

Lesson 2 Fundamental concepts: how do machines learn?





How do machines learn?

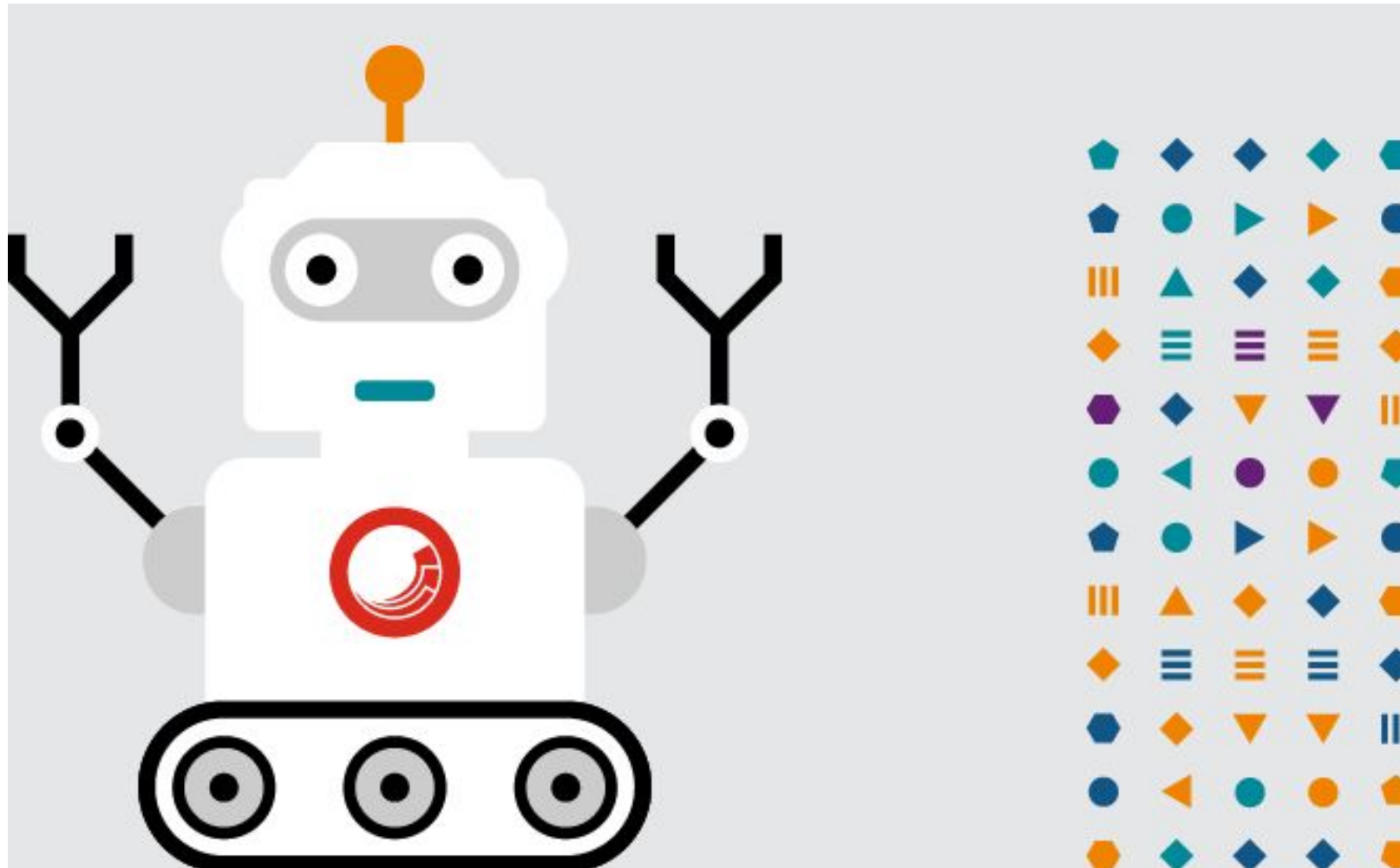
In this lesson we learn

- What are deep learning, machine learning, and artificial intelligence?
- What are parametric models and nonparametric models?
- What are supervised learning and unsupervised learning?
- How can machines learn?

