Machine Learning

Unsupervised Learning

Phd. César Astudillo | Facultad de Ingeniería

What is Unsupervised Learning?

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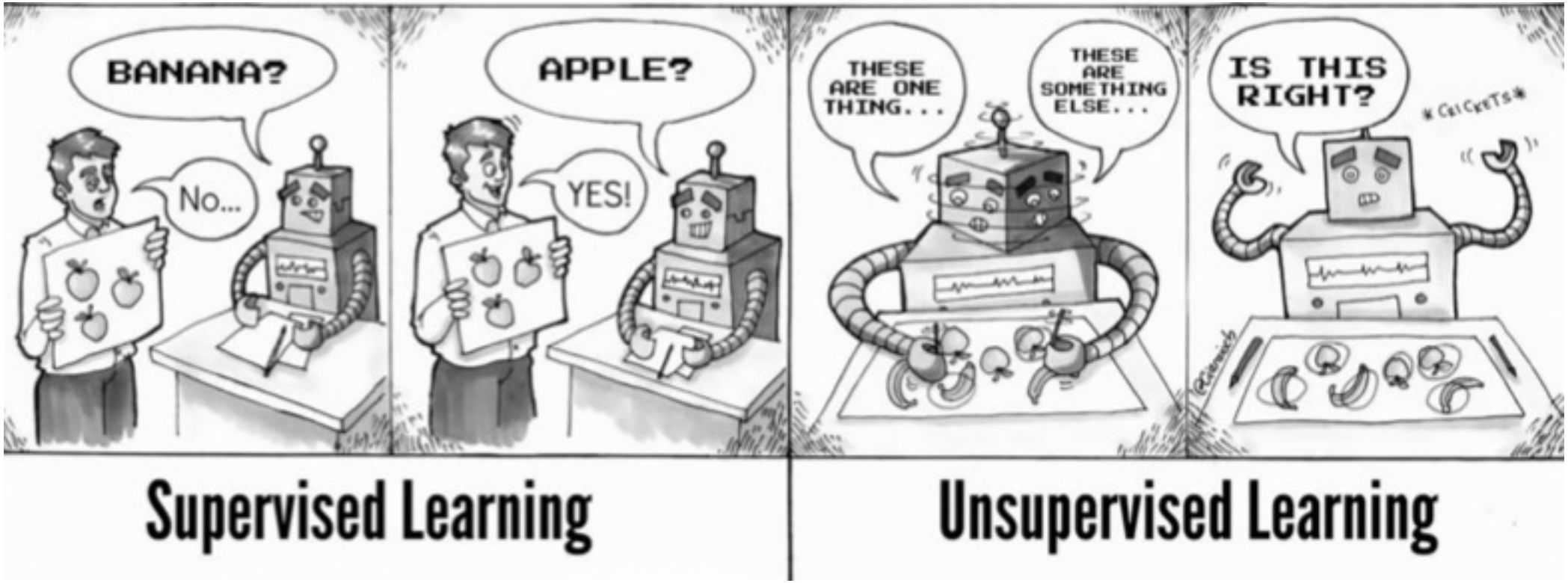

Unsupervised Learning can be thought as self-learning where the algorithm can find previously unknown patterns in datasets that does not have any sort of labels

What is Unsupervised Learning?

For Example

Suppose you and your Friends want to watch the cricket match but you do not know what cricket is. But for your Friends, you say yes. You reach home and start watching the match

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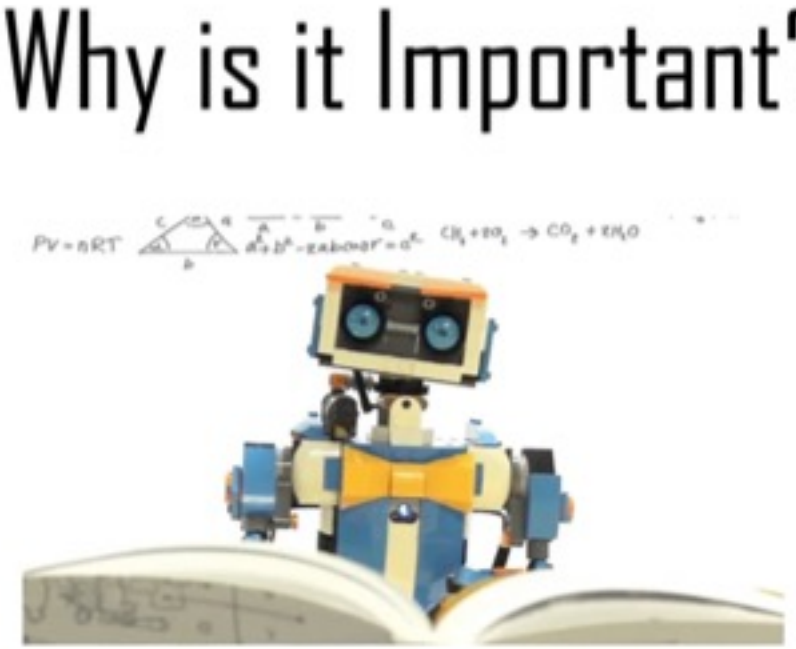


