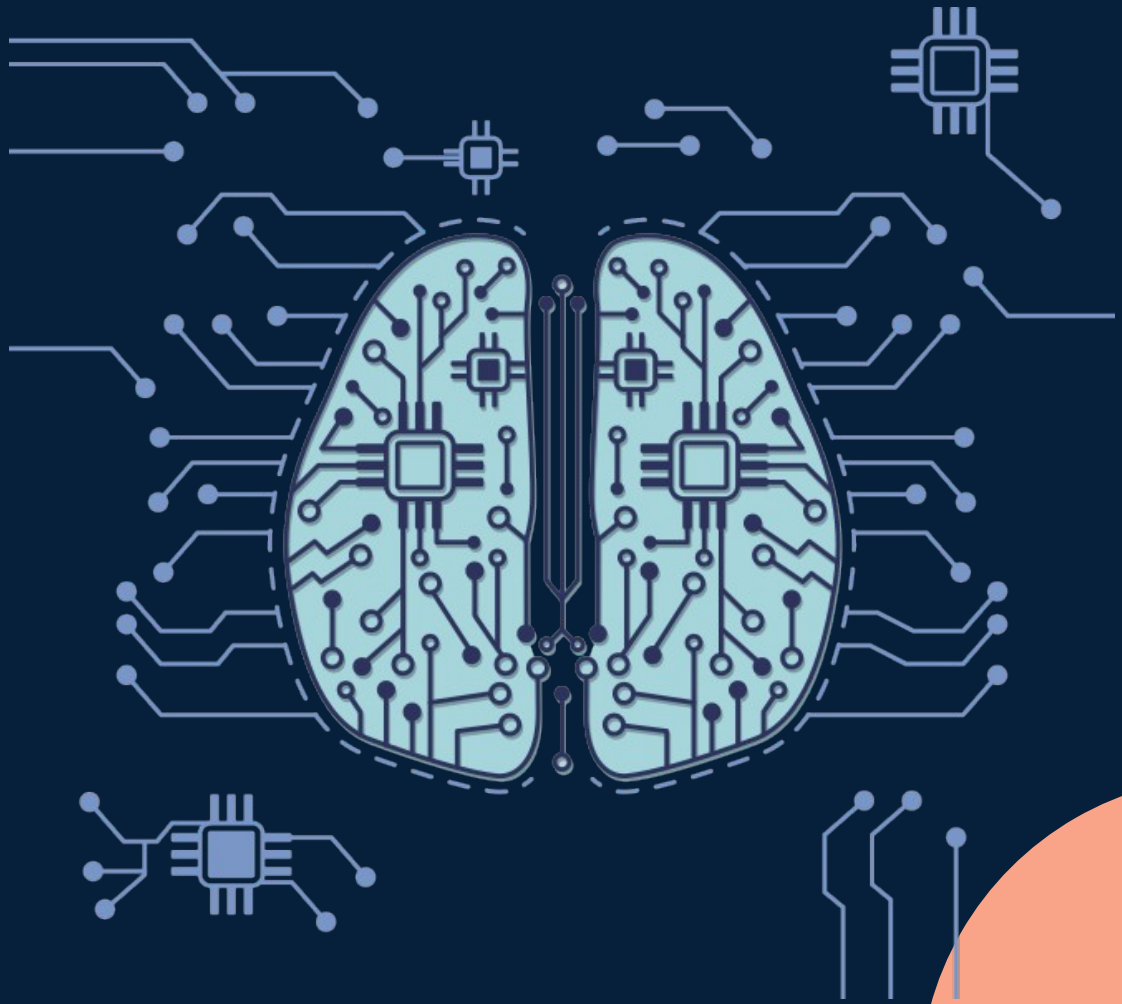
Types of AI & ML



PLAY · EXPERIENCE · LEARN

A POSTERIORI

Types of AI (Summary)

REACTIVE
No memory
Respond to stimuli

LIMITED MEMORY
Uses memory
Learn and improve

THEORY OF MIND
Understand the needs of others

SELF AWARE
Human-like intelligence
Self awareness

Most games AI, Deep Blue (Chess)

Machine Learning

Supervised

Unsupervised

Reinforcement

Doesn’t exist (yet...)