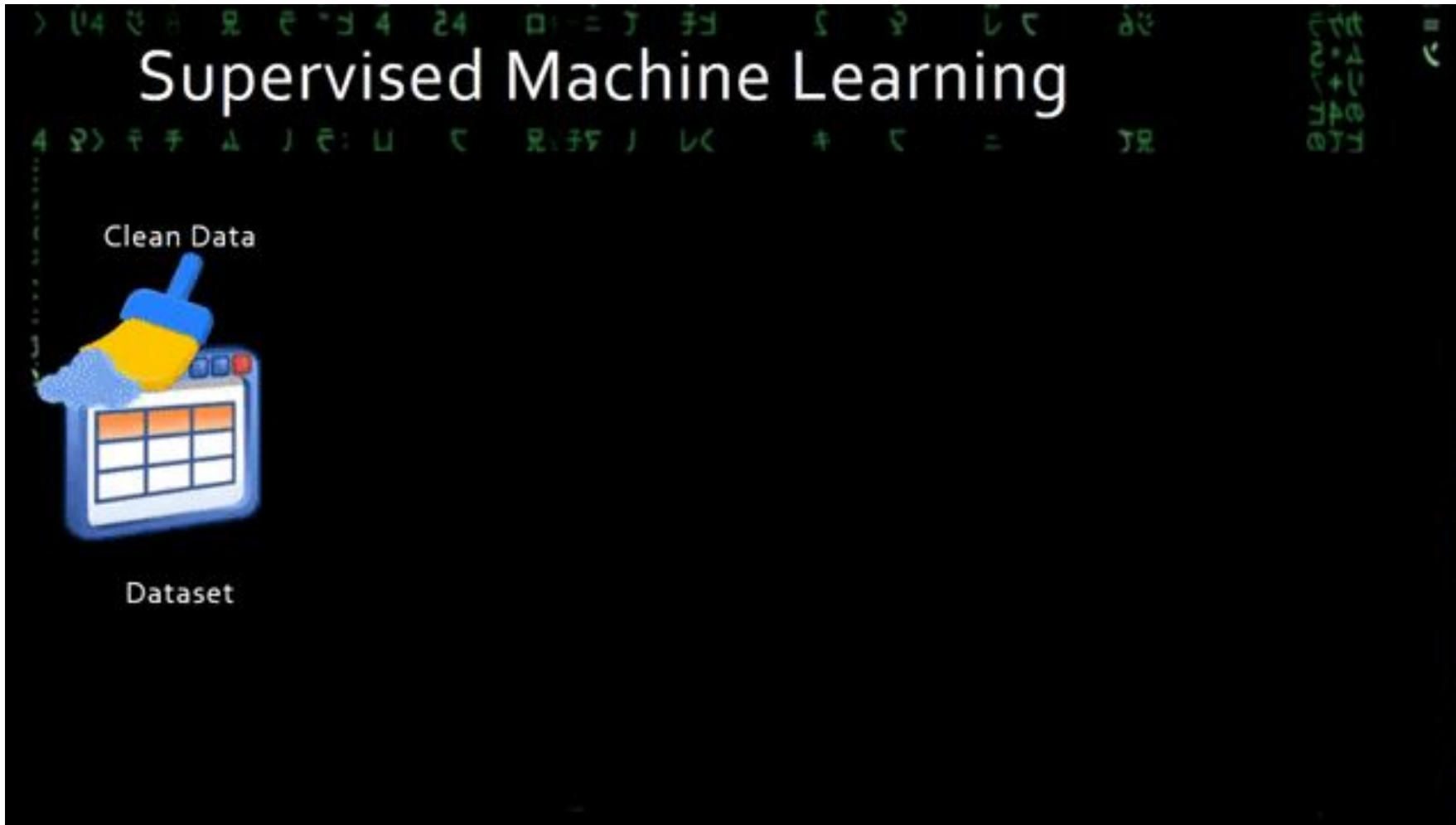
What is deep learning?



