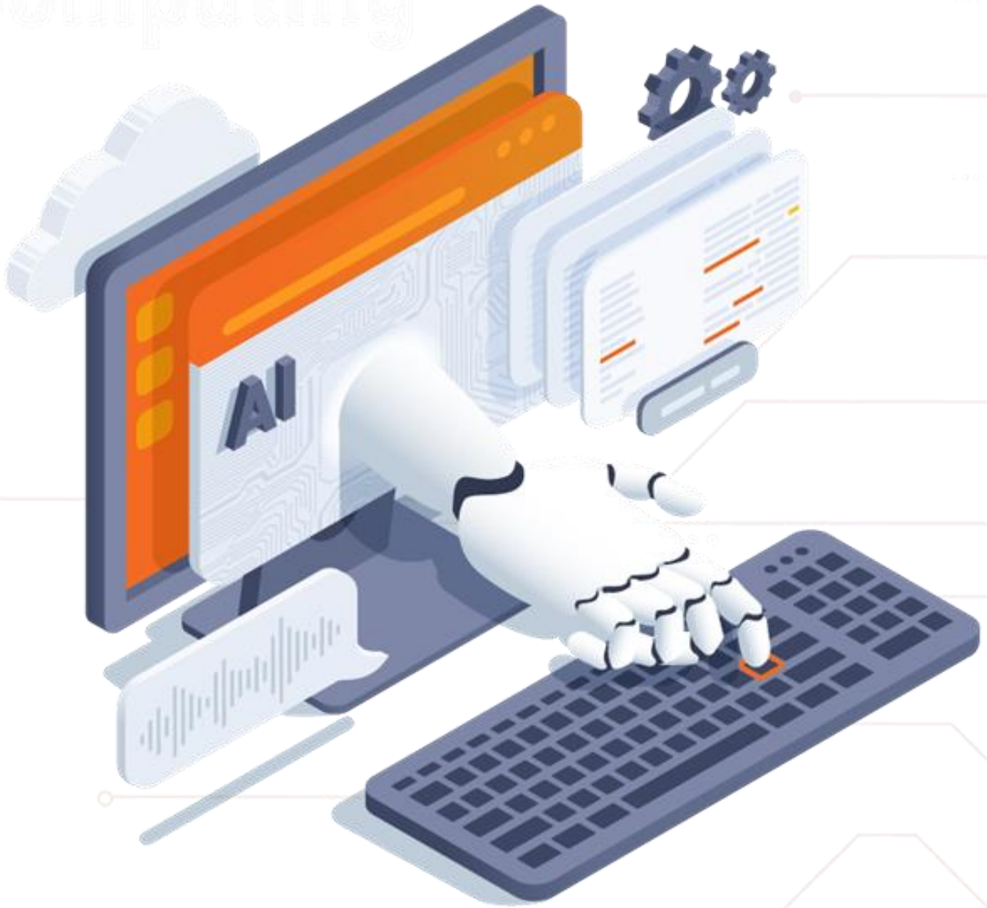


Caltech | Center for Technology & Management Education

Introduction to Machine Learning

Powerd by simplilearn

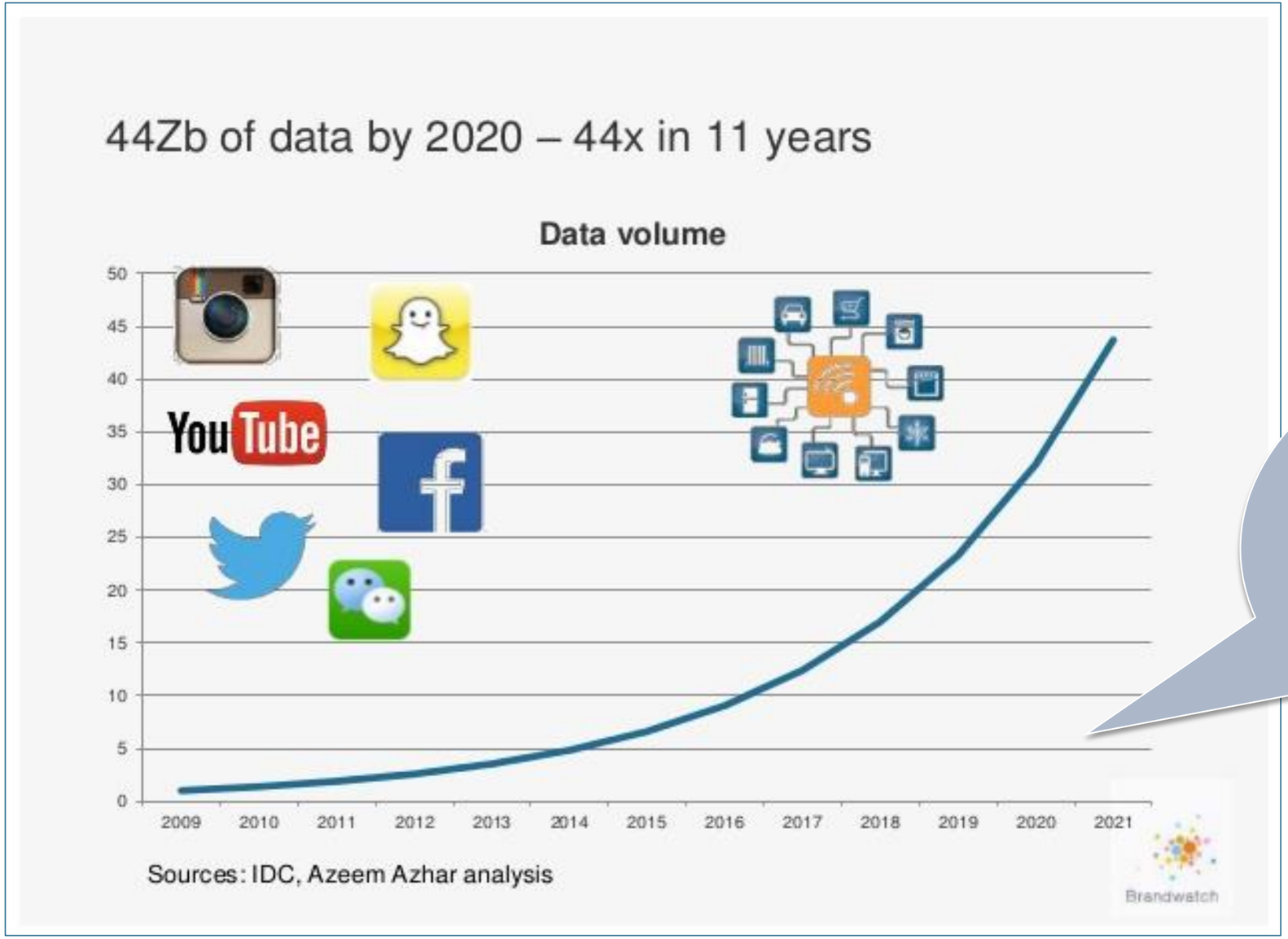
Learning Objectives

By the end of this lesson, you will be able to:

- Define Artificial Intelligence (AI) and understand its relationship with data
- Explain Machine Learning (ML) and understand its relationship with Artificial Intelligence and Data Science
- Understand Machine Learning approaches
- Identify the applications of Machine Learning

Emergence of Artificial Intelligence

Data Economy



Data explosion has given rise to a new economy, and there is a constant battle for ownership of data between enterprises to derive benefits from it.

Emergence of Artificial Intelligence

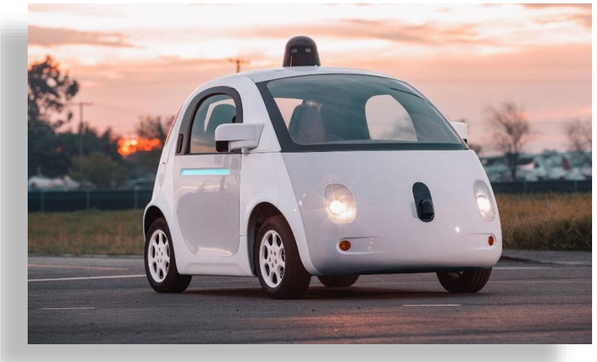
Science associated with data is moving towards a new paradigm where machines can be taught to learn from data and derive insights to develop Artificial Intelligence.

Definition of Artificial Intelligence

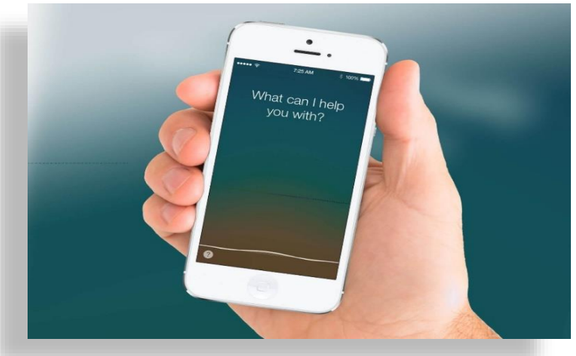
Artificial Intelligence refers to intelligence displayed by machines that simulate human and animal intelligence.