- They find patterns which were previously unknown.
- Patterns help in categorization or finding association.
- They can detect anomalies and defects in the data.
- They work on unlabeled data which makes our work easier.

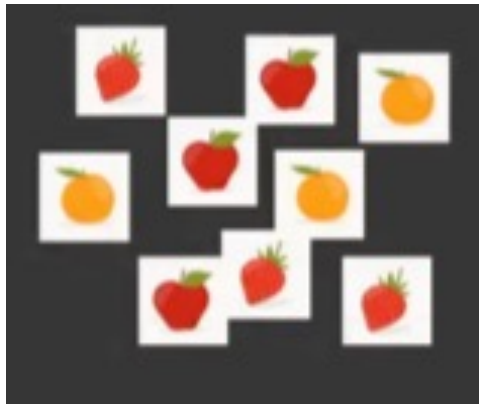
Types of Unsupervised Learning

Clustering

Association

Types of Unsupervised Learning

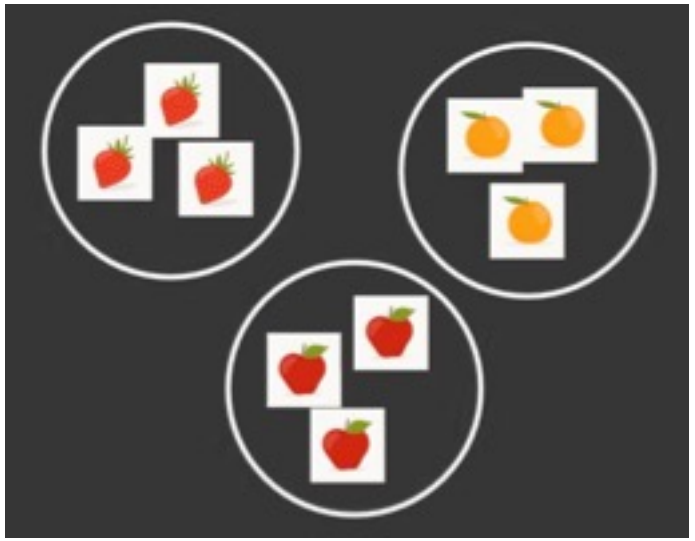
