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# Introduction to Artificial Intelligence (AI) for Business

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# Agenda

- AI Definition
- Why AI is getting popular recently?
- AI sub-domain: Machine Learning
- AI sub-domain: Deep Learning
- Case Study

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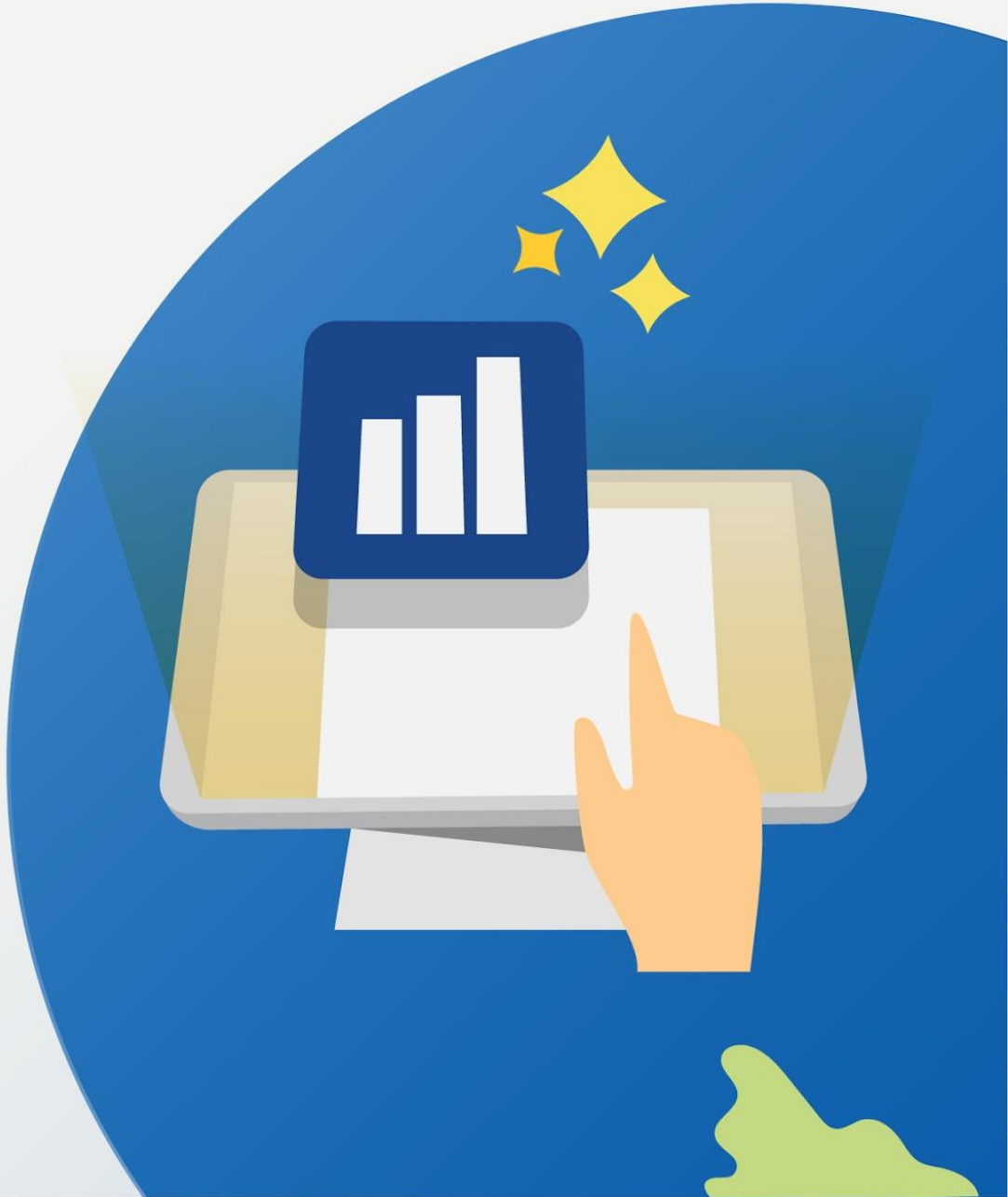
# What is Moka ?

**Moka** is a **technology company** providing cloud-based Point-of-Sale and payment solutions that empowers businesses to better sell and grow. **Moka** is currently present across **200+ cities** in Indonesia with **over 40,000 merchants**.



## VISION

To Bring Business Ecosystem to Everyone

## MISSION

Empowering Businesses to Sell and Grow

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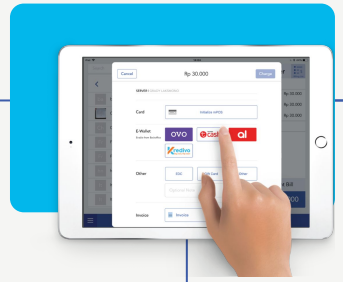
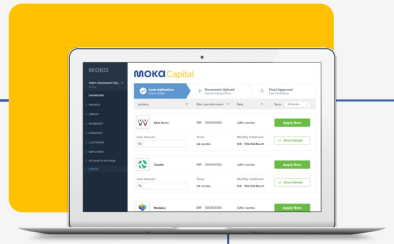
## Moka POS

Dashboard & Report
Sync Bill & Split Bill
Ingredient & Inventory
Loyalty Program
Table Management
and many more!



