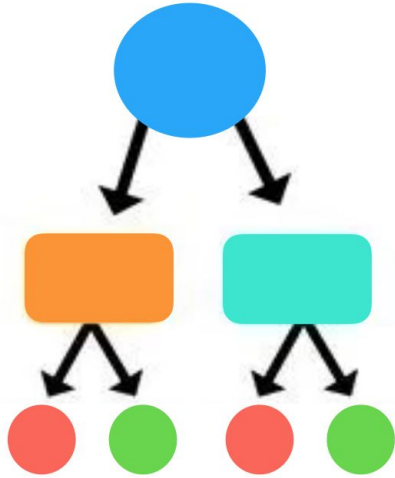


Machine Learning

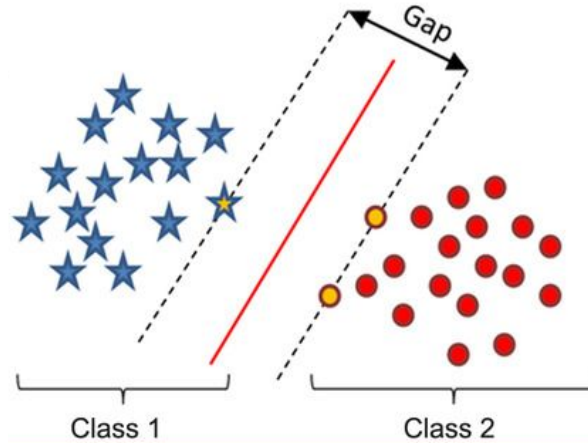
- **Get structural description / model from data analysis, then use it predict on future unknown data**
- **Structural description/model has different forms**
 - Decision tree
 - Support Vector Machine
 - K-means clustering and others
- **Data scientist use different methods on different domains**



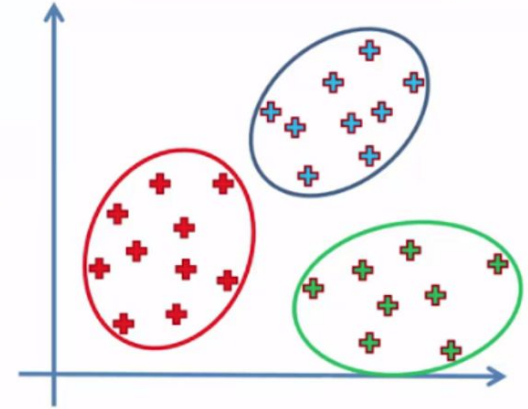
Machine Learning Models



Decision Tree



Support Vector Machine

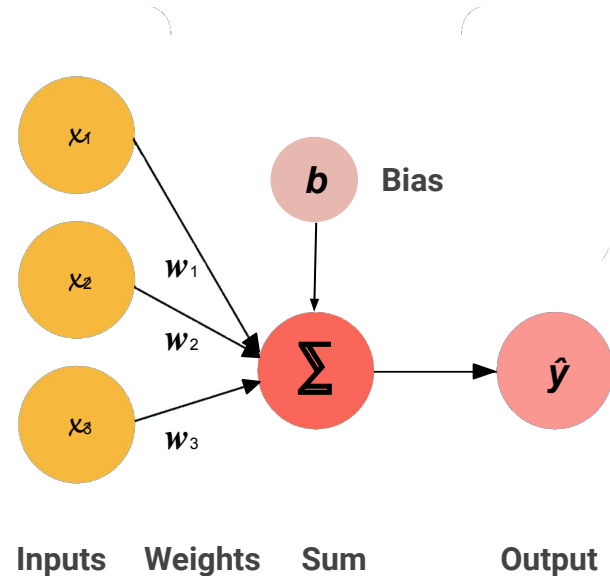
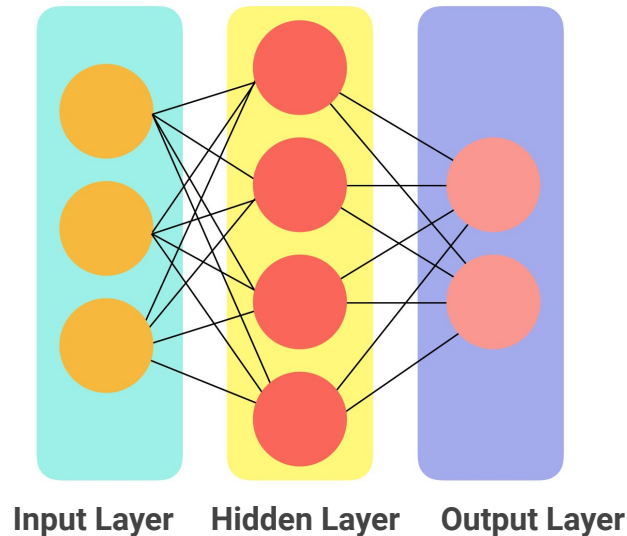