Artificial Intelligence in Practice

AI is redefining industries by providing greater personalization to users and automating processes.

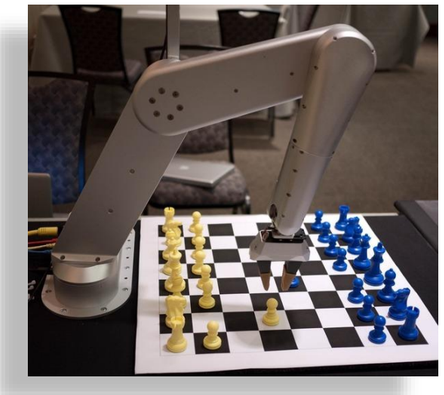


Self-driving cars



Siri (iPhone)

Google's AlphaGo



Chess

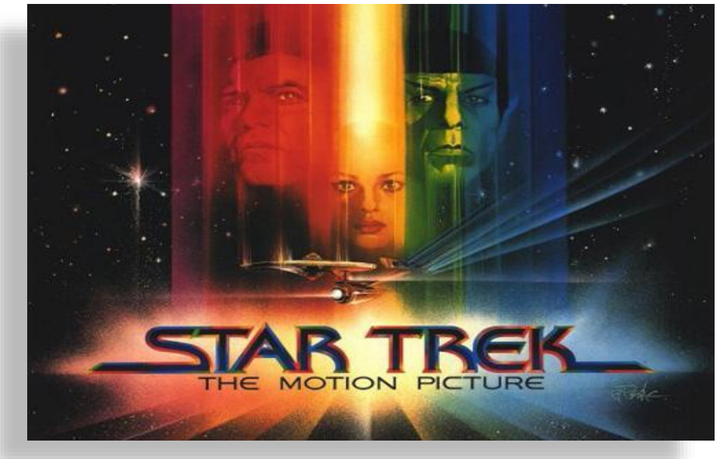
Amazon ECHO

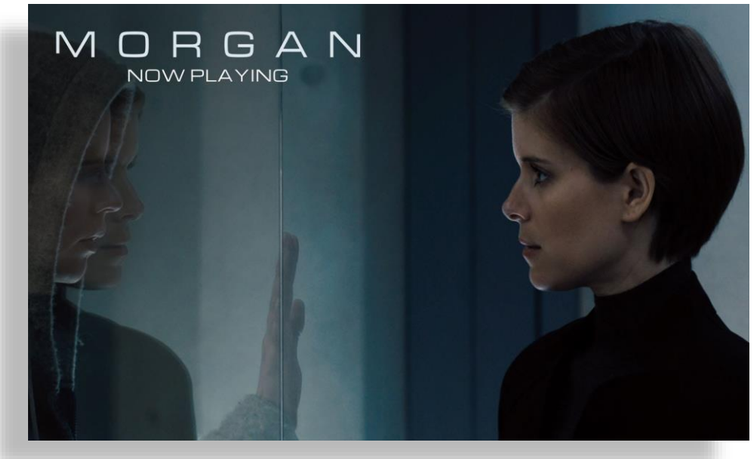
Concierge robot from IBM Watson

Sources: documentarytube, wired, Quora

Sci-Fi Movies with the Concept of AI

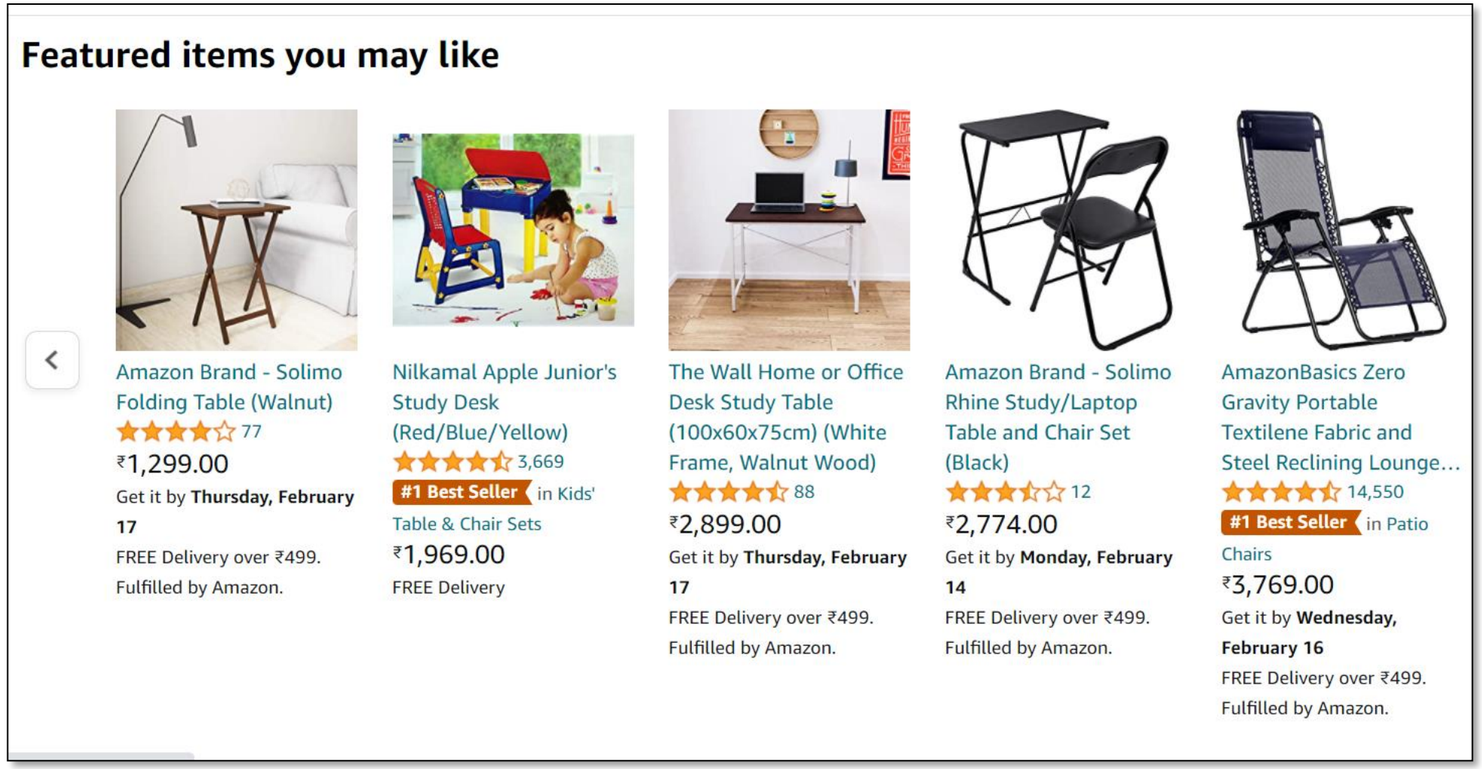
Few AI films spanned through the decades reflect our everchanging spectrum of emotions regarding the machines we have created.





Data Facilitates in Recommendations

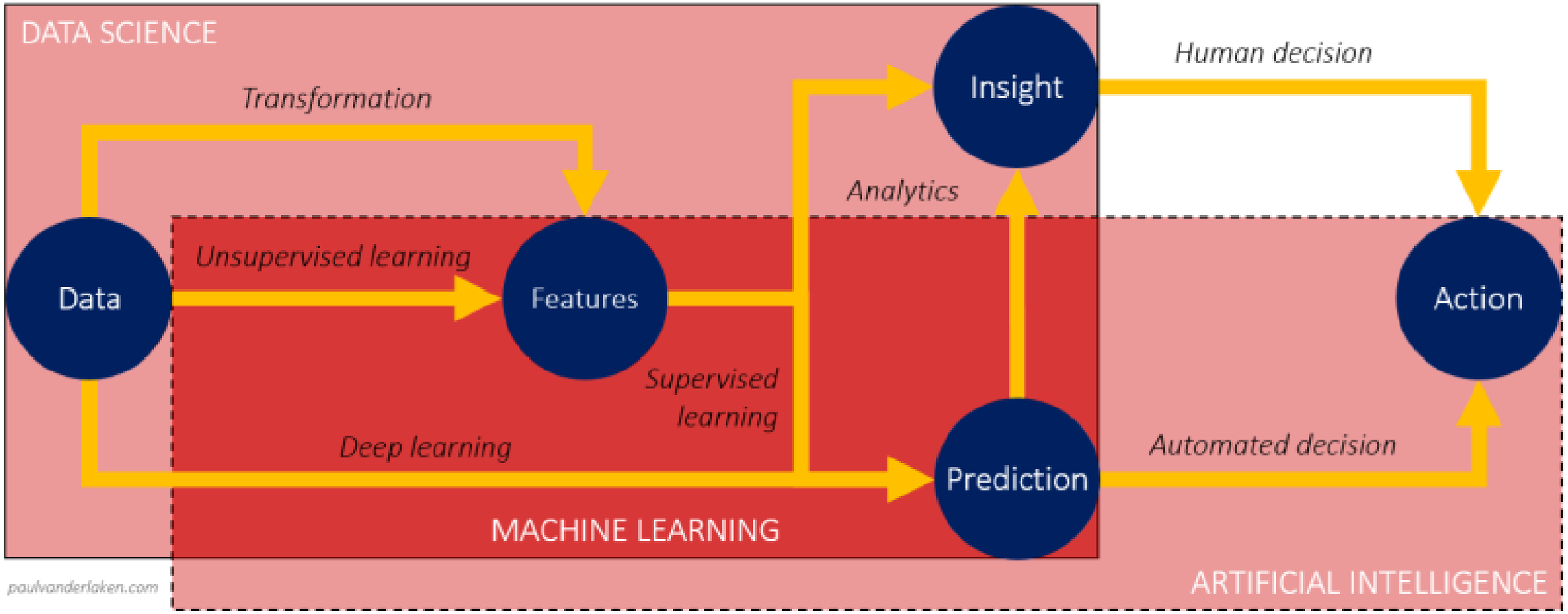
Amazon collects data from users and recommends the best products according to the user's buying or shopping pattern.