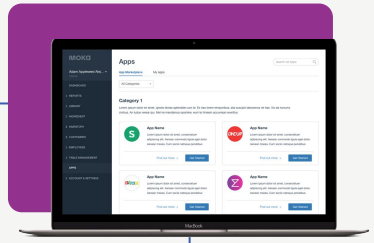
## Moka Pay

OVO
gopay
DANA
Link Aja!
akulaku
Kredivo
Buy now, Pay later



## Moka Capital

KOINWORKS
taralite
modalku



## Moka Connect

accurate
Storelogy.com
SIRCLO

# Artificial Intelligence

Computer (combination of hardware and software) generally good in doing these things:

1. Calculation
   What is 8,765 x 1,234 ?

2. Repetitive tasks

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# Artificial Intelligence

The ability of a machine to perform cognitive functions we associate with human minds, such as:

1. perceiving,
2. reasoning,
3. learning,
4. interacting with the environment,
5. problem solving,
6. exercising creativity (to some extent)

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**Algorithmic** : Programming advancements
**Exponential** : Exponential increases in computing power and storage
**Explosion** : Explosion of data

# Timeline: Why AI Now? [1/3]

**1965**
Alexey Grigorevich Ivakhnenko develops the first general working learning algorithms for supervised multilayer artificial neural networks (**ANN**s) (**Algorithmic**)

**1965**
Intel cofounder Gordon Moore notices that the number of transistors per square inch on integrated circuits has **doubled every year** since their invention (**Exponential**)

**1991**
The European Organization for Nuclear Research (CERN) begins opening up the **World Wide Web** to the public (**Explosion**)

**1805**
Adrien-Marie Legendre publishes the **least square method** for regression (**Algorithmic**)

**1986**
**Backpropagation** allows the ANN to optimize itself without human intervention (**Algorithmic**)

**1989**
Yann LeCun and others publish a paper describing convolutional neural network (**CNN**) is well suited for shape-recognition tasks (**Algorithmic**)

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**Algorithmic** : Programming advancements
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# Timeline: Why AI Now? [2/3]

**1992**
Support Vector Machines (**SVMs**) can be easily upgraded to deal with nonlinear problems by modifying kernel
(**Algorithmic**)

**1997**
**Deep Blue** won against the world chess champion
(**Exponential**)

**1998**
**PagesRank** was created by Sergey Brin and Larry Page (co-founder of Google)
(**Algorithmic**)

**1999**
NVIDIA launched Graphics Processing Unit (**GPU**)
(**Exponential**)

**2002**
Amazon launched Amazon Web Services (**AWS**)
(**Exponential**)

**2004**
Web **2.0**
(**Explosion**)

**2004**
**Facebook** launched
(**Explosion**)

**2004**
**MapReduce** created
(**Exponential**)

**2005**
**Youtube** launched
(**Explosion**)

**2005**
**One-billion** internet users
(**Explosion**)

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**Algorithmic** : Programming advancements
**Exponential** : Exponential increases in computing power and storage
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# Timeline: Why AI Now? [3/3]

**2006**
**Hadoop** invented to store and process massive datasets
(**Exponential**)

**2007**
**iPhone** was introduced and started massive data creation and consumption using mobile device
(**Explosion**)

**2009**
**Spark** introduced to overcome Hadoop's weakness
(**Exponential**)

**2010**
**Microsoft Azure and Google Cloud Storage** launched to create great cloud provider options
(**Exponential**)

**2011**
**IBM Watson** won in Jeopardy!
(**Algorithmic**)

**2012**
Facebook reached one-billion users with more than 500 TB of data
(**Explosion**)

**2017**
Electronic-device users generate 2.5 EB of data per day
(1 EB = 1M TB)
(**Explosion**)

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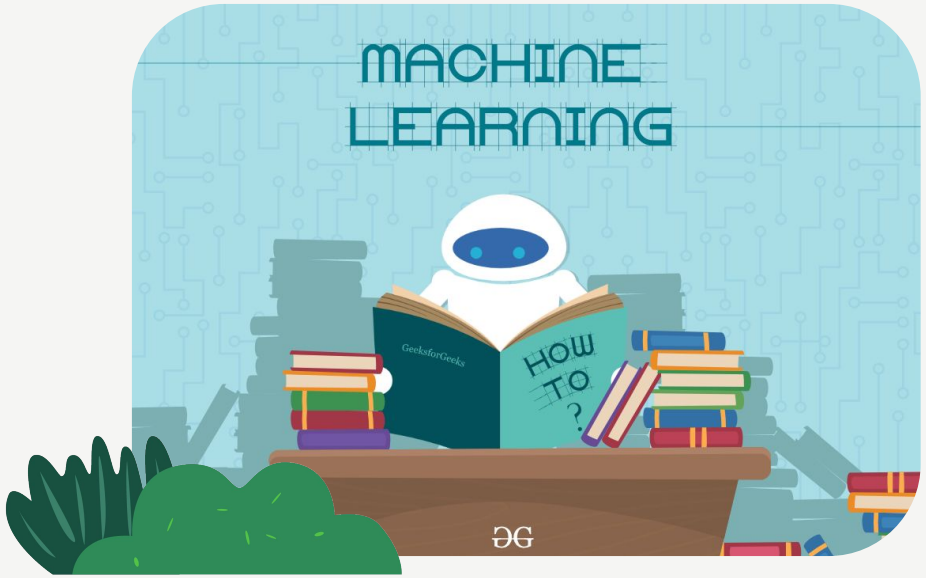
# Machine learning

Machine-learning algorithms detect patterns and learn how to make predictions and recommendations by processing data and experiences, rather than by receiving explicit programming instruction. The algorithms also adapt in response to new data and experiences to improve efficacy over time.




Types of analytics (in order of increasing complexity):

1. **Descriptive:** describe what happened; employed heavily across all industries
2. **Predictive:** anticipate what will happen; employed in data-driven organizations as a key source of insight
3. **Prescriptive:** provide recommendations on what to do to achieve goals; employed heavily by leading data and Internet companies