What is machine learning?



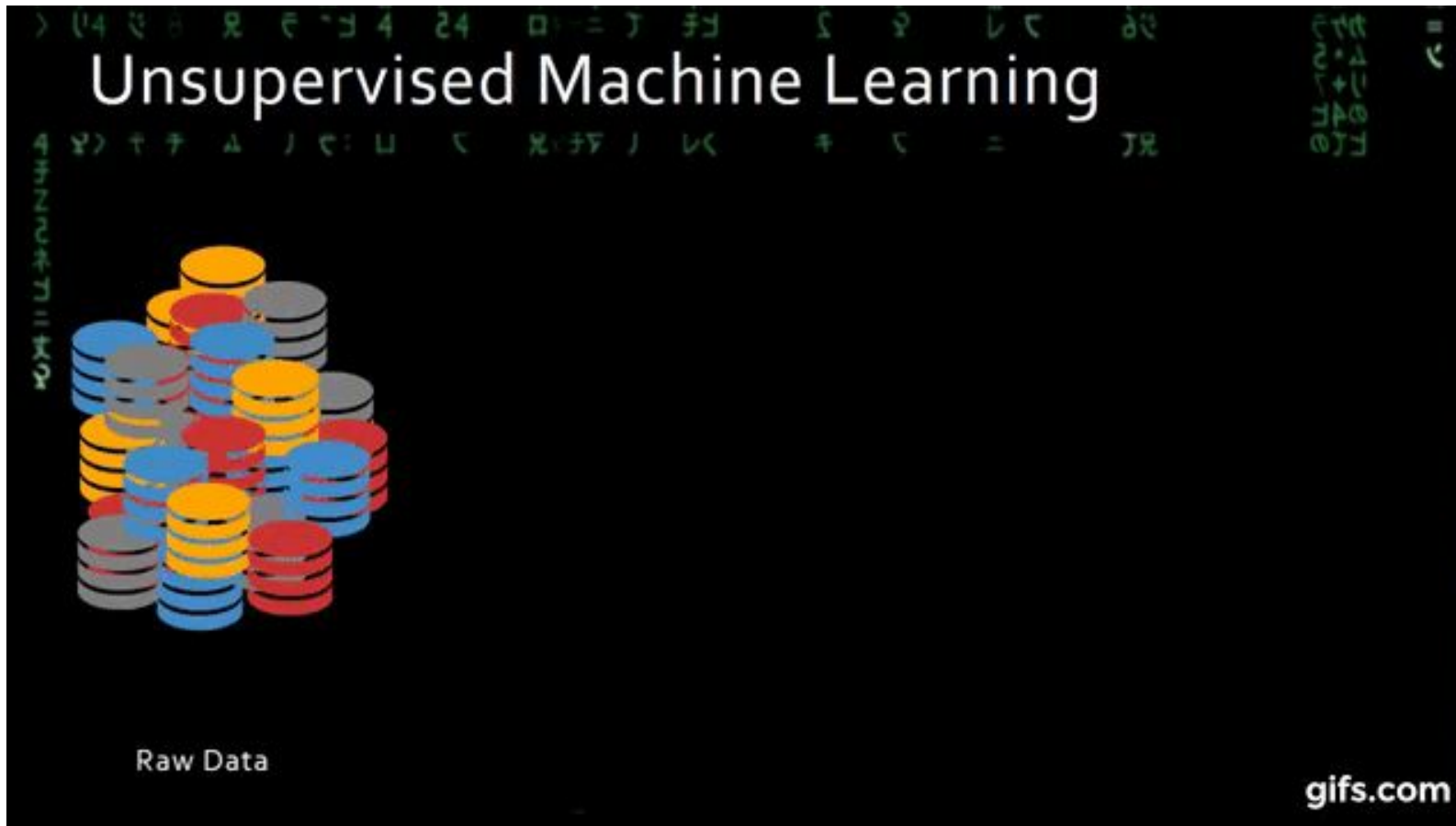
Supervised machine learning



Unsupervised machine learning

Unsupervised learning groups your data.