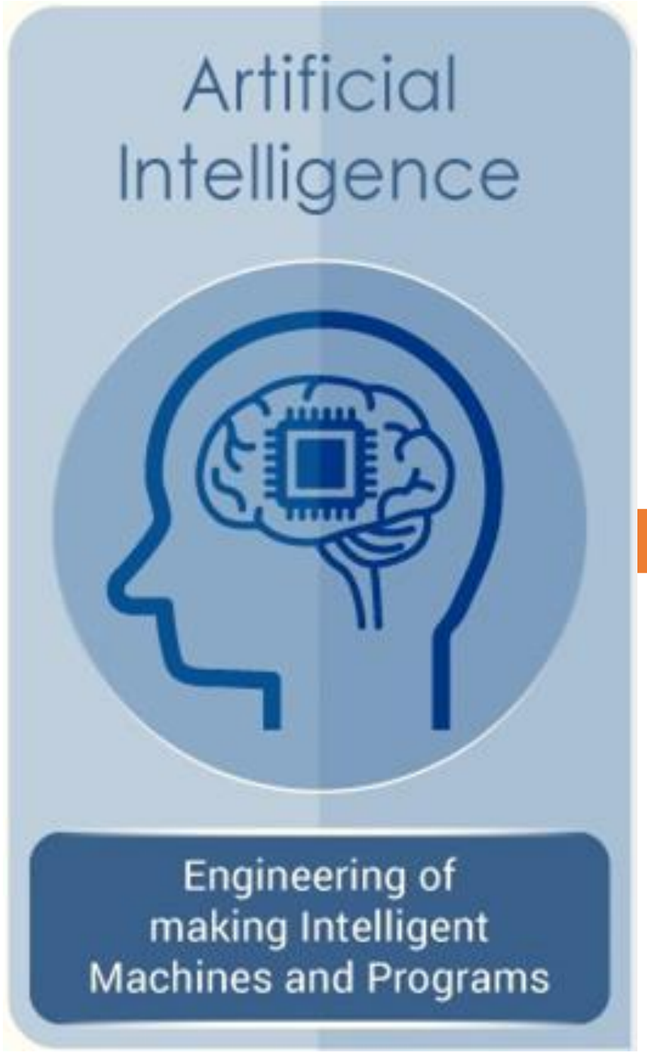
Relationship Between AI, ML, and Data Science

Relationship Between Artificial Intelligence, Machine Learning, and Data Science

Even though the terms Data Science, Machine Learning, and Artificial Intelligence (AI) fall in the same domain and are connected to each other, they have their specific applications and meaning.



Relationship Between Artificial Intelligence and Machine Learning



> Machine Learning is a subset of Artificial Intelligence that is based on the idea that machines can be given access to data along with the ability to learn from it.

Definition of Machine Learning

> The capability of Artificial Intelligence systems to learn by extracting patterns from data is known as Machine Learning.

Features of Machine Learning

01

It uses data to detect patterns in datasets and adjust program actions accordingly.

It focuses on the development of computer programs that can teach themselves to grow and change when exposed to new data.

02

03

It enables computers to find hidden insights using iterative algorithms without being explicitly programmed.

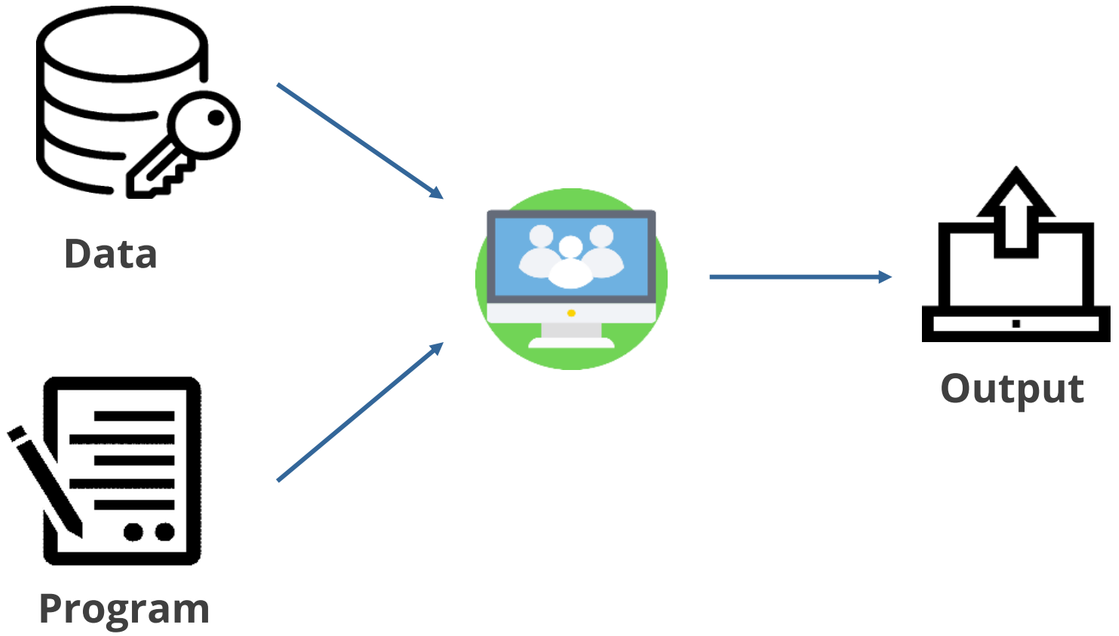
It automates analytical model building.

04

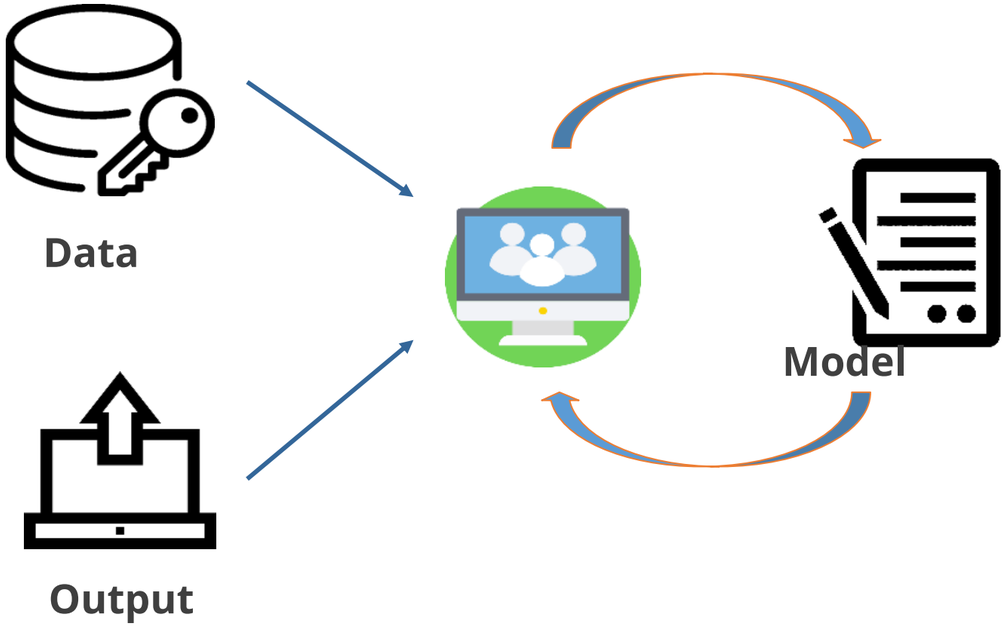
Machine Learning Approach

Traditional Approach vs. Machine Learning Approach

Traditional Programming: Data and program is run on the computer to produce the output.