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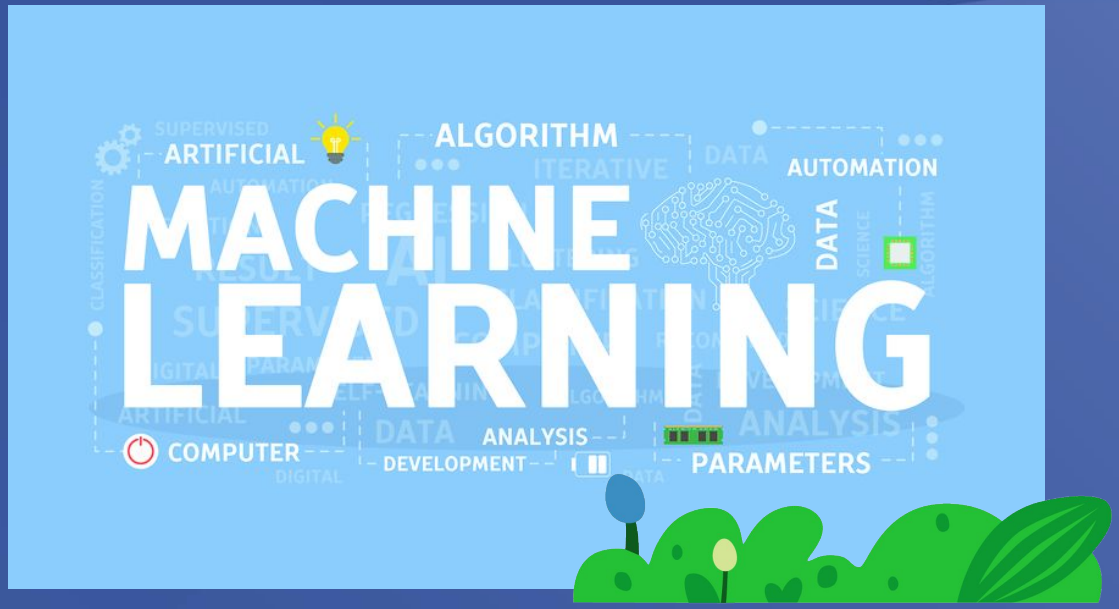
Major Types of

# Machine Learning



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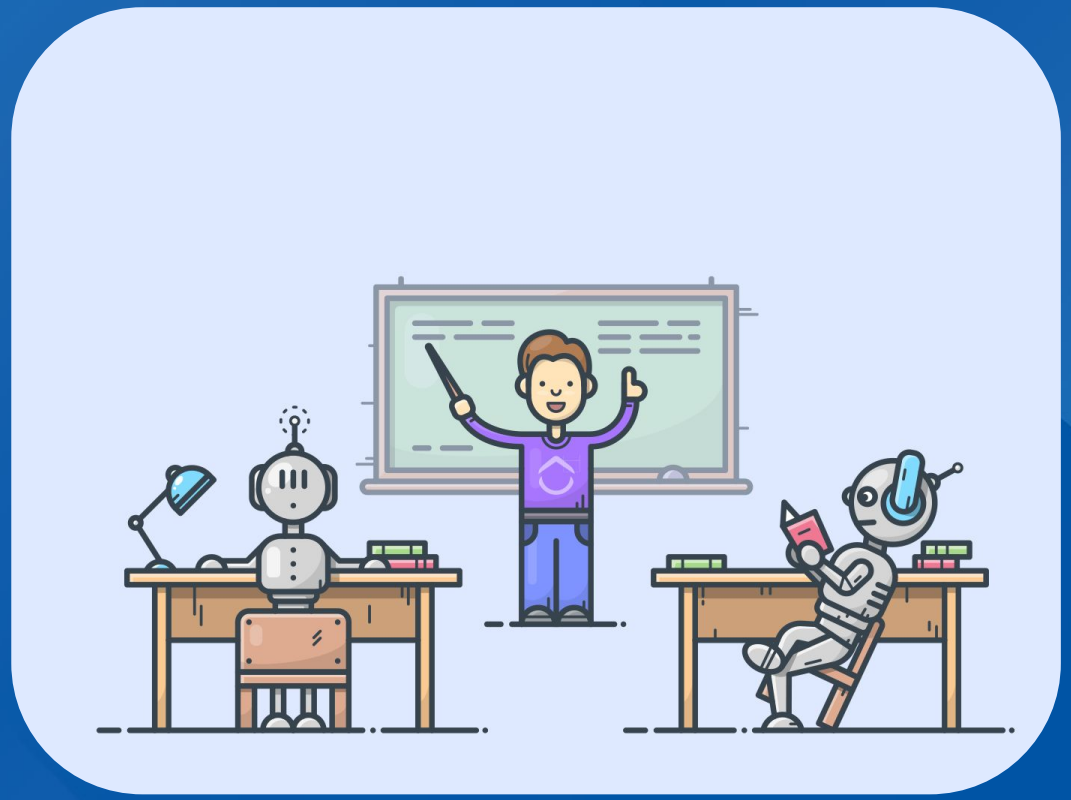
Supervised Learning | Unsupervised Learning | Reinforcement Learning



# Supervised Learning

An algorithm uses training data and feedback from humans to learn the relationship of given inputs to a given output. You know how to classify the input data and the type of behavior you want to predict, but you need the algorithm to calculate it for you on new data.

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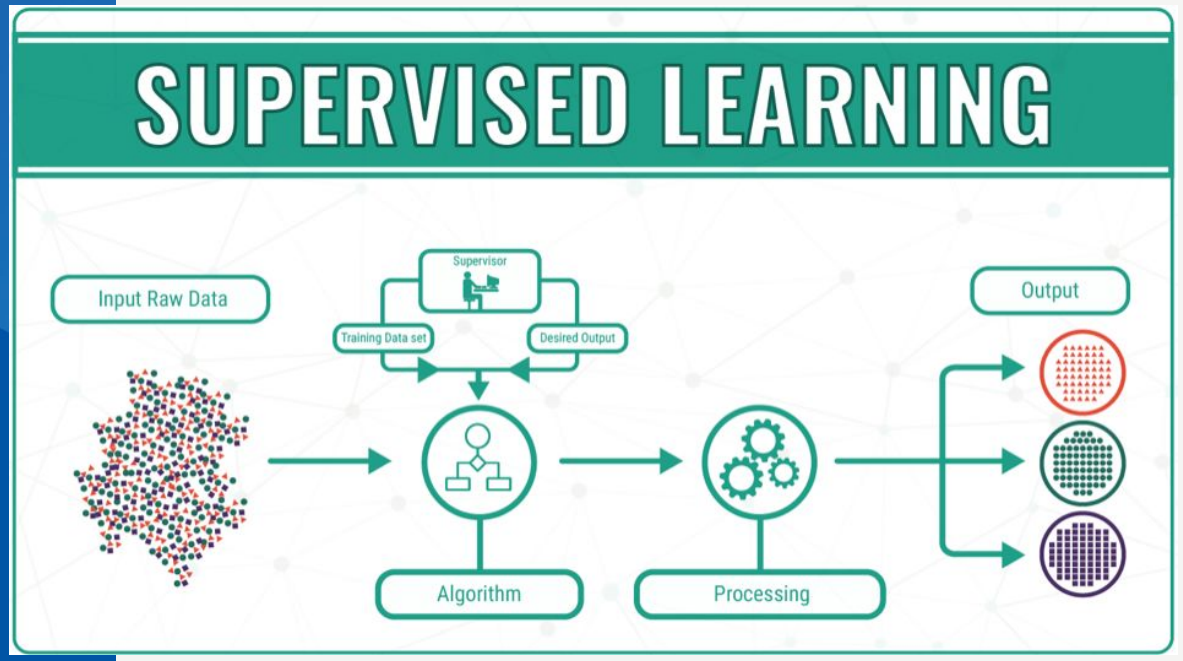
Supervised Learning | Unsupervised Learning | Reinforcement Learning