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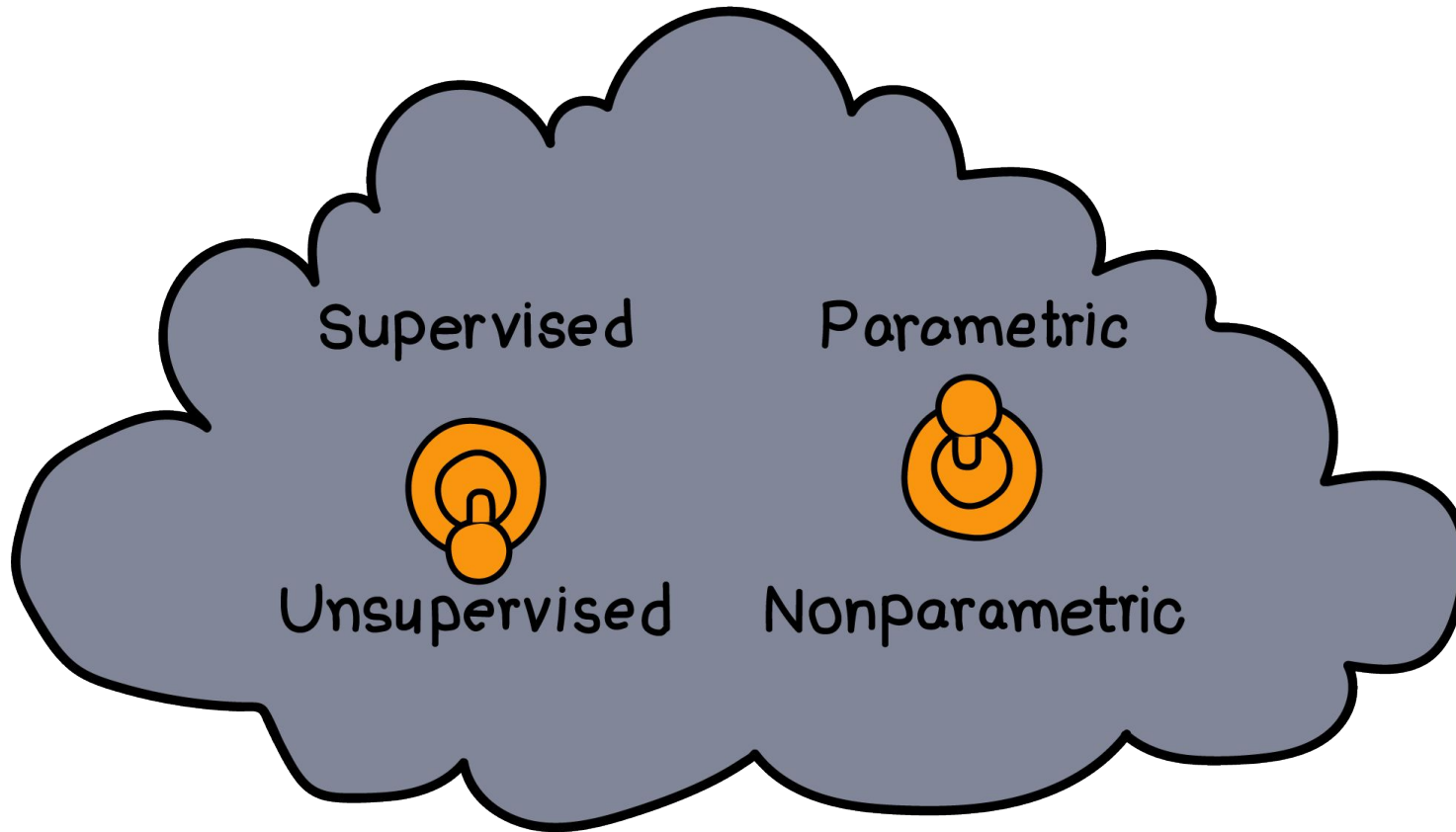
Unsupervised machine learning