Clustering



Association

Types of Unsupervised Learning

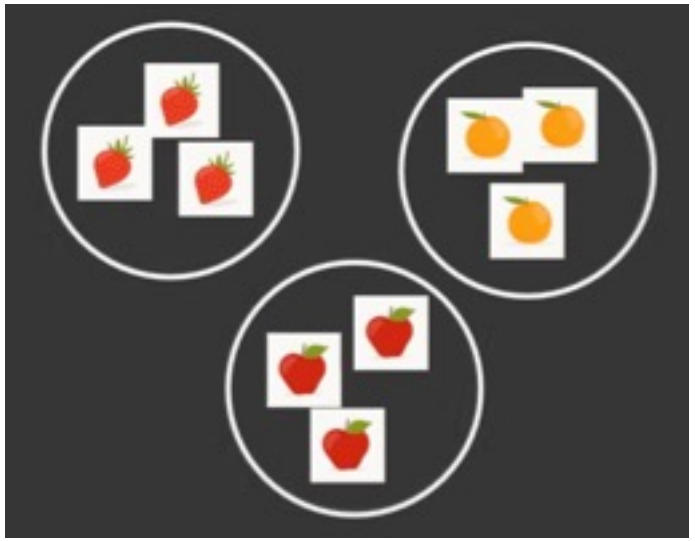
Clustering



Association

Types of Unsupervised Learning

Clustering



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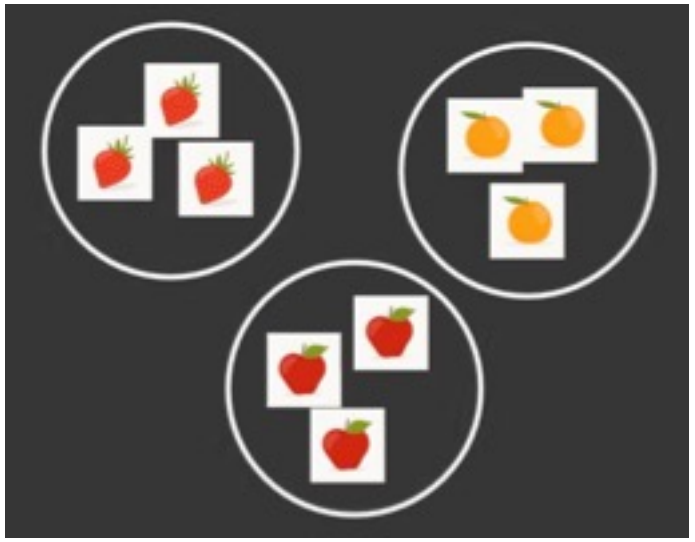

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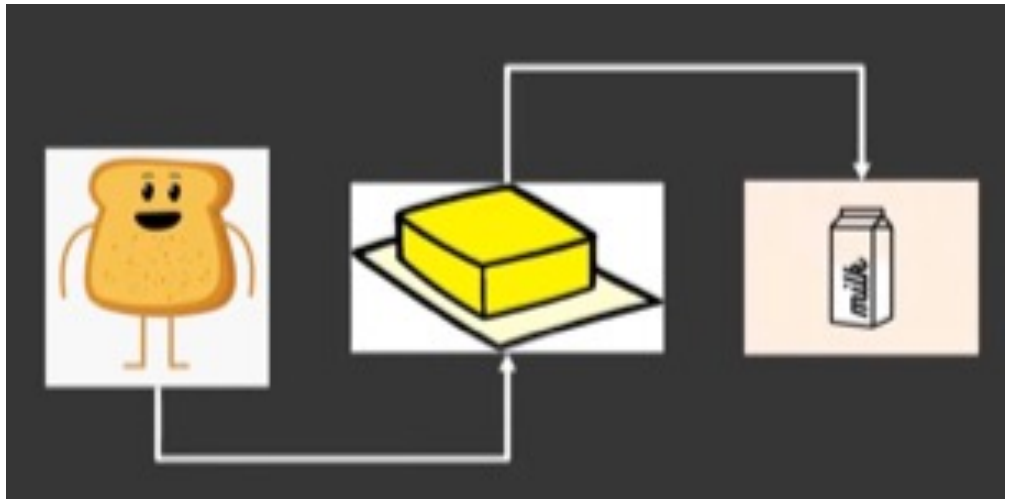