# How it works: Supervised Learning

1. A human labels the input data and defines the output variable
2. The algorithm is trained on the data to find the connection between the input variables and the output
3. Once training is complete–typically when the algorithm is sufficiently accurate–the algorithm is applied to new data

**We will learn business use cases for this type together with the case study at the end of session.**



# Unsupervised Learning

An algorithm explores input data without being given an explicit output variable. You do not know how to classify the data, and you want the algorithm to find patterns and classify the data for you.

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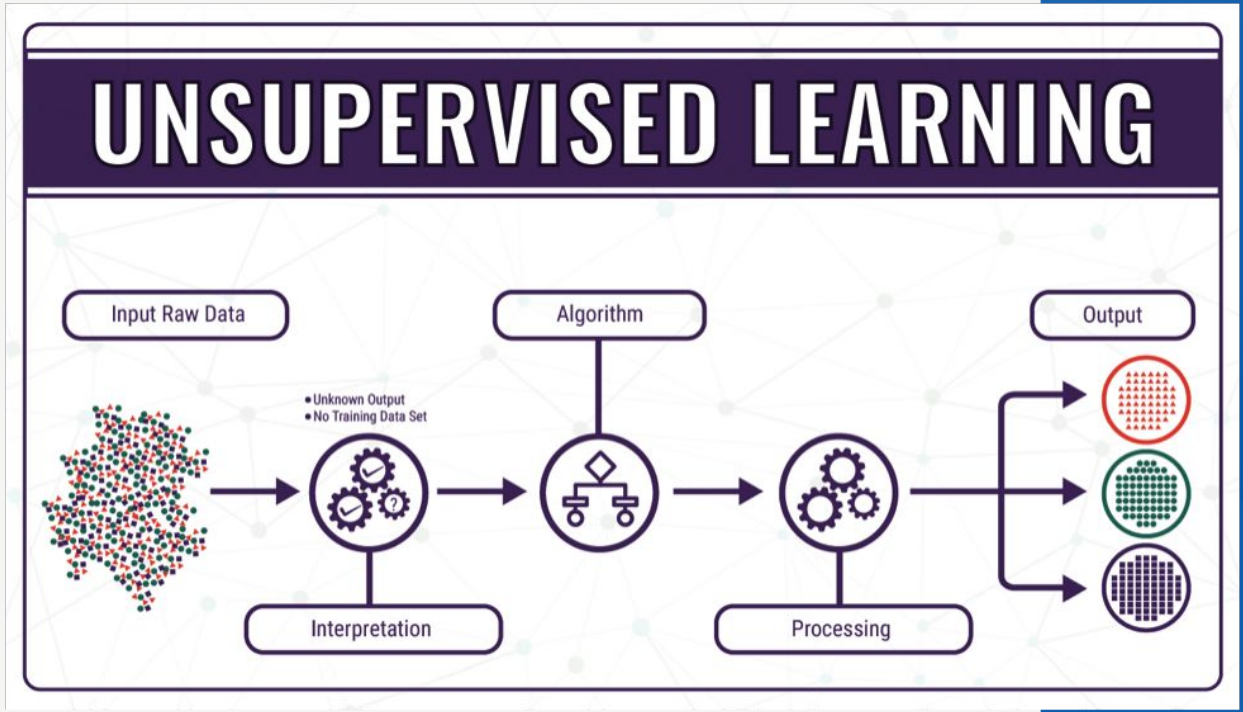
Supervised Learning | Unsupervised Learning | Reinforcement Learning

How it works:

# Unsupervised Learning




1. The algorithm receives unlabeled data
2. It infers a structure from the data
3. The algorithm identifies groups of data that exhibit similar behavior

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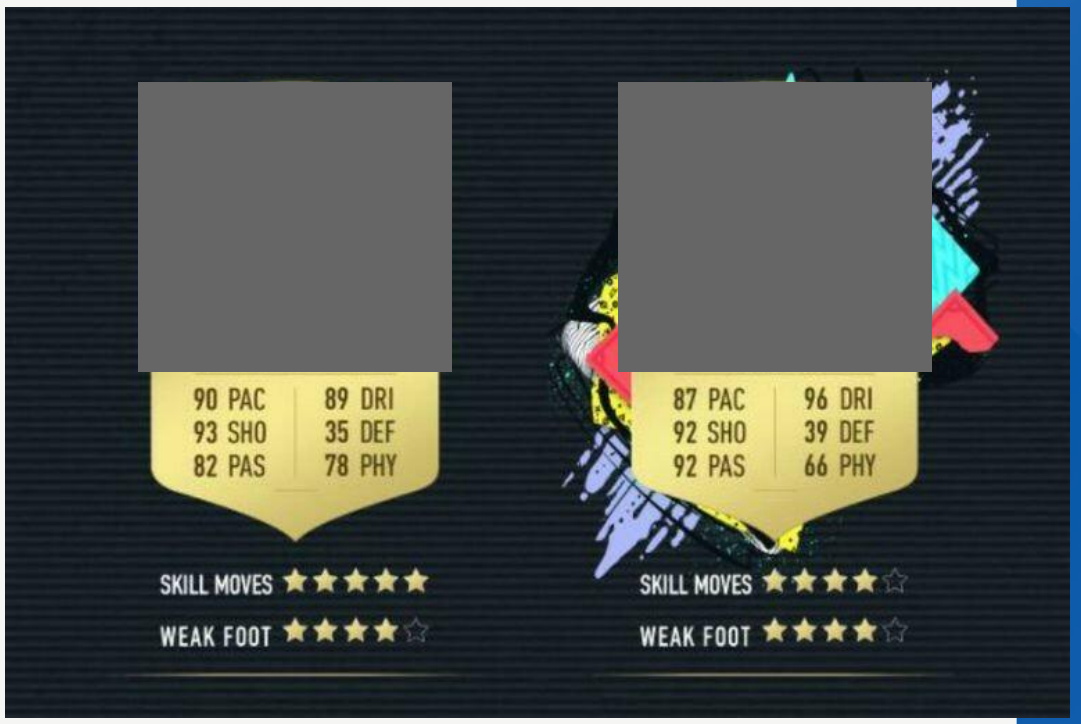
Supervised Learning | Unsupervised Learning | Reinforcement Learning