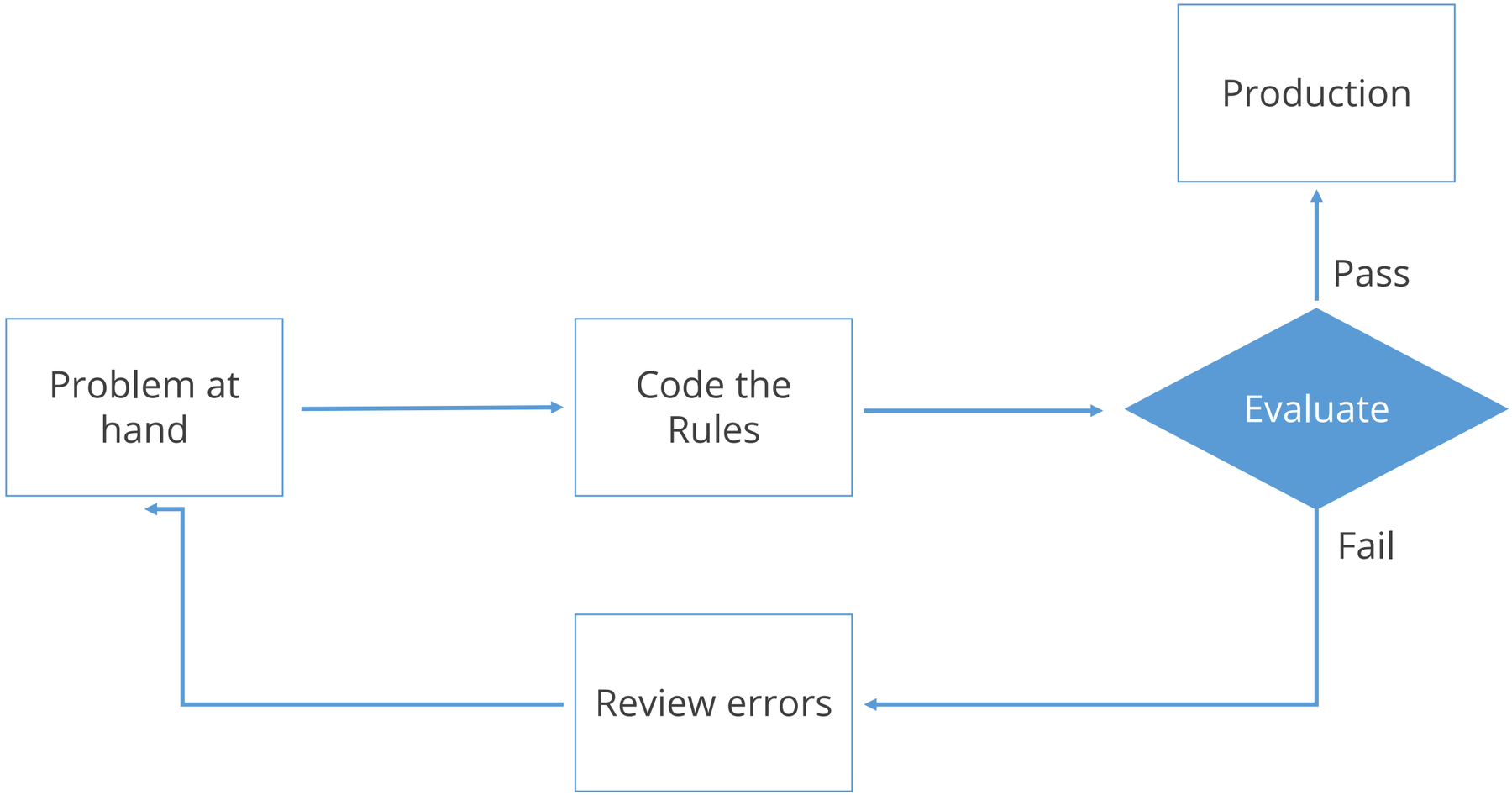


Machine Learning: Data and output is run on the computer to create a program.



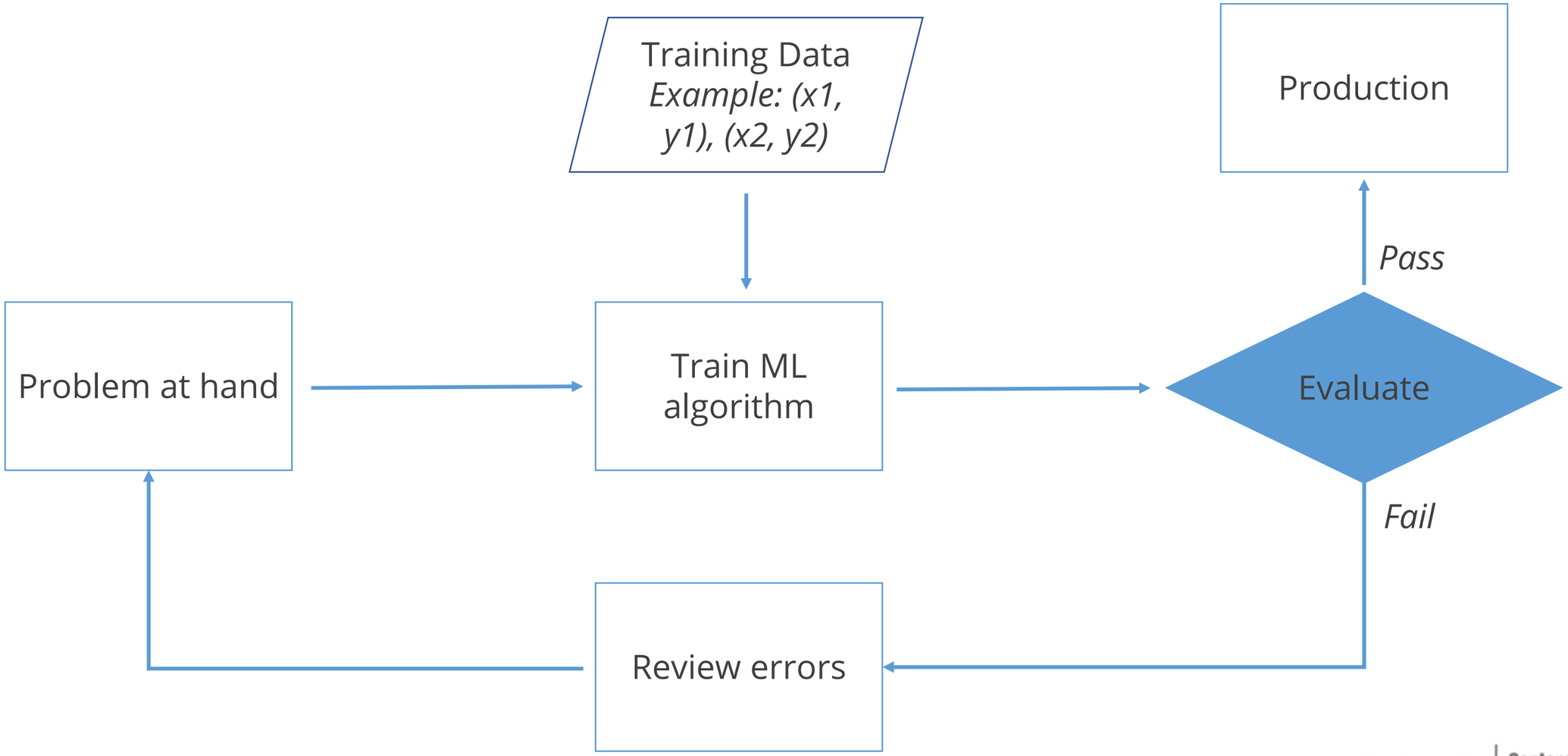
Traditional Approach

Traditional programming relies on hard-coded rules.