K means clustering

Neural Networks

Neural Network is a computational learning network that aims to understand the underlying relationships between data input and desired output. It mimics the way human brain works.

- **Input Layer:** load and store raw input data
- **Hidden Layer:** contained learned information of the raw training data
- **Output Layer:** get prediction from the network



Basic Concepts of AI

Branches of AI: Computer Vision and
Natural Language Processing

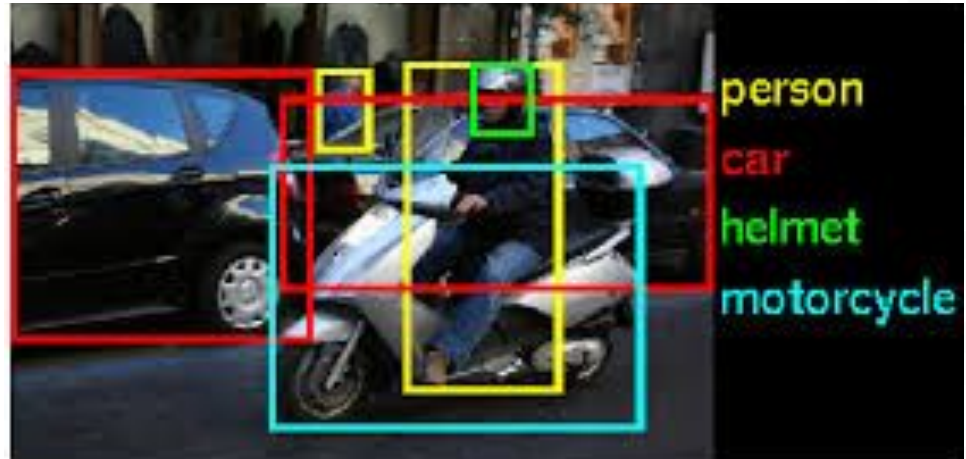
Computer Vision

Goal:

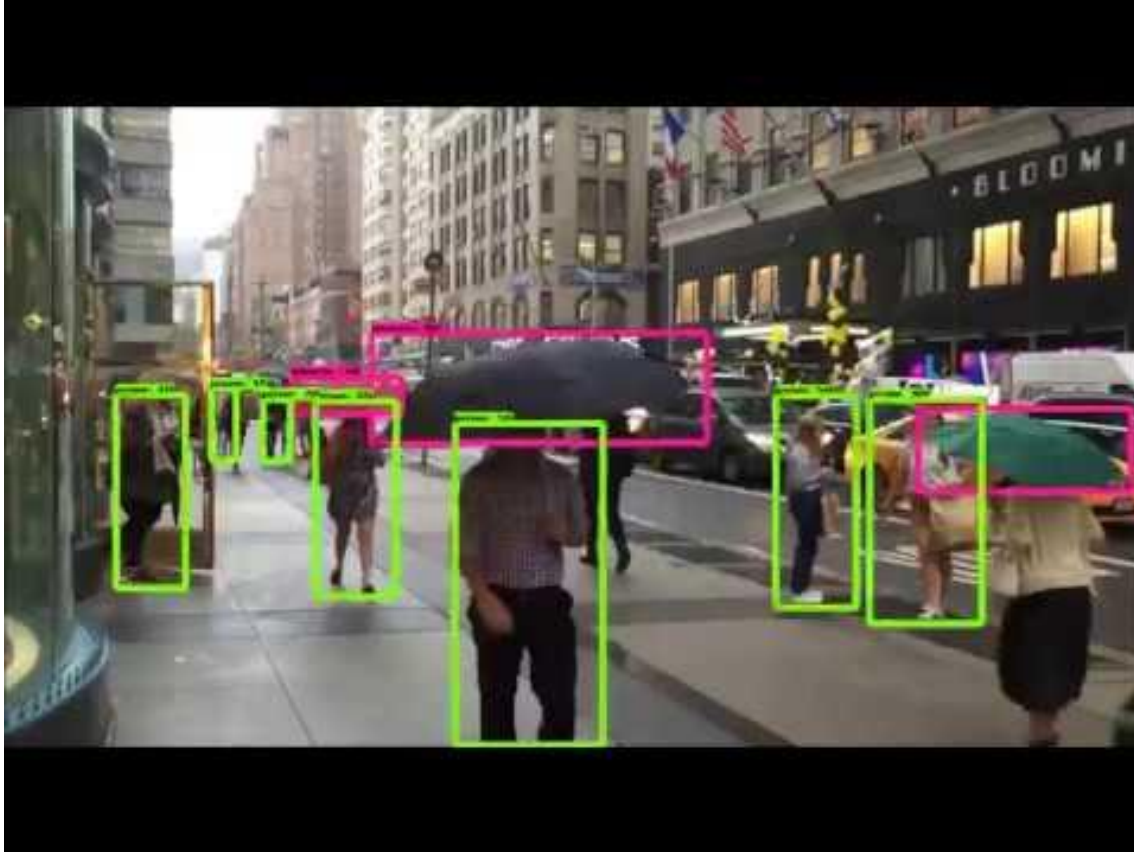
To **understand** the scene of features in **images** of the real world