The example of

# Unsupervised Learning

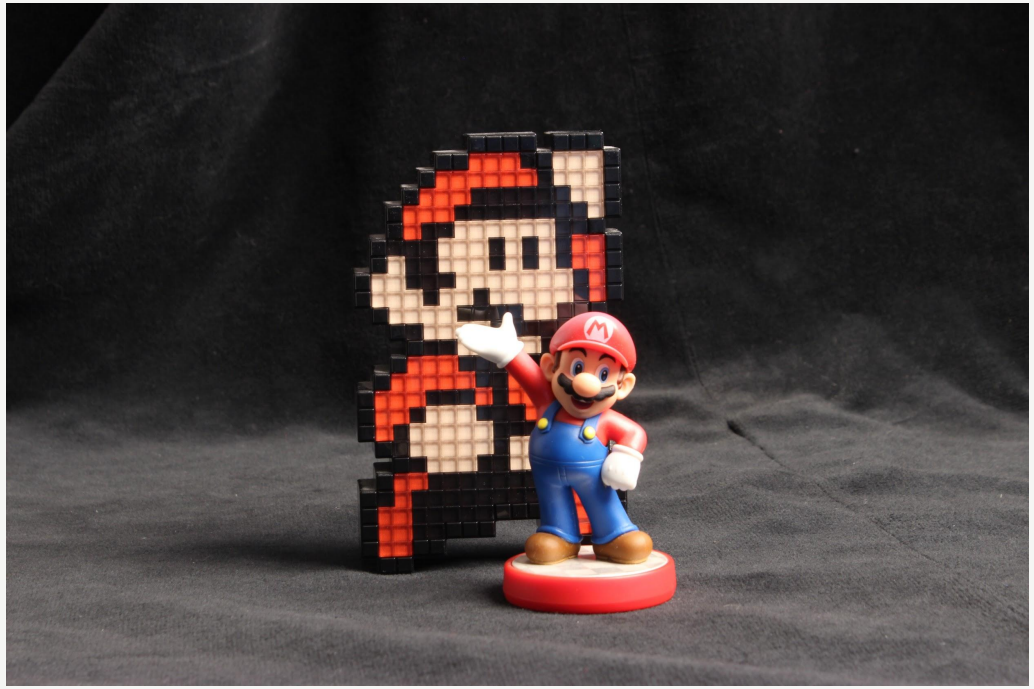



One of the algorithm for this type is K-means Clustering. The example for this algorithm is **when you already knew the attributes of a football player** (without you have to know about other informations), **you will know the possible position**.

Supervised Learning | Unsupervised Learning | Reinforcement Learning

# Reinforcement Learning

An algorithm learns to perform a task simply by trying to maximize rewards it receives for its actions. You don't have a lot of training data; you cannot clearly define the ideal end state; or the only way to learn about the environment is to interact with it.



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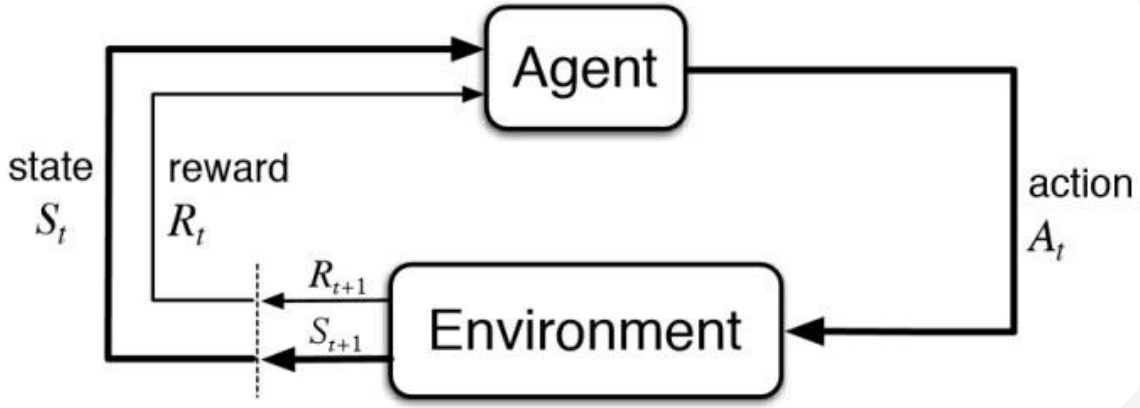
Supervised Learning | Unsupervised Learning | Reinforcement Learning

How it works:

# Reinforcement Learning

1. The algorithm takes an action on the environment
2. It receives a reward if the action brings the machine a step closer to maximizing the total rewards available
3. The algorithm optimizes for the best series of actions by correcting itself over time