Machine Learning Approach

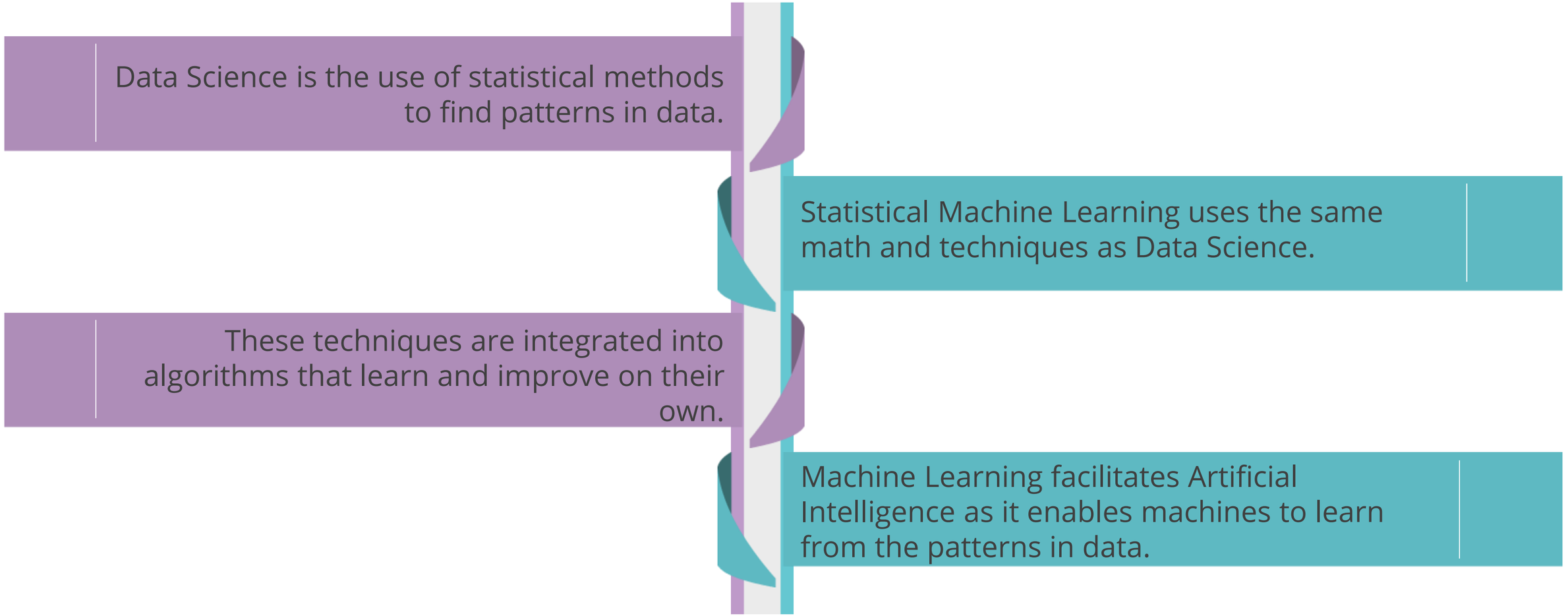
Machine Learning relies on learning patterns based on sample data.



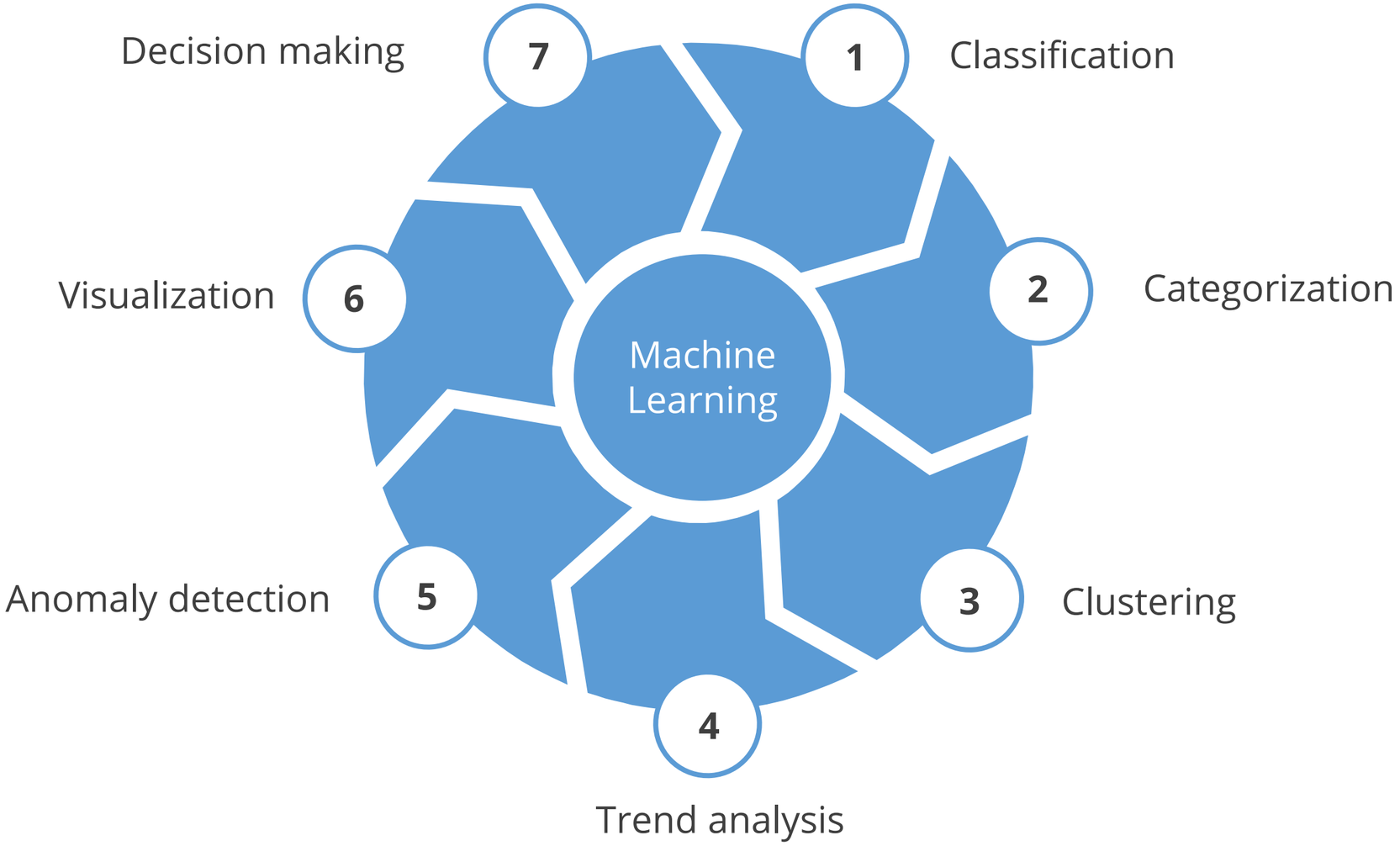
Relationship Between Machine Learning and Data Science

Data Science and Machine Learning go hand in hand. Data Science helps evaluate data for Machine Learning algorithms.

Relationship Between Machine Learning and Data Science

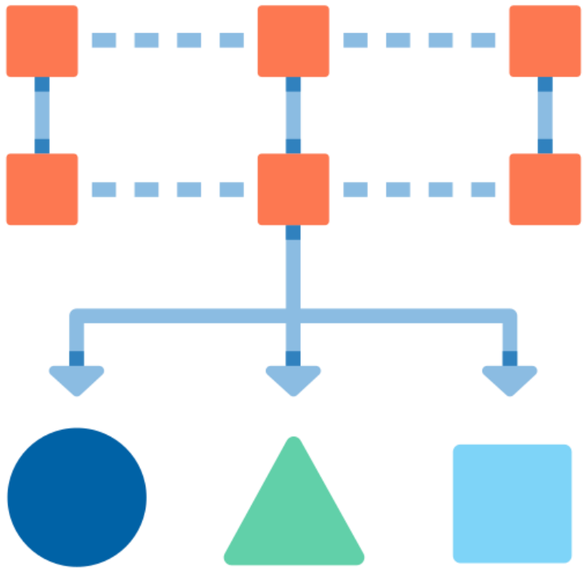


Machine Learning Techniques



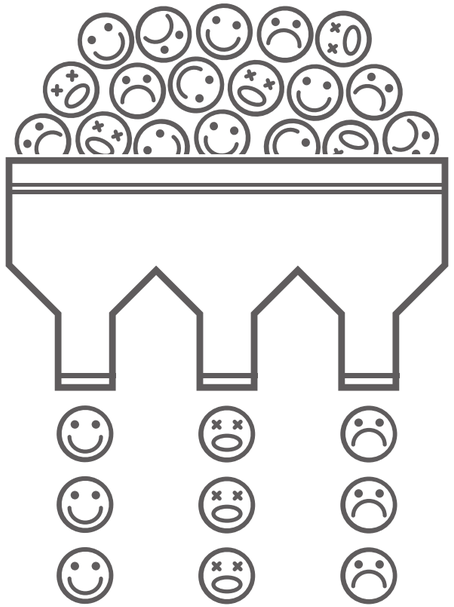
Machine Learning Techniques

Classification is a technique in which the computer program learns from the given data and uses it to classify new observations.



Machine Learning Techniques

Categorization is a technique of organizing data into categories for its most effective and efficient use.



