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Task 22

(CheatSheet)

Supervised ,Self\_supervised,Reinforcement, Unsupervised

Machine Learning Algorithms

### Supervised learning

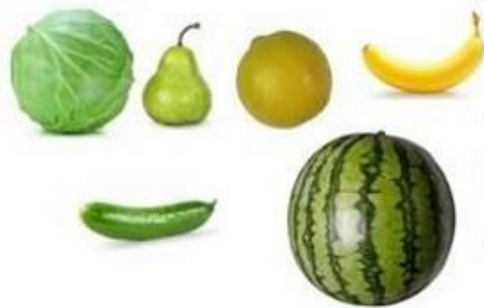
In supervised learning, the machine is taught by example. The operator provides the machine learning algorithm with a known dataset that includes desired inputs and outputs, and the algorithm must find a method to determine how to arrive at those inputs and outputs. While the operator knows the correct answers to the problem, the algorithm identifies patterns in data, learns from observations and makes predictions. The algorithm makes predictions and is corrected by the operator – and this process continues until the algorithm achieves a high level of accuracy/performance.

“We already have training data means supervise so have both input and output and check the label data to insert new input to check the validation if the result is according to demand or not means collect data input and write required output in training data or check with new input”

‘For example if a person marks is 90 it got A+ or voting example ‘

Under the umbrella of supervised learning fall: Classification, Regression and Forecasting.

1. **Classification:** In classification tasks, the machine learning program must draw a conclusion from observed values and determine to what category new observations belong. For example, when filtering emails as ‘spam’ or ‘not spam’, the program must look at existing observational data and filter the emails accordingly.
2. **Regression:** In regression tasks, the machine learning program must estimate – and understand – the relationships among variables. Regression analysis focuses on one dependent variable and a series of other changing variables – making it particularly useful for prediction and forecasting.
3. **Forecasting:** Forecasting is the process of making predictions about the future based on the past and present data, and is commonly used to analyse trends.



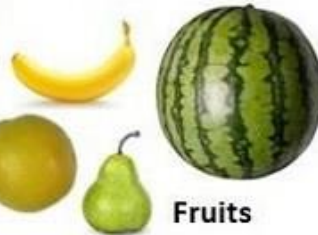
Objects are classified and labelled depending upon their type, color, and shape.



**Classification**



**Vegetables**



**Fruits**



**Labelling**



Vegetable, Green, Round



Vegetable, Green, Long



Fruit, Yellow, Long



Fruit, Green, Roundish



Fruit, Yellow, Round



Fruit, Green, Round

## Self-supervised learning

Self-supervised learning is similar to supervised learning, but instead uses both labelled and unlabelled data. Labelled data is essentially information that has meaningful tags so that the algorithm can understand the data, whilst unlabelled data lacks that information. By using this combination, machine learning algorithms can learn to label unlabelled data. Without human in a loop and using heuristics algorithms

“Used unlabeled data set to generate label dataset example find the word which starts is self-supervised learning e.g Ayesha is teacher ,ali is businessman this is unlabeled data Teacher and businessman is label data or autocorrect example in keyboard or autopredict keyboard according to the past experiences store the different past outcomes in mind and judge the data accordingly without supervision but supervision of itself”

## For Example

For instance, autoencoders are a well-known instance of self-supervised learning, where the generated targets are the input, unmodified. In the same way, trying to predict the next frame in a video, given past frames, or the next word in a text, given previous words, are instances of self-supervised learning (temporally supervised learning, in this case: supervision comes from future input data), auto sentence complete etc.

- **Language understanding:** Self-supervised learning has been used to improve the performance of natural language processing (NLP) tasks, such as machine translation, language modeling, and text classification. For example, a self-supervised learning model might be trained to predict the next word in a sentence given the previous words, or to classify a sentence as positive or negative.
- **Speech recognition:** Self-supervised learning has been used to improve the performance of speech recognition tasks, such as transcribing audio recordings into text. For example, a self-supervised learning model might be trained to predict the speaker of an audio clip based on the characteristics of their voice.