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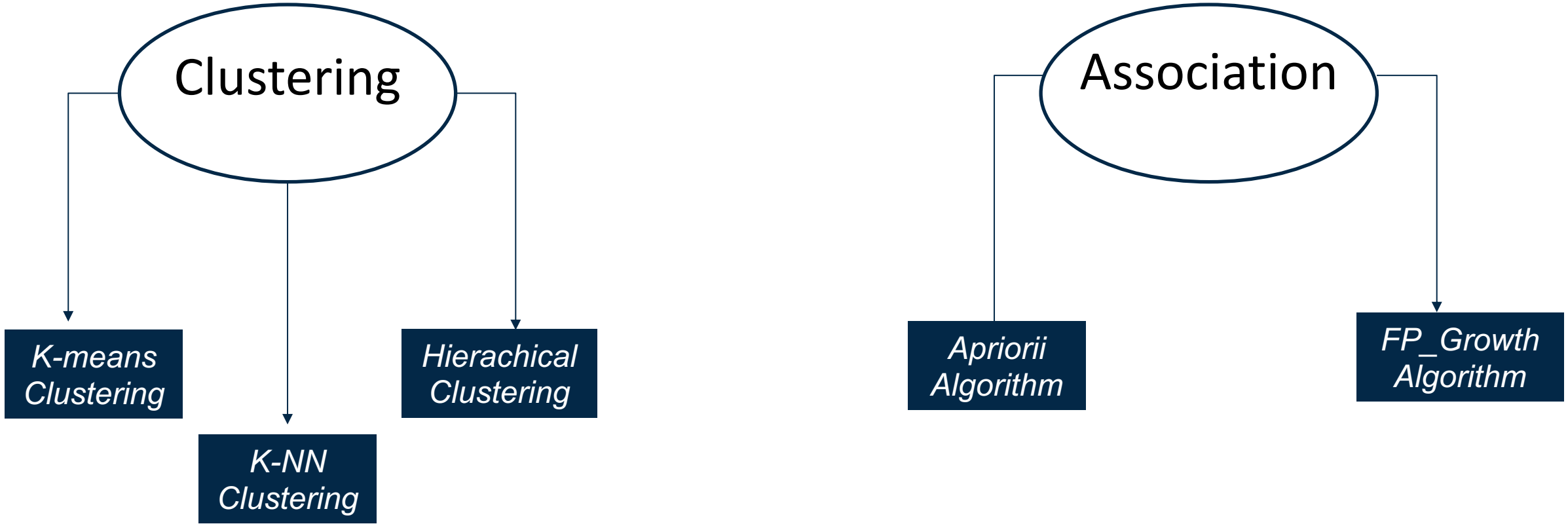
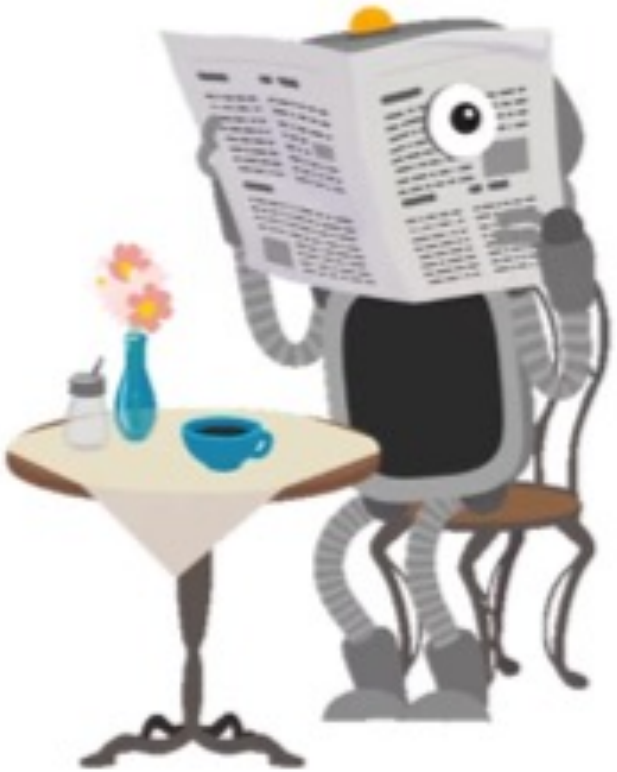