Machine Learning Techniques

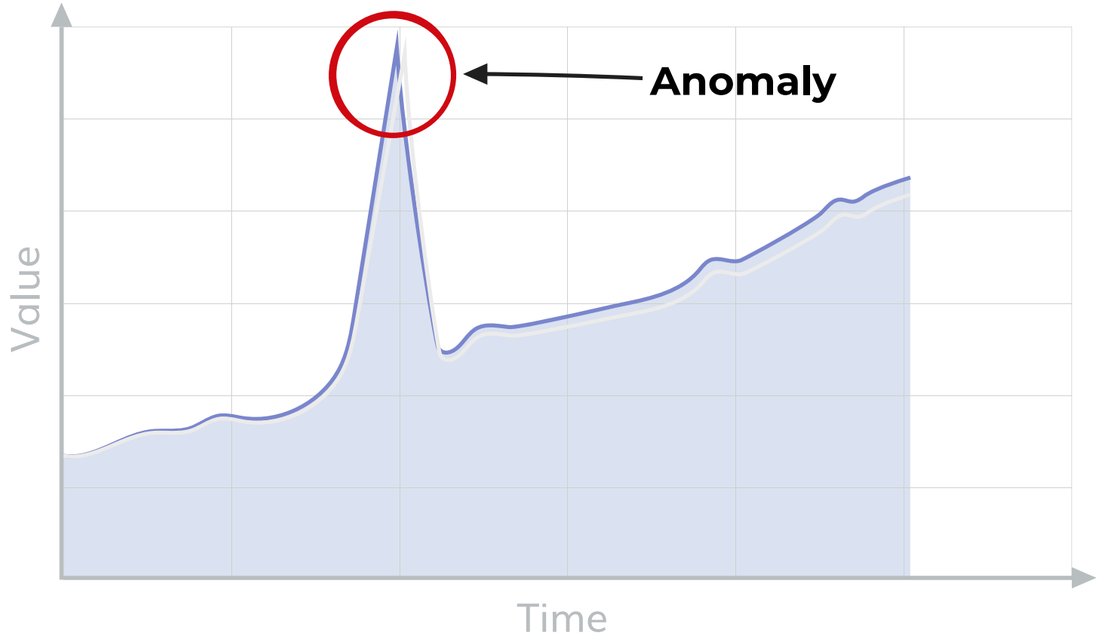
Clustering involves grouping objects in such a way that those in the same group are more similar to each other than those in other groups.

Machine Learning Techniques

Trend analysis is a technique aimed at projecting both current and future movement of events by using time series data analysis.

Machine Learning Techniques

Anomaly detection is a technique to identify cases that are unusual within homogeneous data.

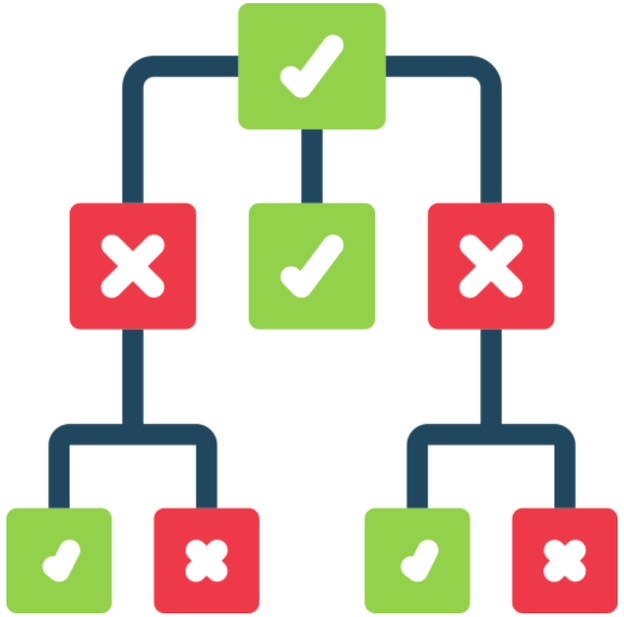


Machine Learning Techniques

Visualization is a technique to present data in a graphical format. It enables decision-makers to see analytics presented visually.

Machine Learning Techniques

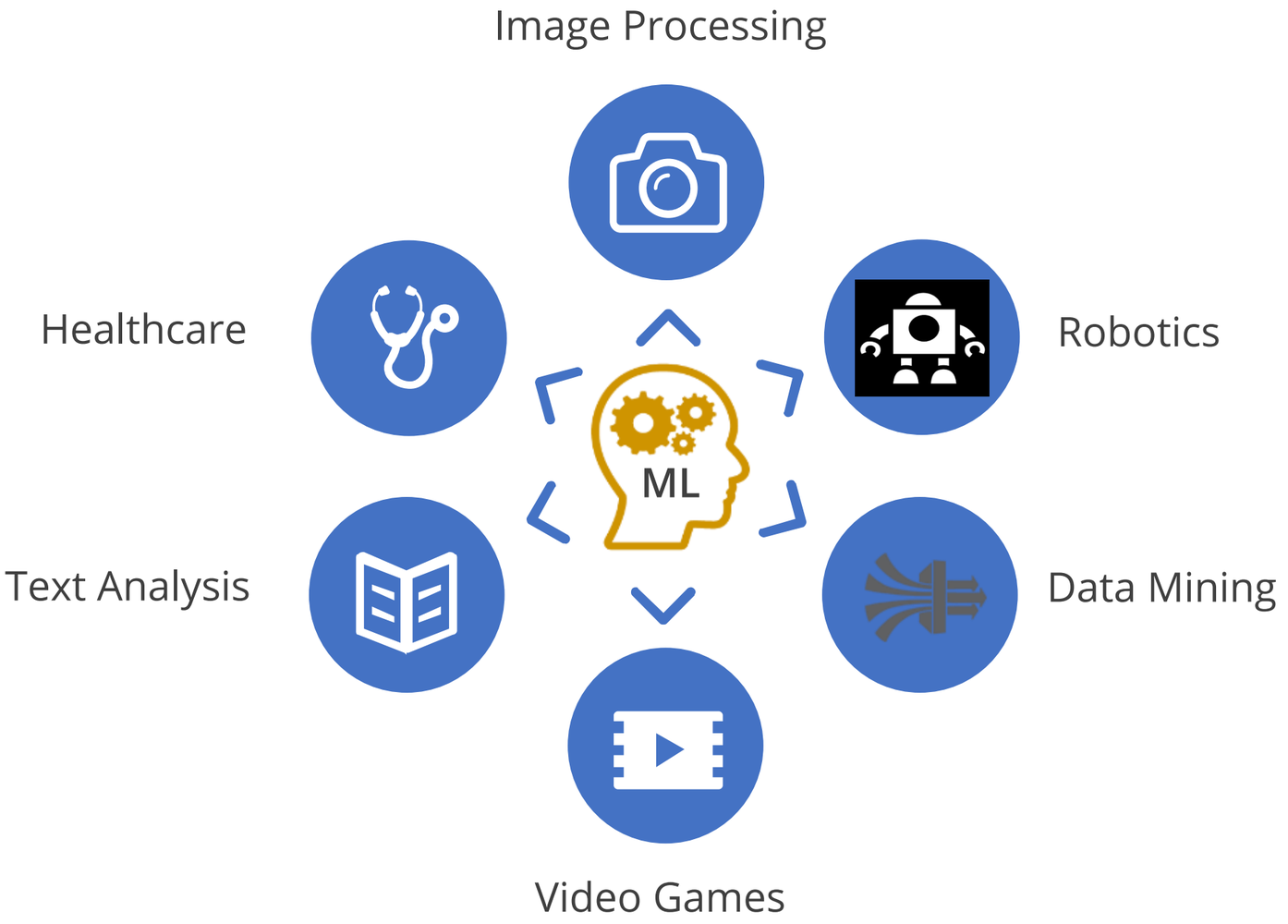
Decision making is a technique or skill which provides you with the ability to influence managerial decisions with data as the evidence.