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puppies
pizza
kittens
hot dog
burger



Parametric vs. nonparametric learning





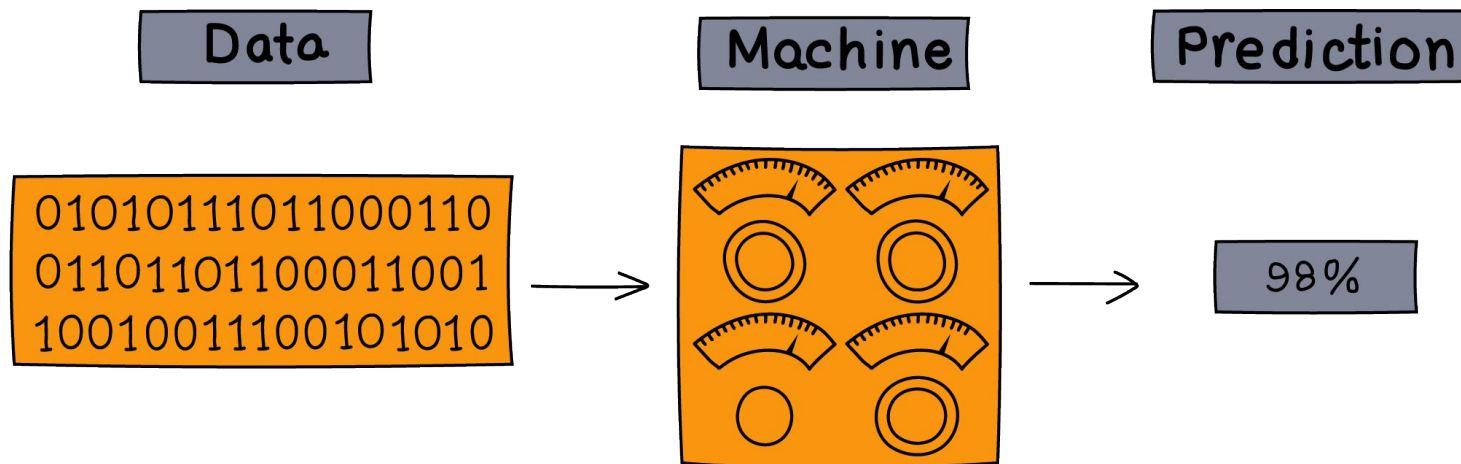
Supervised parametric learning

Oversimplified: Trial-and-error learning using dials

Supervised parametric learning

Step 1: Predict

- The first step, as mentioned, is to gather sports statistics, send them through the machine, and make a prediction about the probability that the Steelers will win.





Supervised parametric learning

Step 2: Compare to the truth pattern

- The second step is to compare the prediction (98%) with the pattern you care about (whether the Steelers won).
- Sadly, they lost, so the comparison is