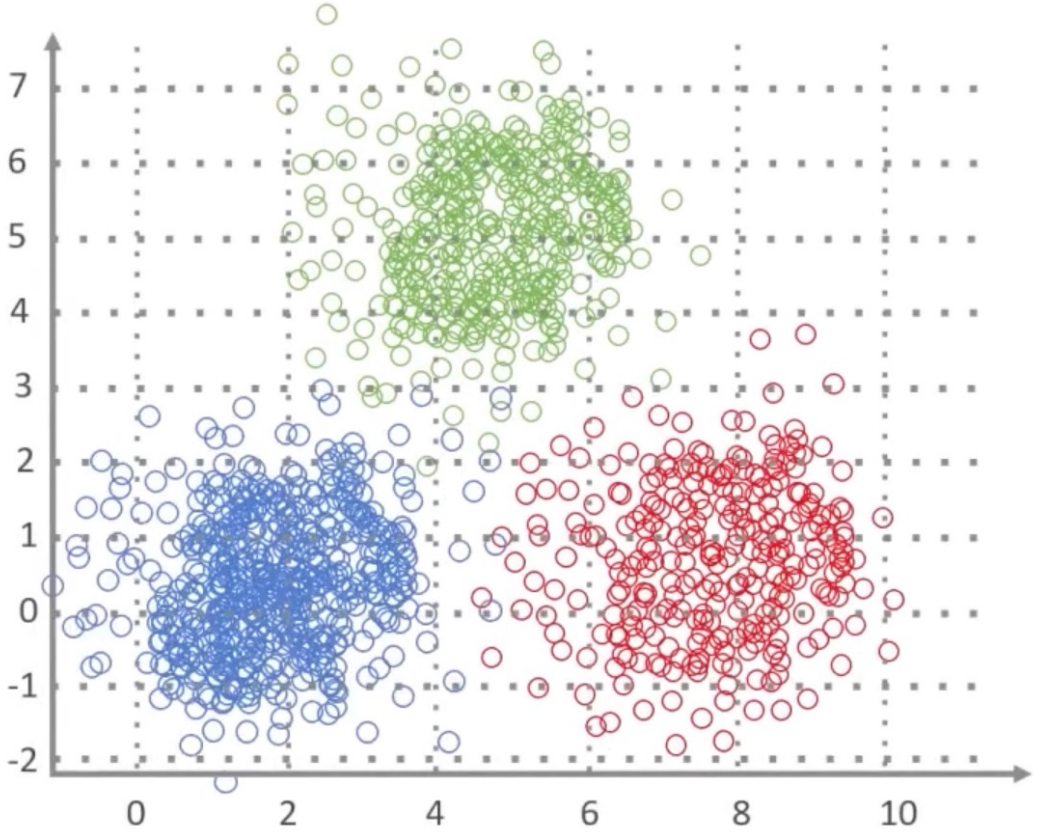
Applications

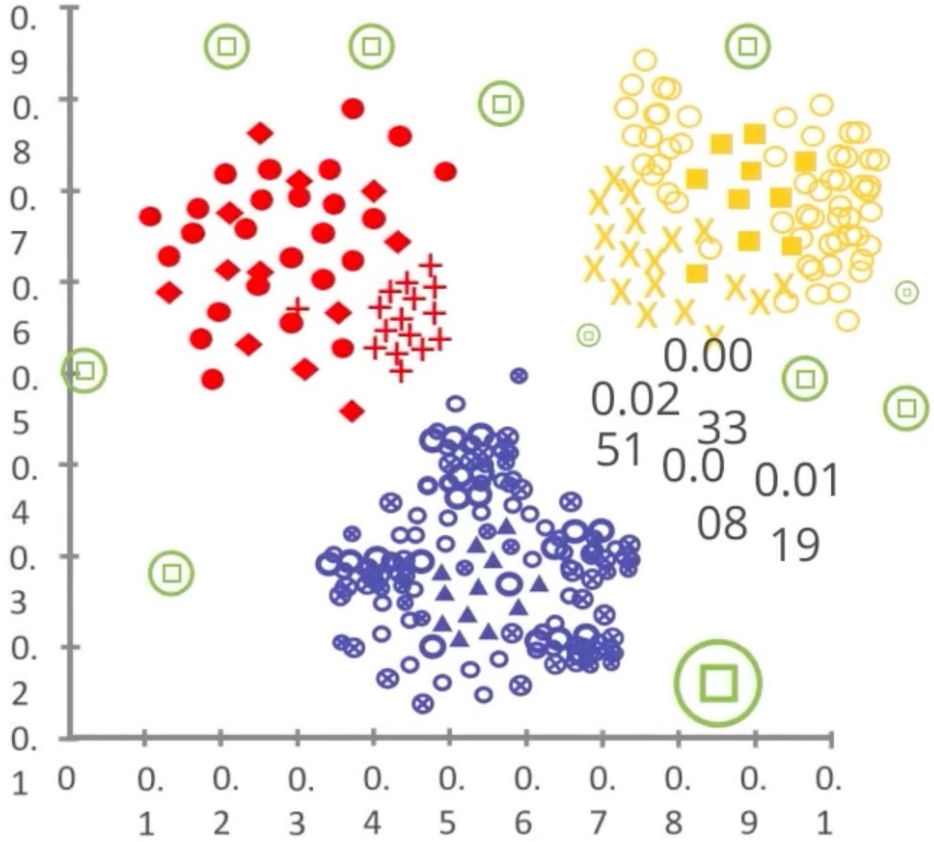


- Recognize patterns to cluster data.
- Defects in the data collected.
- Identify dependencies.
- Cleasing the datasets by removing unwanted features.

Applications of Unsupervised Learning

Unsupervised learning can be used for anomaly detection as well as clustering.





Applications

Users query their requirements and Airbnb learns these patterns and recommends stays and experiences which fall under the same group or cluster.

Applications

Amazon learns the customer´s purchase and recommend the products which are most frequently bought together.

Applications

Various patterns of the user and their usage of the credit card are studied by the algorithm. If the cards is used in ways that do not match the behavior an alarm is generated possibly meaning fraud.