Applications of Machine Learning

Applications of Machine Learning

Artificial Intelligence and Machine Learning are being increasingly used in various functions such as:



Applications of Machine Learning

Image Processing

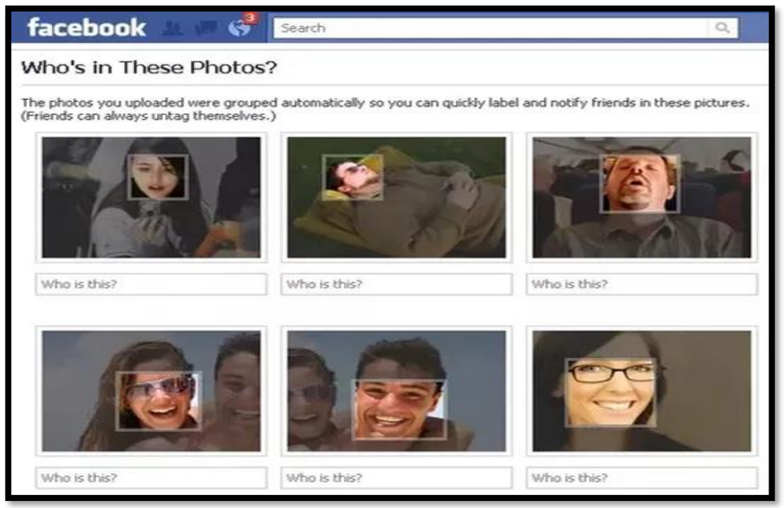
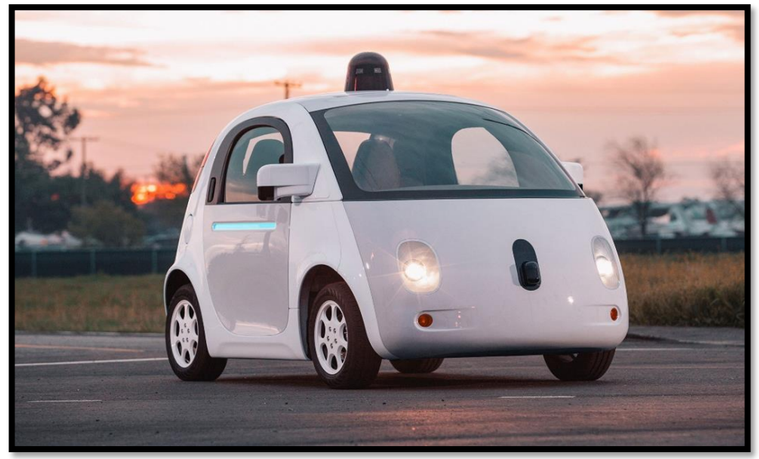


Image tagging and recognition

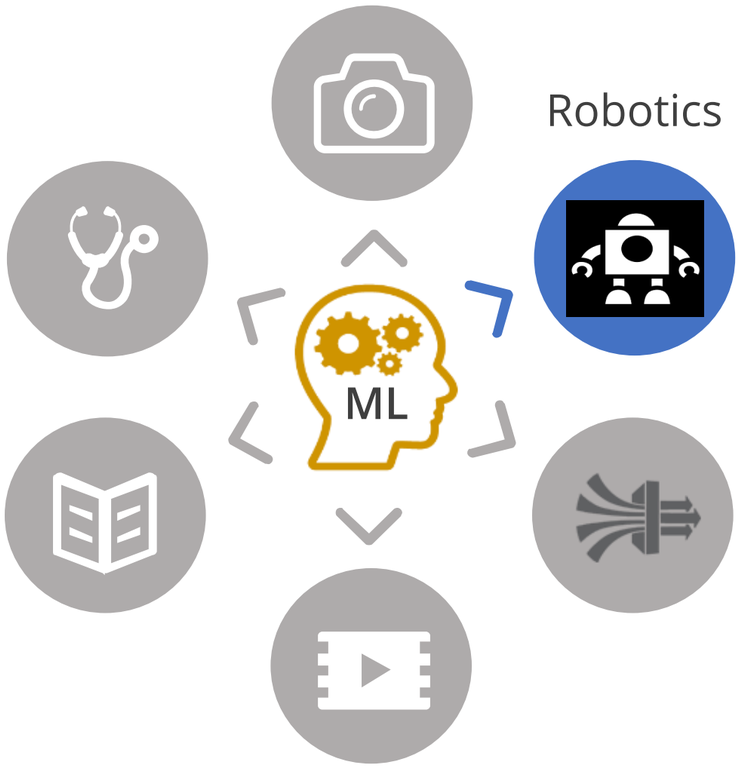
Optical Character Recognition (OCR)