Tasks:

- Object recognition and categorization
- Tracking and visual servoing
- Understanding human behavior
- Contextual scene understanding



Computer Vision - Object Detection & Recognition

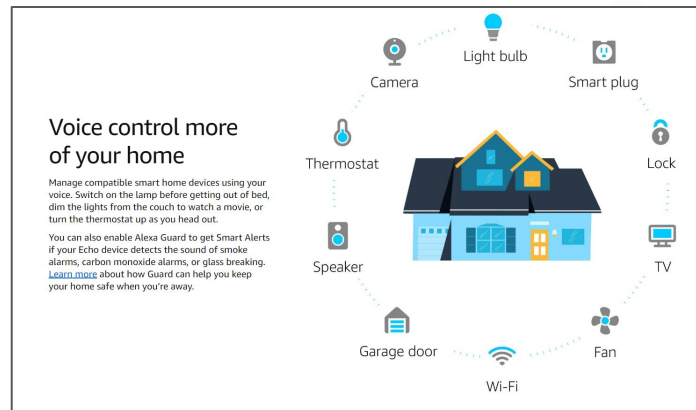
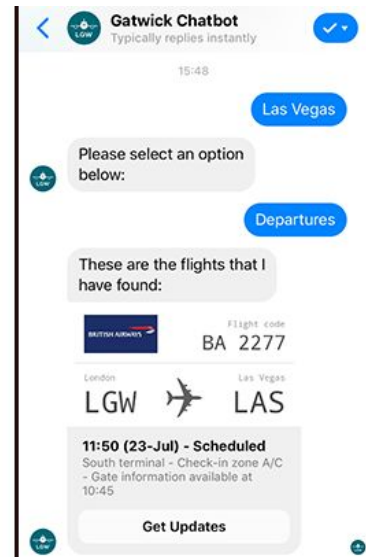


Natural Language Processing

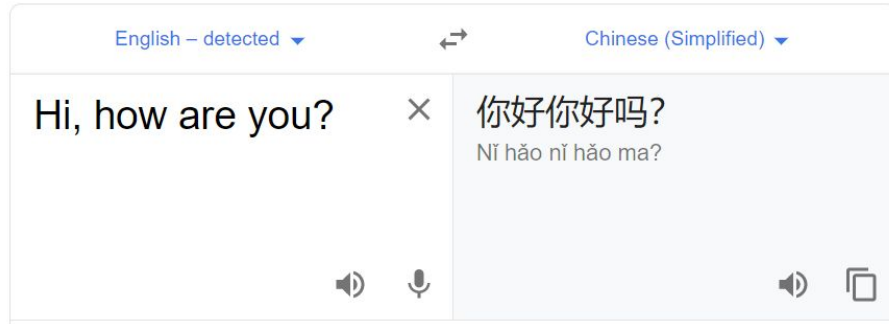
Goal: To achieve human-like
comprehension of texts/languages

Tasks:

- Speech recognition
- Machine translation
- Text summarization
- Text generation
- Text-to-speech/Speech-to-text conversion