Supervised Learning vs. Unsupervised Learning

Supervised Learning	Unsupervised Learning
Deals with labeled data where the output data patterns are known to the system	Works with unlabeled data in which the output is just based on the collection of perceptions

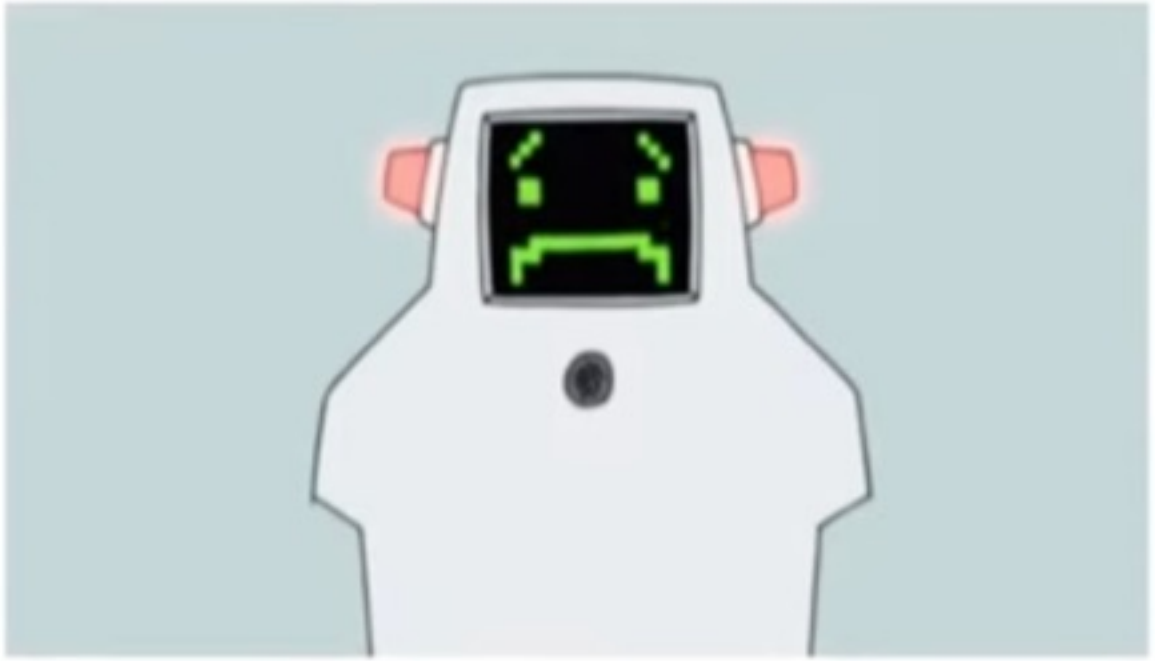
Supervised Learning vs. Unsupervised Learning

Supervised Learning	Unsupervised Learning
Less complex	More complex
Conducts offline analysis	Performs real-time analysis
Comparatively more accurate and reliable results	Moderately accurate but reliable results
Includes classification and regression	Includes clustering and associative rule mining problems

Supervised vs. Unsupervised Leaning

Parameter	Supervised Learning	Unsupervised Learning
Dataset	Labelled Dataset	Unlabeled Dataset
Method of Leaning	Guided Learning	Algorithm learns by Itself using dataset
Complexity	Simpler Method	Computationally Complex
Accuracy	More Accurate	Less Accurate

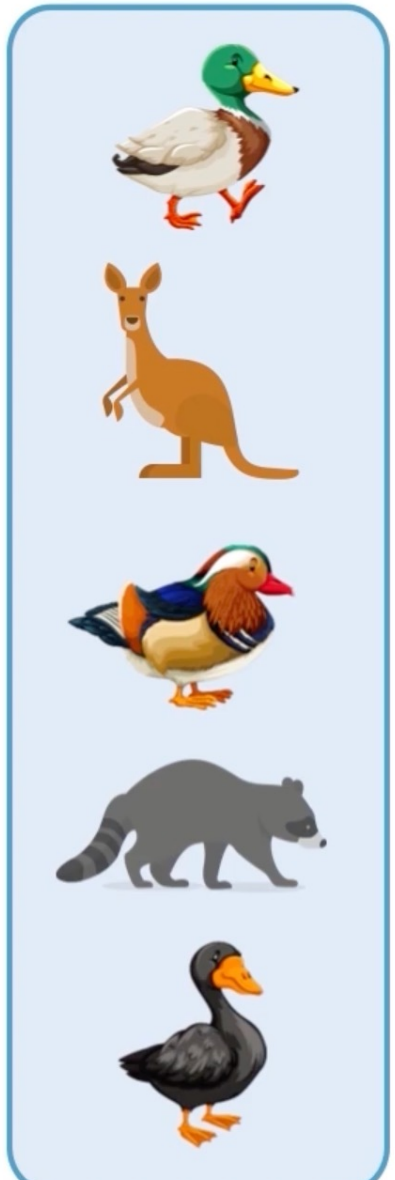
Disadvantages



- You may never know the ethod of how the data was sorted by algorithm.
- It provides less accurate outputs.
- Output obtained may not be what the user was expecting due to data interpretation mismatch.
- Output obtained has to be undestood by user and mapped with corresponding labels.