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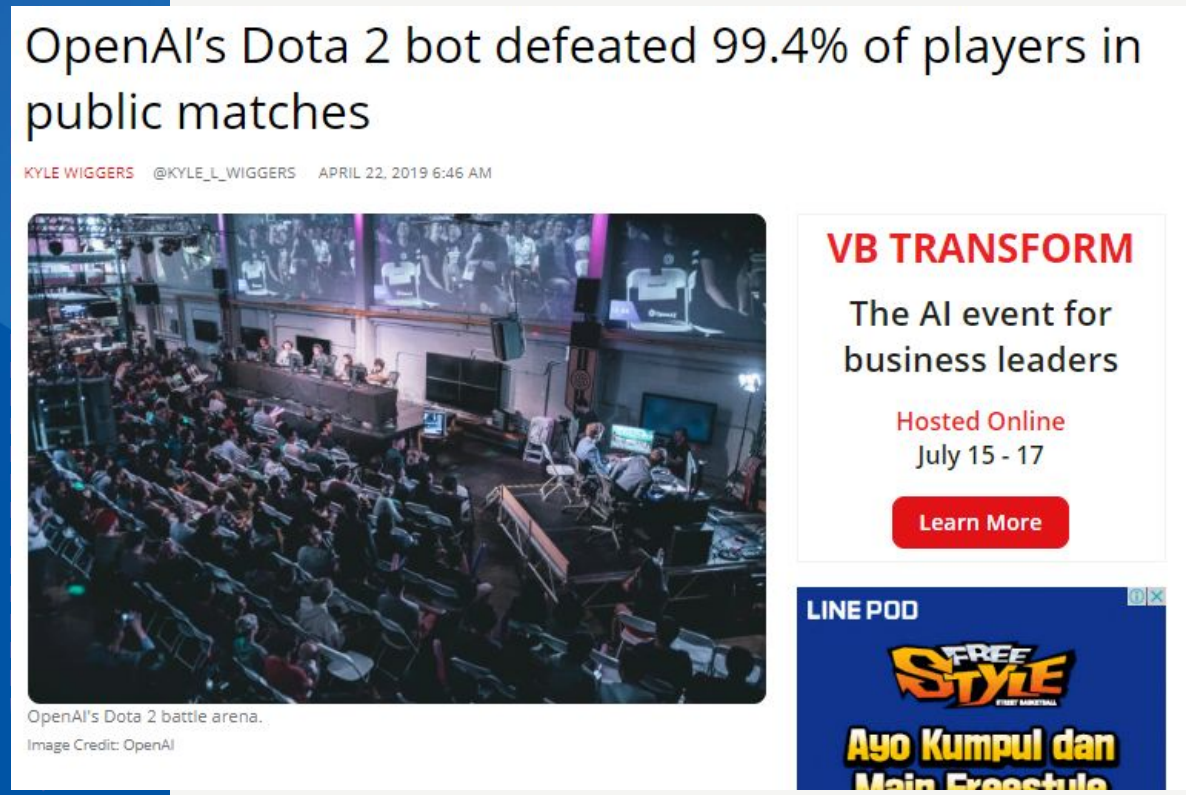
Supervised Learning | Unsupervised Learning | **Reinforcement Learning**

# The Example of Using **Reinforcement Learning**

OpenAI's Dota 2 bot defeated 99.4% of players in public matches. OpenAI Five consists of five single-layer, 4,096-unit long short-term memory (LSTM) networks each assigned to a single hero. The networks are trained using a deep reinforcement learning model that incentivizes their self-improvement with rewards.

In OpenAI Five's case, those rewards are kills, deaths, assists, last mile hits, net worth, and other stats that track progress in Dota 2. To self-improve, OpenAI Five plays 180 years' worth of games every day.



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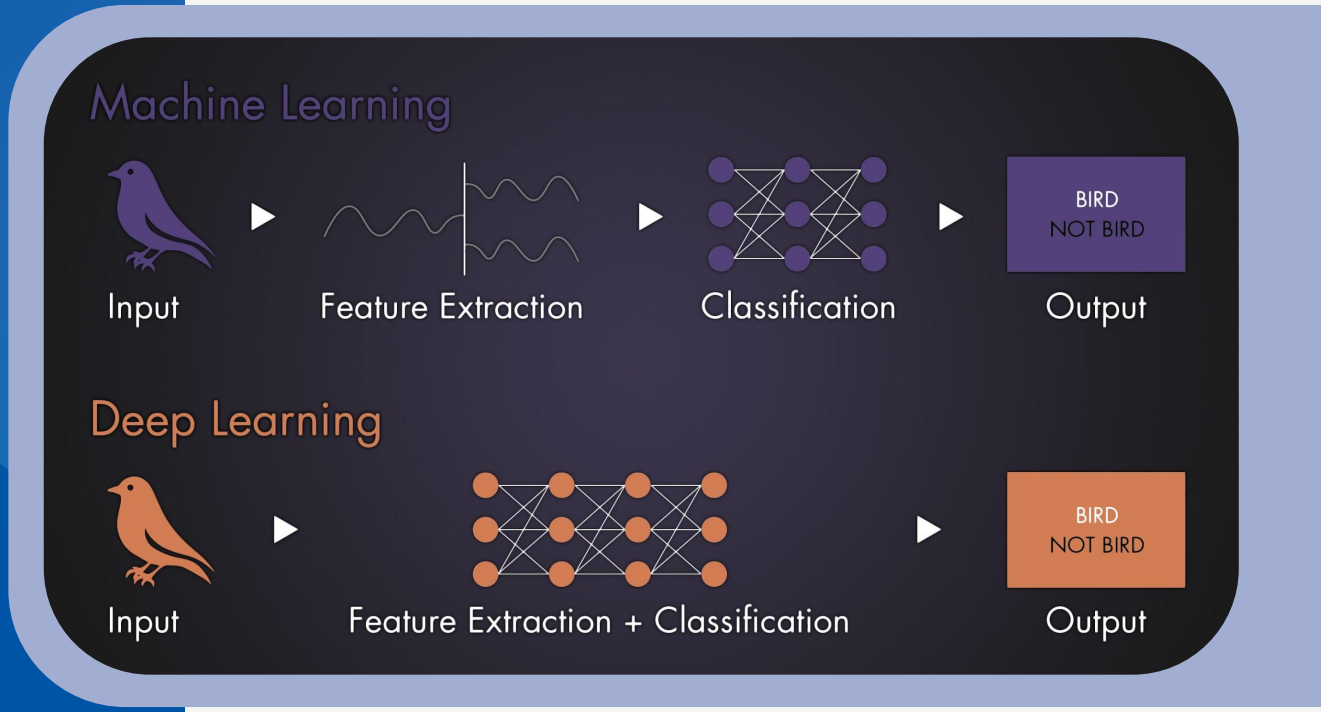
# Deep Learning

Deep learning is a type of machine learning that can process a wider range of data resources, requires less data preprocessing by humans, and can often produce more accurate results than traditional machine-learning approaches. In deep learning, interconnected layers of software-based calculators known as “neurons” form a neural network.