Self-driving cars

Sources: Quora, documentarytube, Wikipedia

Applications of Machine Learning



Human simulation

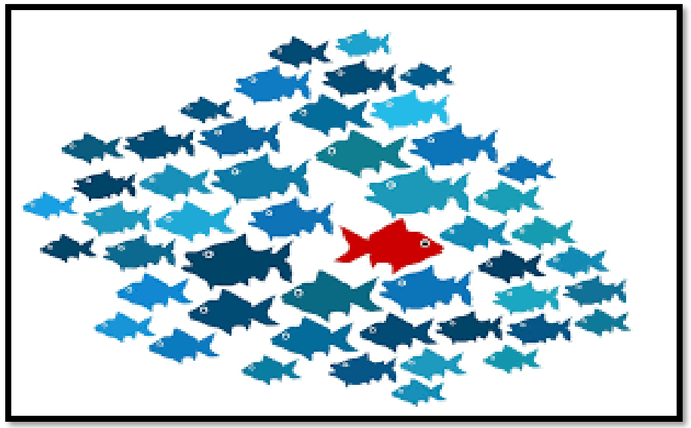
Humanoid Robot

Industrial robotics

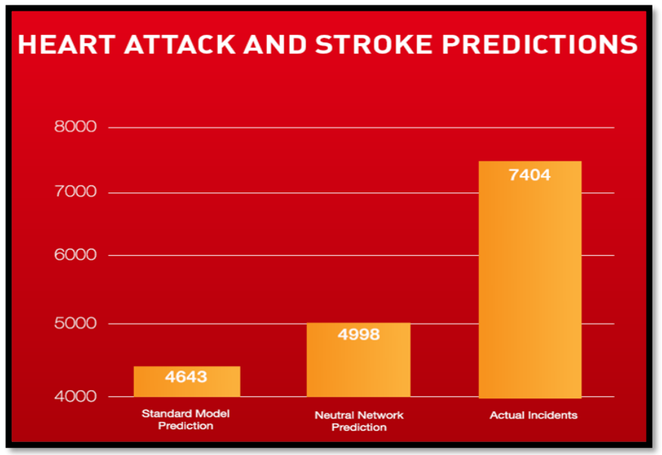
Sources: uiowa.edu, LinkedIn, Hilton

Applications of Machine Learning

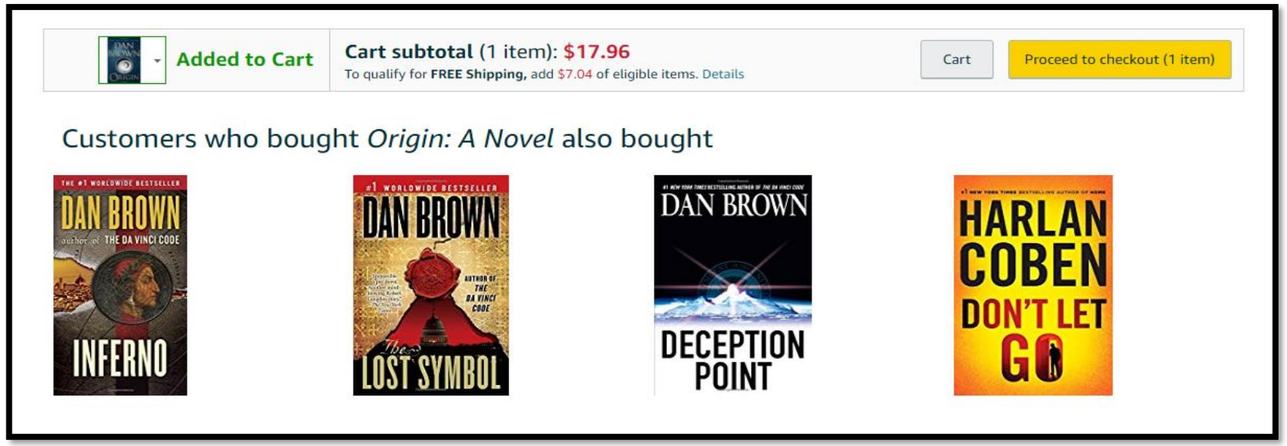
Data Mining



Anomaly detection



Grouping and Predictions



Association rules

Sources: dbta, Futurism

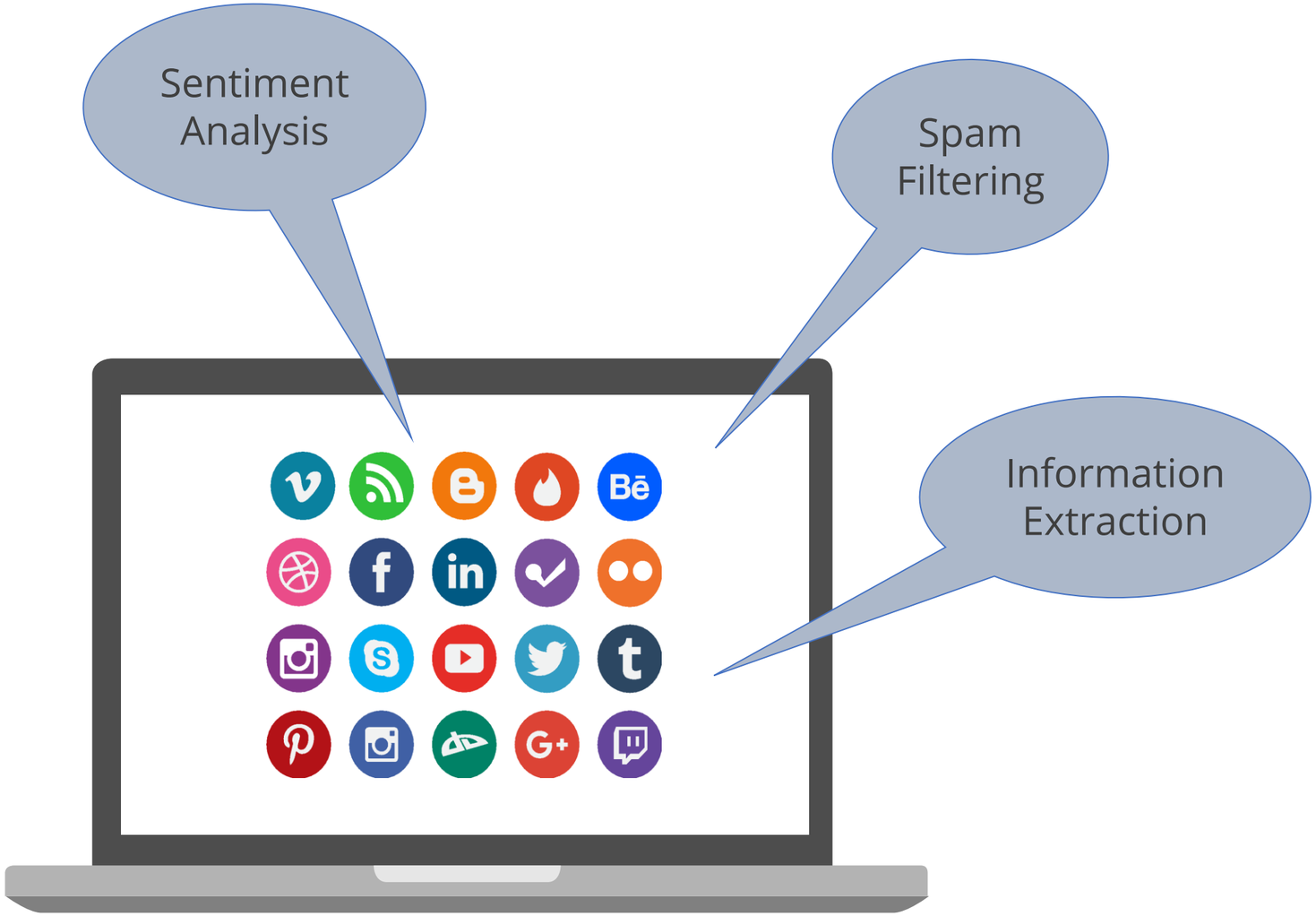
Applications of Machine Learning

Video Games

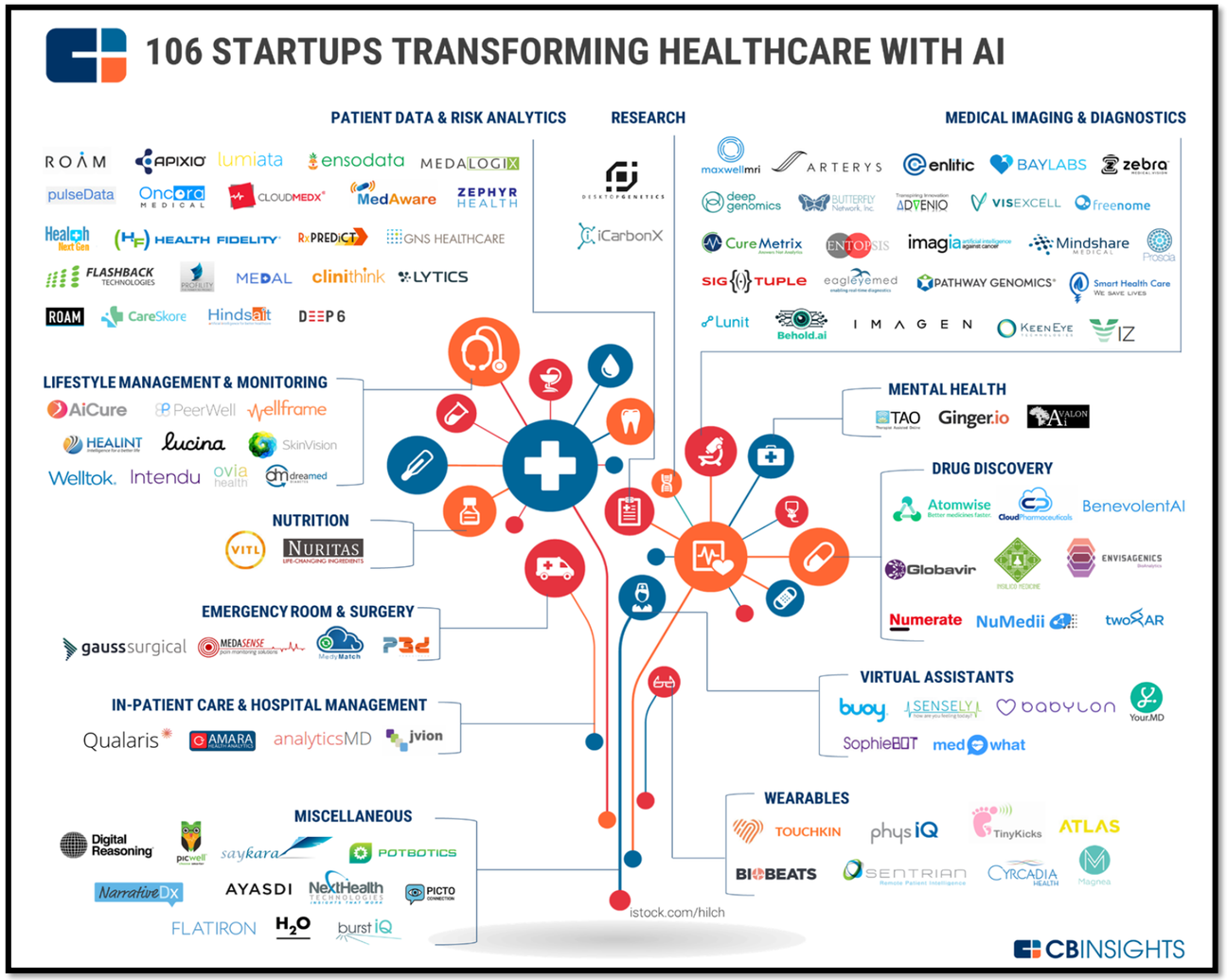
Some games implement reinforcement learning

Sources: Quora

Applications of Machine Learning



Applications of Machine Learning



Source: cbinsights

Knowledge Check

Knowledge Check

1

Machine Learning is _____

A. An autonomous acquisition of knowledge through the use of algorithms

B. An autonomous acquisition of knowledge through the use of manual programs

C. A selective acquisition of knowledge through the use of computer programs

D. A selective acquisition of knowledge through the use of manual programs

Knowledge Check

1

Machine Learning is _____

A. An autonomous acquisition of knowledge through the use of algorithms

B. An autonomous acquisition of knowledge through the use of manual programs

C. A selective acquisition of knowledge through the use of computer programs

D. A selective acquisition of knowledge through the use of manual programs

The correct answer is **A**

Machine learning is an autonomous acquisition of knowledge through the use of algorithms.

Knowledge Check

2

What is the difference between traditional programming and machine learning?

A. Traditional programming is based on permutations and combinations, whereas machine learning uses traditional analytics.

B. Traditional programming considers output of the program to generate code, whereas machine learning uses data and program to generate output.

C. Traditional programming uses software programs, whereas machine learning uses hardware solutions.

D. Traditional programming uses hard-coded rules to make decisions, whereas machine learning learns from data.

Knowledge Check

2

What is the difference between traditional programming and machine learning?

A. Traditional programming is based on permutations and combinations, whereas machine learning uses traditional analytics.

B. Traditional programming considers output of the program to generate code, whereas machine learning uses data and program to generate output.

C. Traditional programming uses software programs, whereas machine learning uses hardware solutions.

D. Traditional programming uses hard-coded rules to make decisions, whereas machine learning learns from data.

The correct answer is **D**

Traditional programming uses hard-coded rules to make decisions, whereas machine learning learns from data.

Key takeaways

- The explosion of data has given rise to a new economy known as the data economy.
- AI refers to the intelligence in machines that simulates human intelligence.
- The capability of AI systems to learn by extracting patterns from data is known as machine learning.
- Statistical Machine Learning uses the same math and techniques as Data Science.