Examples of Unsupervised Learning

What is Unsupervised Learning?



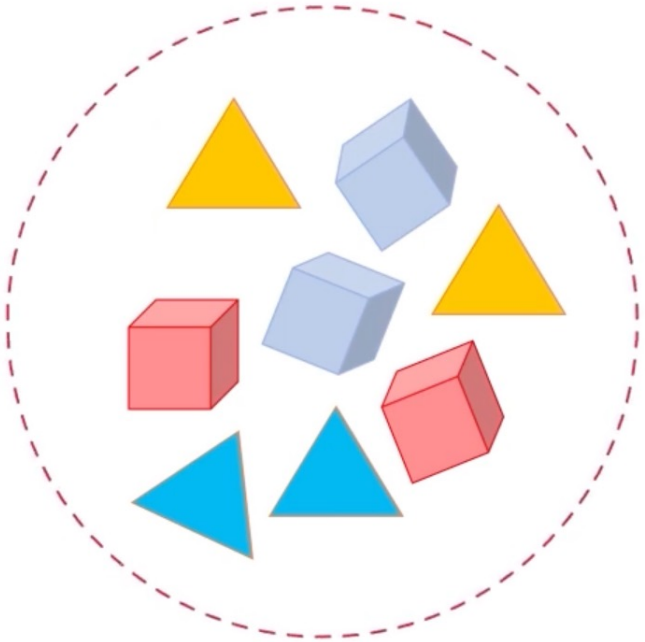
Unsupervised Learning

Group with wings

Group with two legs

Group with four legs

Applications: Clustering



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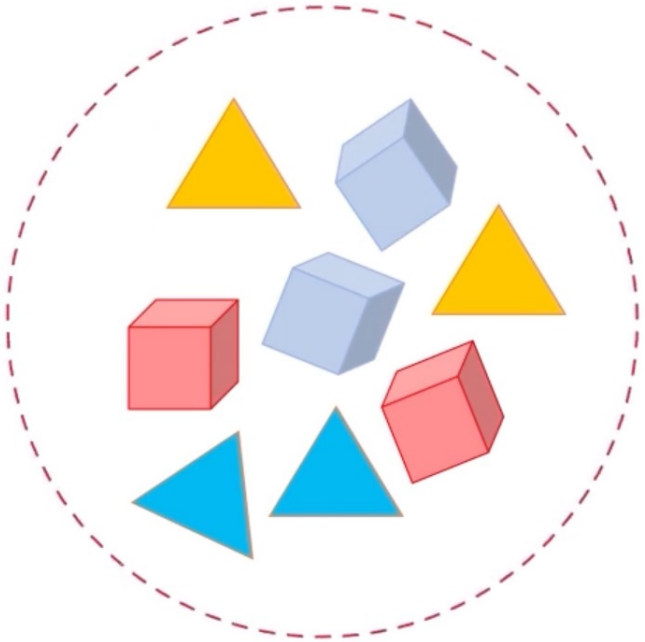