Pred: 98% > Truth: 0%

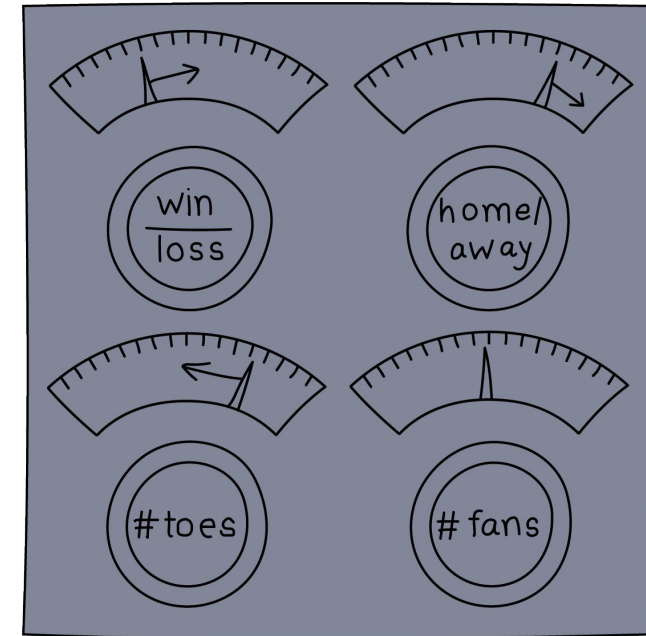
Supervised parametric learning

Step 3: Learn the pattern

- This step adjusts the dials by studying both how much the model missed by (98%) and what the input data was (sports stats) at the time of prediction.