Natural Language Processing

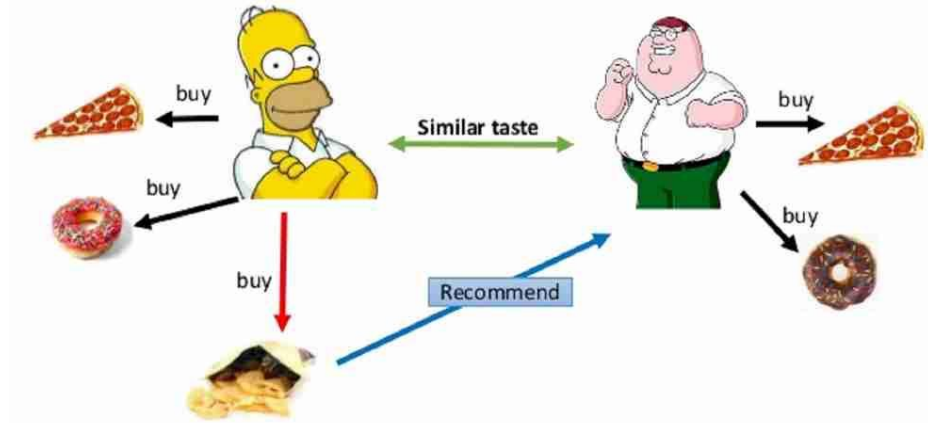
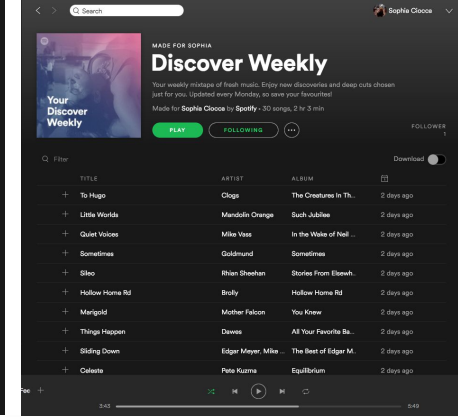
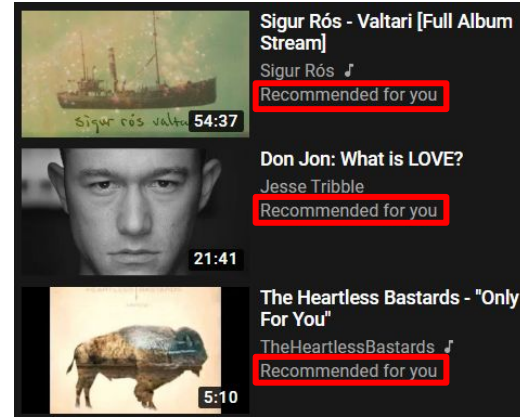


Recommender System

Goal: Content/product recommendation and ranking

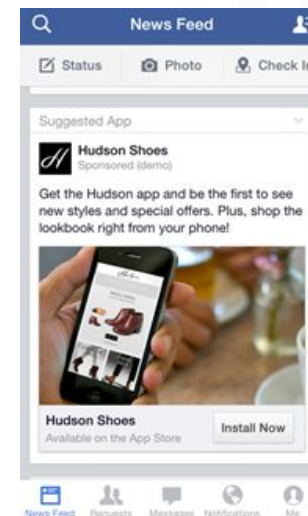
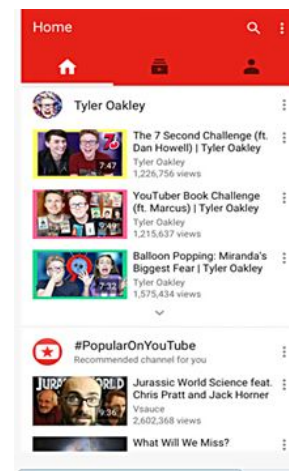
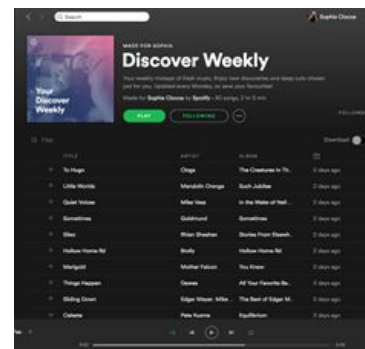
Towards personalisation

- Online advertising
- Item recommendations



Recommender System

Discover and **suggest** products and content from user's **tracks of history**



Thank You