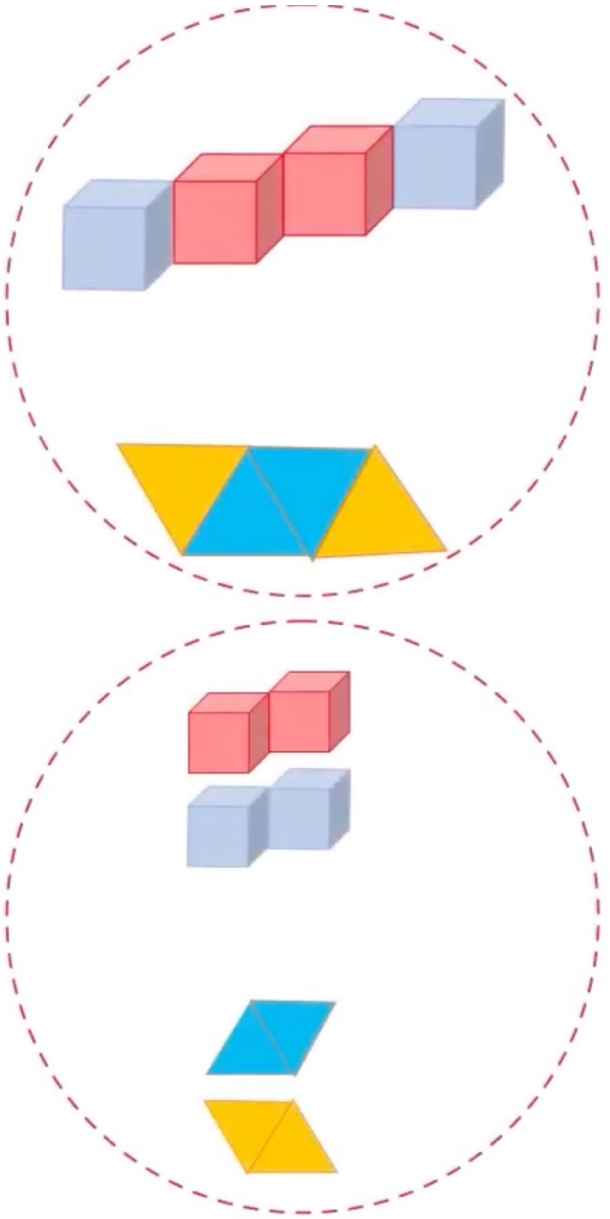

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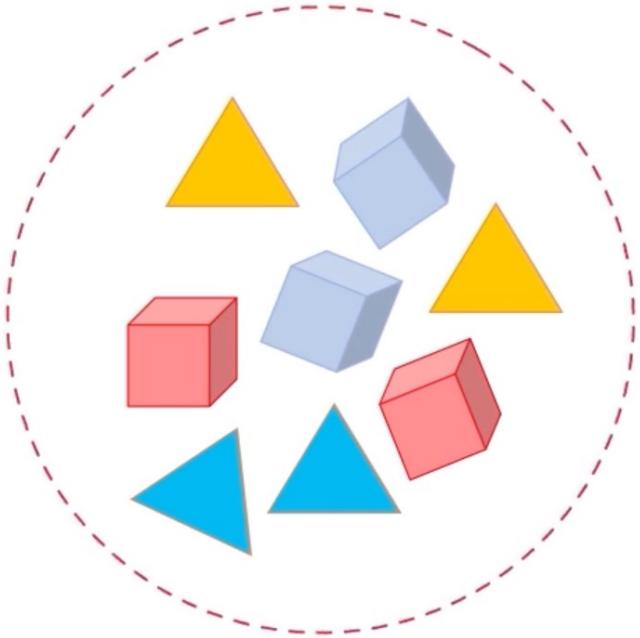

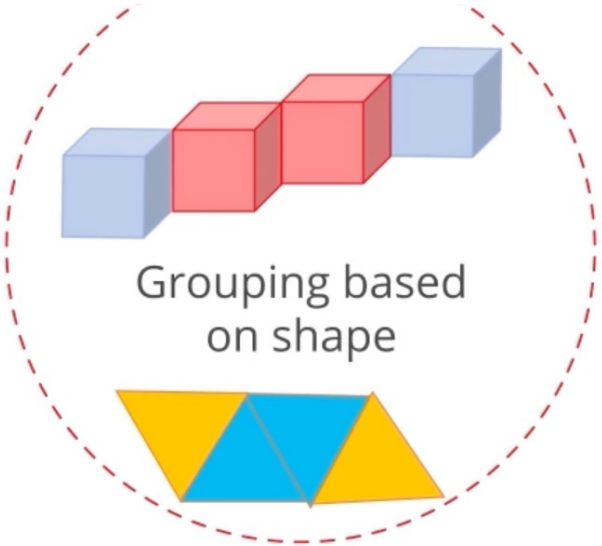

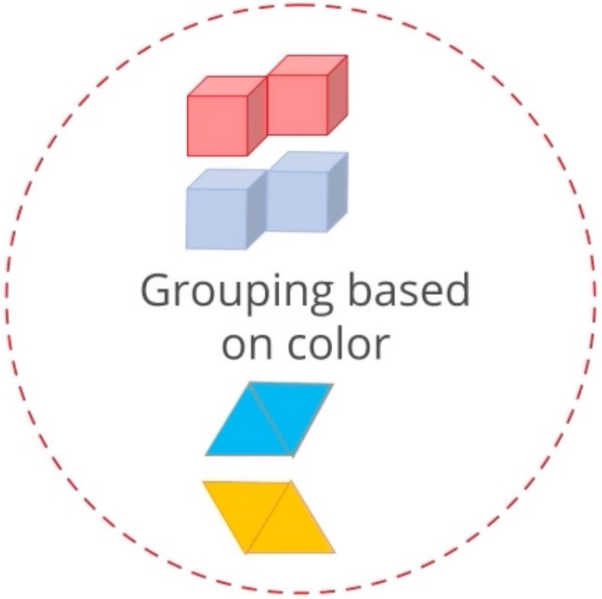

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