## Hate speech in AI for self-supervised learning



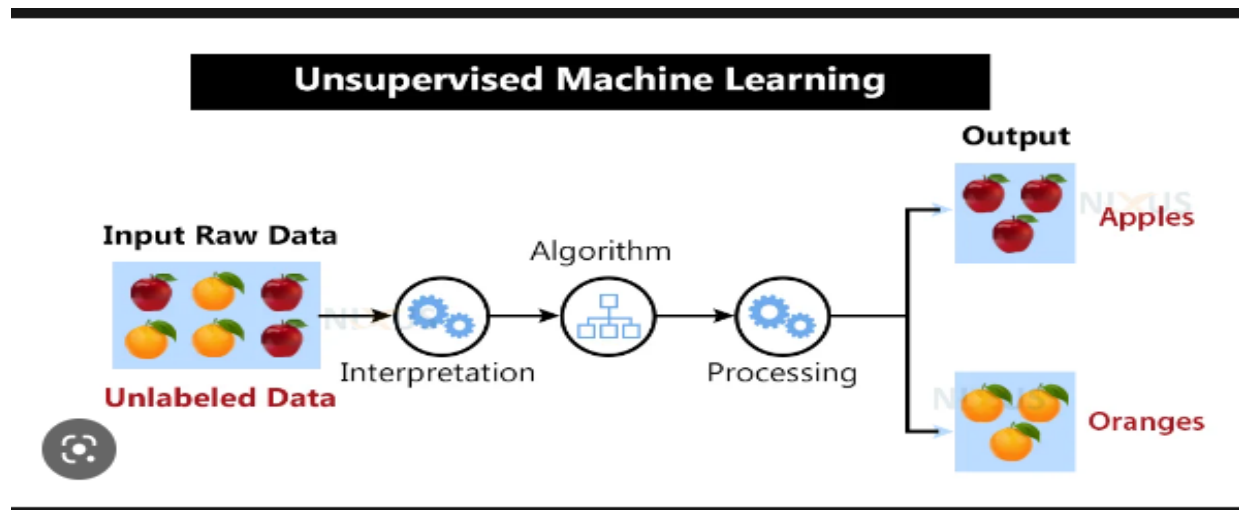
## Unsupervised learning

Here, the machine learning algorithm studies data to identify patterns. There is no answer key or human operator to provide instruction. Instead, the machine determines the correlations and relationships by analysing available data. In an unsupervised learning process, the machine learning algorithm is left to interpret large data sets and address that data accordingly. The algorithm tries to organise that data in some way to describe its structure. This might mean grouping the data into clusters or arranging it in a way that looks more organised. Unsupervised learning is when it can provide a set of unlabelled data, which it is required to analyze and find patterns inside. The examples are dimension reduction and clustering. The training is supported to the machine with the group of data that has not been labeled, classified, or categorized, and the algorithm required to facilitate on that data without some supervision. The objective of unsupervised learning is to restructure the input record into new features or a set of objects with same patterns.

“ Don't have output knowledge learn independently don't have output just input to judge and judge according to which it feature and then make the groups according cluster if the person height short or long, white or black, fat or skinny just used input and judge according to the characteristics or feature of different things example just like in pk movie amir judge differently because it does not know anything e.g. boys, girls, man, women group may be the data is not refined full gradually learn and reach to the output ”

Set of unlabeled data which can analyze and find the pattern

As it assesses more data, its ability to make decisions on that data gradually improves and becomes more refined.



Under the umbrella of unsupervised learning, fall:

1. **Clustering:** Clustering involves grouping sets of similar data (based on defined criteria). It's useful for segmenting data into several groups and performing analysis on each data set to find patterns.
2. **Dimension reduction:** Dimension reduction reduces the number of variables being considered to find the exact information required.

Cluster analysis is used to form groups or clusters of the same records depending on various measures made on these records. The key design is to define the clusters in ways that can be useful for the objective of the analysis. This data has been used in several areas, such as astronomy, archaeology, medicine, chemistry, education, psychology, linguistics, and sociology.

Google is an instance of clustering that needs unsupervised learning to group news items depends on their contents. Google has a set of millions of news items written on multiple topics and their clustering algorithm necessarily groups these news items into a small number that are same or associated to each other by using multiple attributes, including word frequency, sentence length, page count, etc

There are various examples of Unsupervised Learning which are as follows –

**Organize computing clusters** – The geographic areas of servers is determined on the basis of clustering of web requests received from a specific area of the world. The local server will include only the data frequently created by people of that region.

**Social network analysis** – Social network analysis is conducted to make clusters of friends depends on the frequency of connection between them. Such analysis reveals the links between the users of some social networking website.

**Market segmentation** – Sales organizations can cluster or group their users into multiple segments on the basis of their prior billed items. For instance, a big superstore can required to send an SMS about grocery elements specifically to its users of grocery rather than sending that SMS to all its users.

It is not only is it cheaper but also superior; after all it can be an irrelevant irritant to those who only buy clothing from the store. The combining of users into multiple segments based on their buy history will provide the store to focus the correct users for increasing sales and enhancing its profits.

**Astronomical data analysis** – Astronomers need high telescopes to study galaxies and stars. The design in light or combining of lights received from multiple parts of the sky help to recognize multiple galaxies, planets, and satellites.

## Reinforcement learning

In reinforcement learning, an agent receives information about its environment and learns to choose actions that will maximize some reward. For instance, a neural network that “looks” at a videogame screen and outputs game actions in order to maximize its score can be trained via reinforcement learning. Currently, reinforcement learning is mostly a research area and hasn’t yet had significant practical successes beyond games. In time, however, we expect to see reinforcement learning take over an increasingly large range of real-world applications: self-driving cars, robotics, resource management, education, based on punishment and reward

“the self driving car moves at normal speed than mor customer trust on self driving cars otherwise cause failure”



SemiSupervised learning

both supervised and unsupervised combination