The network can ingest vast amounts of input data and process them through multiple layers that learn increasingly complex features of the data at each layer. The network can then make a determination about the data, learn if its determination is correct, and use what it has learned to make determinations about new data.

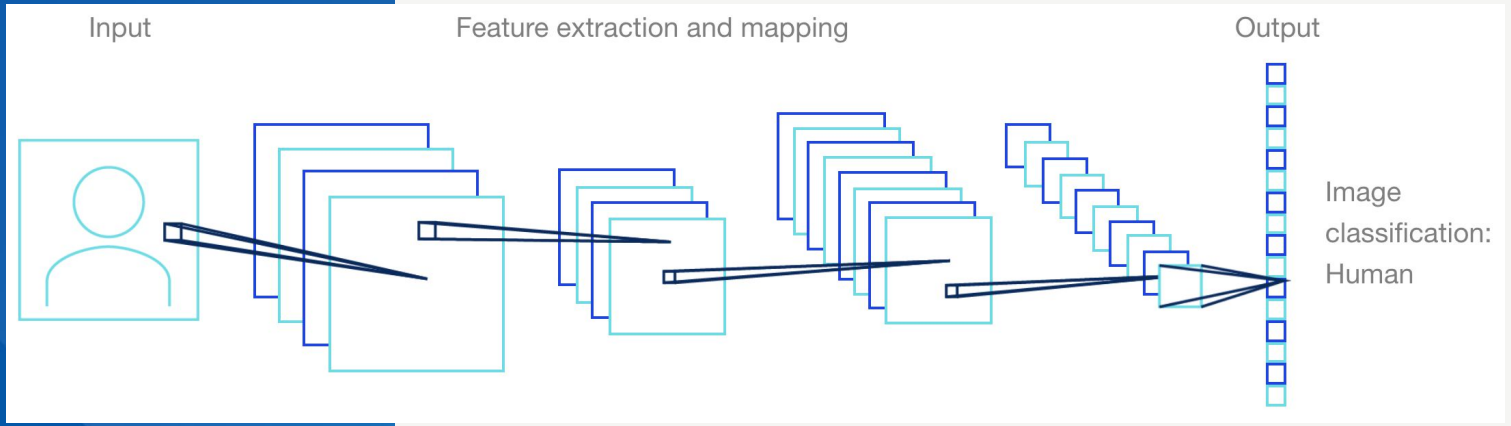


Major Models of

# Deep Learning

Convolutional Neural Network | Recurrent Neural Network

# Convolutional Neural Network




A multilayered neural network with a special architecture designed to extract increasingly complex features of the data at each layer to determine the output. You use it when you have an unstructured data set (eg, images) and you need to infer information from it.

Convolutional Neural Network | Recurrent Neural Network

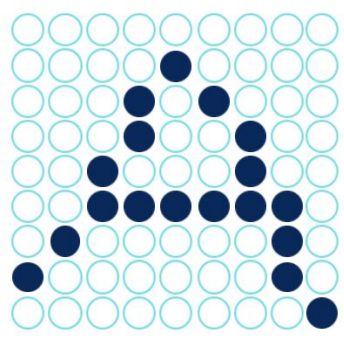
How it works:

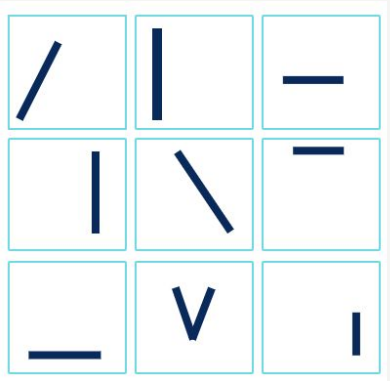
# Convolutional Neural Network

The convolutional neural network (CNN) receives an image–for example, of the letter “A”–that it processes as a collection of pixels

In the hidden layers, it identifies unique features–for example, the individual lines that make up “A”

The CNN can now classify a different image as the letter “A” if it finds in it the unique features previously identified as making up the letter





Convolutional Neural Network | Recurrent Neural Network

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## Business use cases

# for CNN

1. Diagnose health diseases from medical scans
2. Detect defective products in manufacturing line through images

Convolutional Neural Network | Recurrent Neural Network

# Recurrent neural network

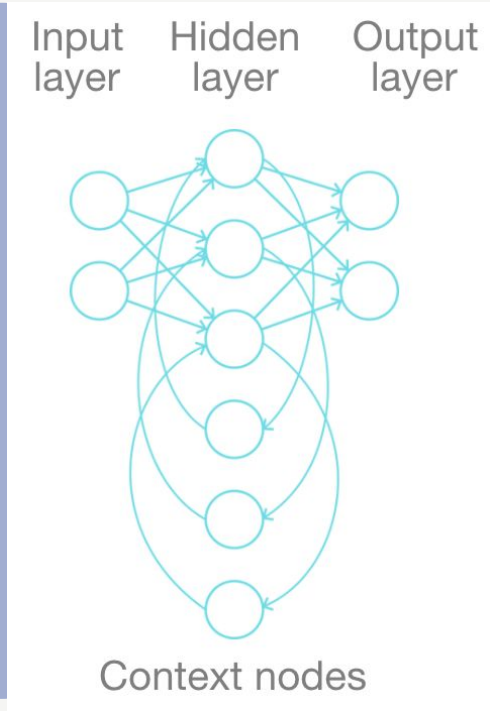

A multilayered neural network that can store information in context nodes, allowing it to learn data sequences and output a number or another sequence. You use it when you are working with time-series data or sequences (eg, audio recordings or text).