A POSTERIORI — PLAY · EXPERIENCE · LEARN

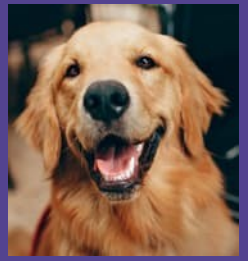
Supervised Learning (Review)

Training

"Dog" "Cat"

Machine Learning Model

Performing



Machine Learning Model

"It's a **Dog**"

Unsupervised Learning

Training

"???" "???"

Machine Learning Model

There are no labels.

How would that work???

Performing

Machine Learning Model

???

Unsupervised Learning

Lo siento

ελπίδα

Bailando

φιλοξενία

Estoy

ψυχή

Salud

υγεία

χαρμολύπη

Disculpa

1) Do you know what these words mean?

2) Can you split them into two groups?

Unsupervised Learning

- Cannot identify what it is looking at
  - ie. It cannot identify that a picture shows a dog
- Can find patterns in the data it is provided
- Can identify relationships between different items
- Commonly used for words and languages

Unsupervised Learning

- Unsupervised learning for words
  1) Prepare training data
  2) Extract features
  3) Calculate vectors

Unsupervised Learning

1) Prepare Training Data

FastText (Facebook)

10s of billions of words

GPT-3 (OpenAI)

100s of billions of words

Unsupervised Learning

2) Extract Features

In this example, we used only words of animals and consider only two features; Cuteness and Size.

In an actual model, subjective features like cuteness and size are poor choices, but it's easier to understand here.

	cuteness (0–100)	size (0–100)
kitten	95	15
hamster	80	8
tarantula	8	3
puppy	90	20
crocodile	5	40
dolphin	60	45
panda bear	75	40
lobster	2	15
capybara	70	30
elephant	65	90
mosquito	1	1
goldfish	25	2
horse	50	50
chicken	25	15

Unsupervised Learning

3) Calculate Vectors

We can visualize this data by plotting it on the X and Y axis.

Numbers used to identify a point in space is called a Vector.

Here we only have two features, so it's a 2 dimensional vector, but actual models usually use 100s of features.