Adjusting sensitivity by turning dials

Adjusting sensitivity
by turning knobs

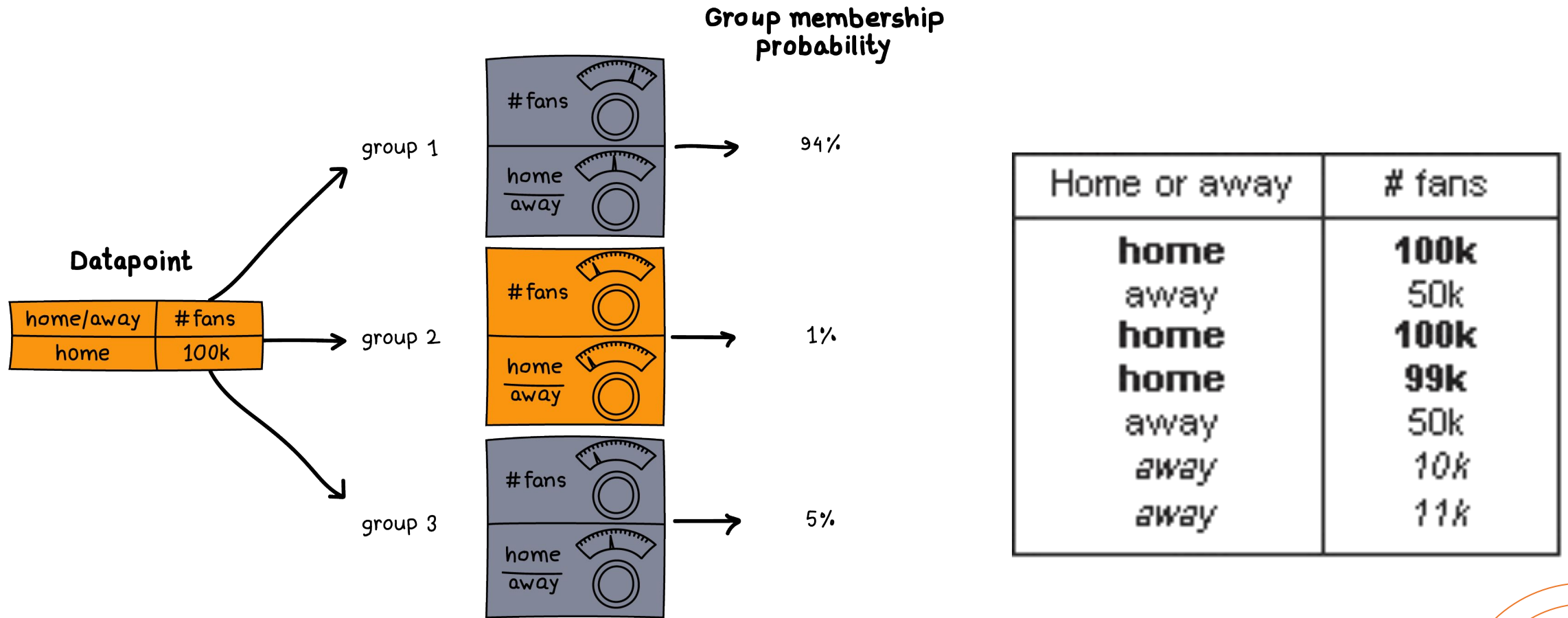


Unsupervised parametric learning

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	Parametric	Non-parametric
Assumed distribution	Normal	Any
Assumed variance	Homogeneous	Homogenous and Heterogeneous
Typical data	Ratio or Interval	Ordinal or Nominal
Data set relationships	Independent	Any
Usual central measure	Mean	Median
Benefits	Can draw more conclusions	Simplicity; Less affected by outliers

Unsupervised parametric learning

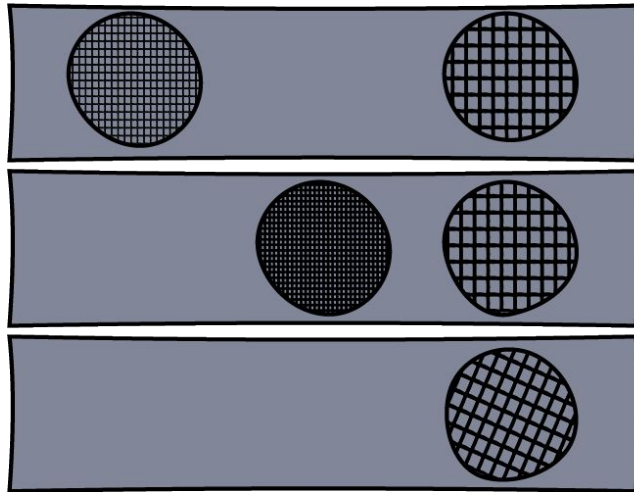


Nonparametric learning

	Parametric	Non-parametric
Assumed distribution	Normal	Any
Assumed variance	Homogeneous	Homogenous and Heterogeneous
Typical data	Ratio or Interval	Ordinal or Nominal
Data set relationships	Independent	Any
Usual central measure	Mean	Median
Benefits	Can draw more conclusions	Simplicity; Less affected by outliers

Nonparametric learning

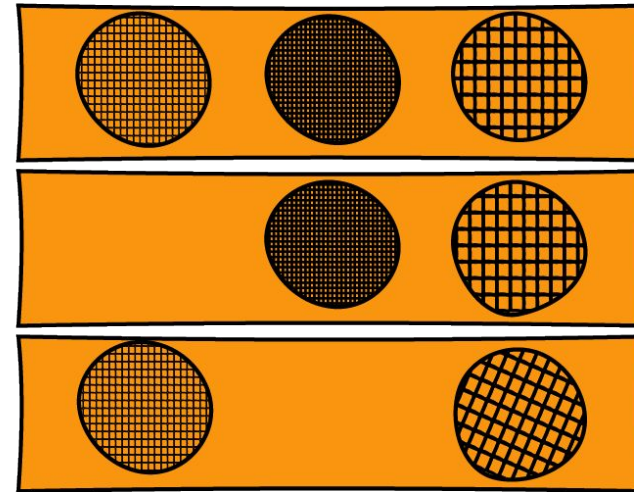
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Stop

Go

Stop



Go

Go

Stop



Summary

- In this lesson, we've gone a level deeper into the various flavors of machine learning.
- You learned that a machine learning algorithm is either supervised or unsupervised and either parametric or nonparametric.
- Furthermore, we explored exactly what makes these four different groups of algorithms distinct.