Other neural-network architectures assume all inputs are independent from one another. But this assumption doesn't work well for some tasks. Take, for example, the task of predicting the next word in a sentence–it's easier to predict the next word if several words that came before are known.

Convolutional Neural Network | Recurrent Neural Network

How it works:

# Recurrent neural network




Predicting next words from : “Are you free _____ ?“

Predicted sentence : “Are you free **tomorrow** ?“

1. A recurrent neural network (RNN) neuron receives a command that indicates the start of a sentence
2. The neuron receives the word “Are” and then outputs a vector of numbers that feeds back into the neuron to help it “remember” that it received “Are” (and that it received it first). The same process occurs when it receives “you” and “free,” with the state of the neuron updating upon receiving each word
3. After receiving “free,” the neuron assigns a probability to every word in the English vocabulary that could complete the sentence. If trained well, the RNN will assign the word “tomorrow” one of the highest probabilities and will choose it to complete the sentence

Convolutional Neural Network → Recurrent Neural Network

# Business use cases for

# RNN


1. Provide language translation
2. Autocomplete feature in smartphone keyboard and email

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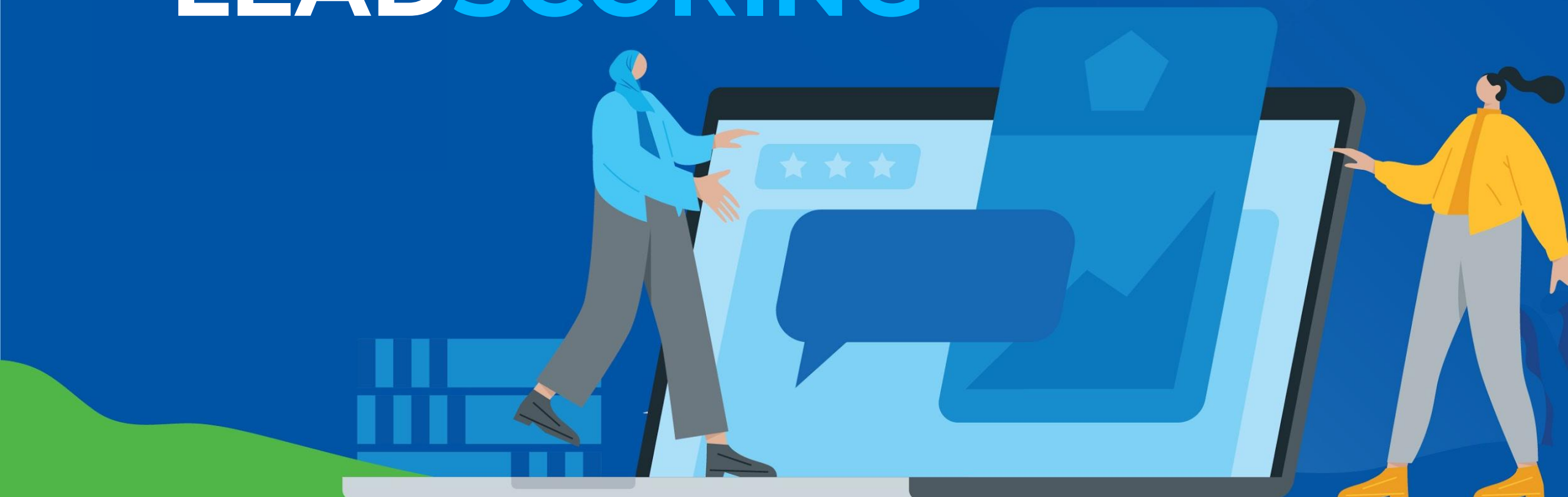
# Case Study

# LEADSCORING



Background

# Lead Scoring

1. Growing registered users makes the call effort from agents not scalable
2. Needs some prioritization effort to select high quality leads with available agents
3. Leverage analysis result from identifying user behavior during trial period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Objectives

# Lead Scoring

1. Identify important features during trial period which will lead to conversion (paid users)
2. Implement machine learning model to help agents prioritize registered users based on their quality


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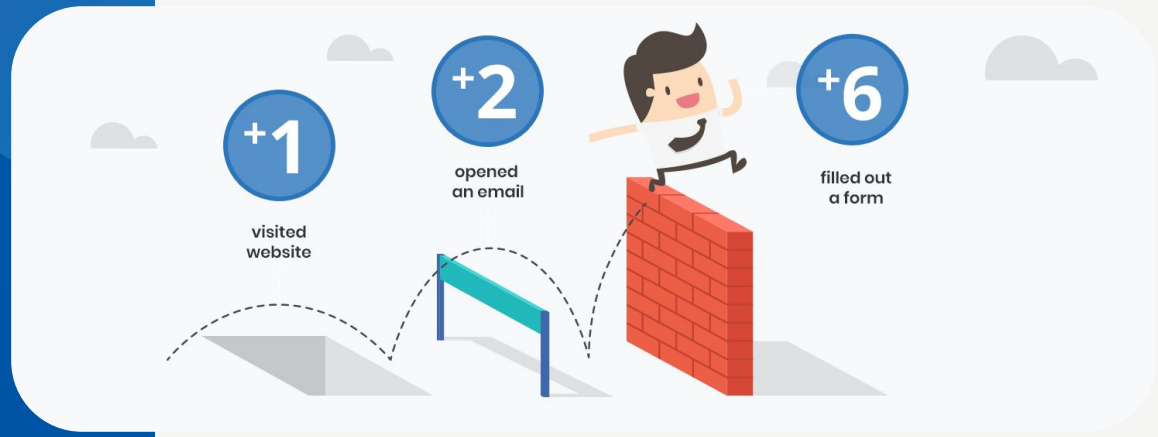
Findings

# Lead Scoring

1. Identified most important features to determine leads quality based on 1-day activity after registration
2. Medium quality leads have **3x** more likelihood to convert than Low quality
3. High quality leads have **2.4x** higher possibility to be paid users than Medium quality

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# QnA


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# Thank You!

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