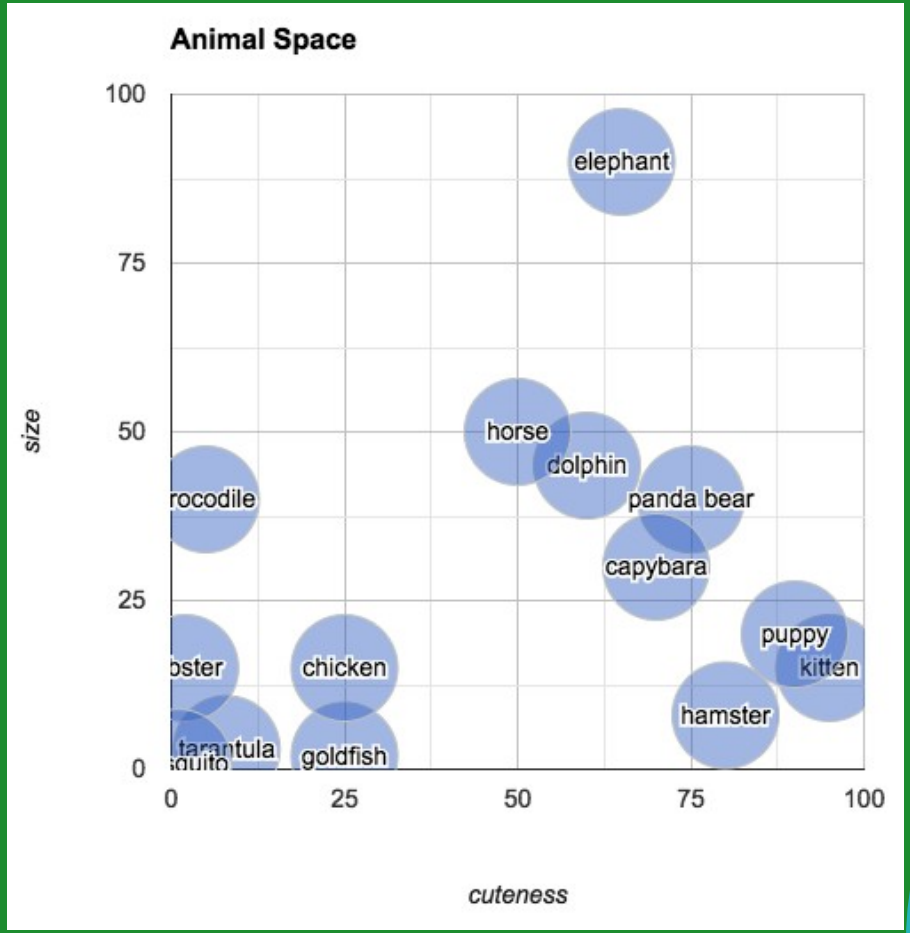
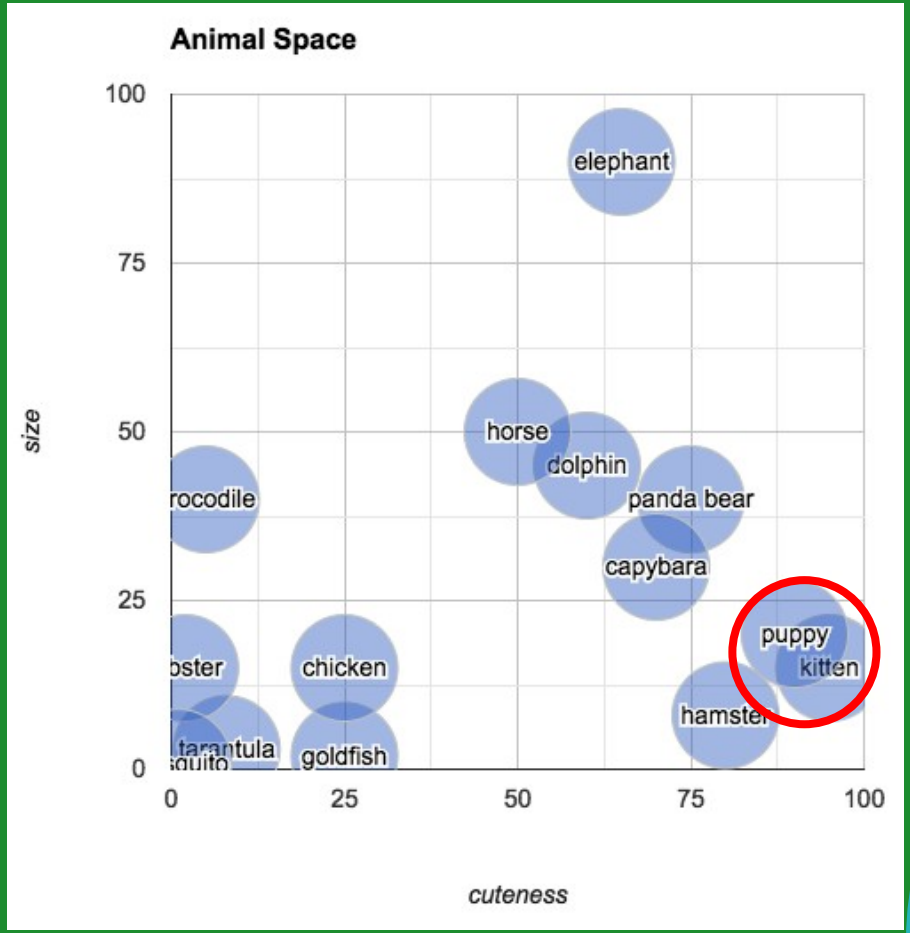


Table and plot of animals made Allison Parish and used under CC BY 4.0

Unsupervised Learning

Some information that we can extract from this...

Puppies and Kittens are very similar. The distance between them are small.



Unsupervised Learning

Some information that we can extract from this...

Pandas and Tarantulas are very different. The distance between them are large.

Distance can be calculated using...

Dist = Sqrt((x2-x1)^2 + (y2-y1)^2)

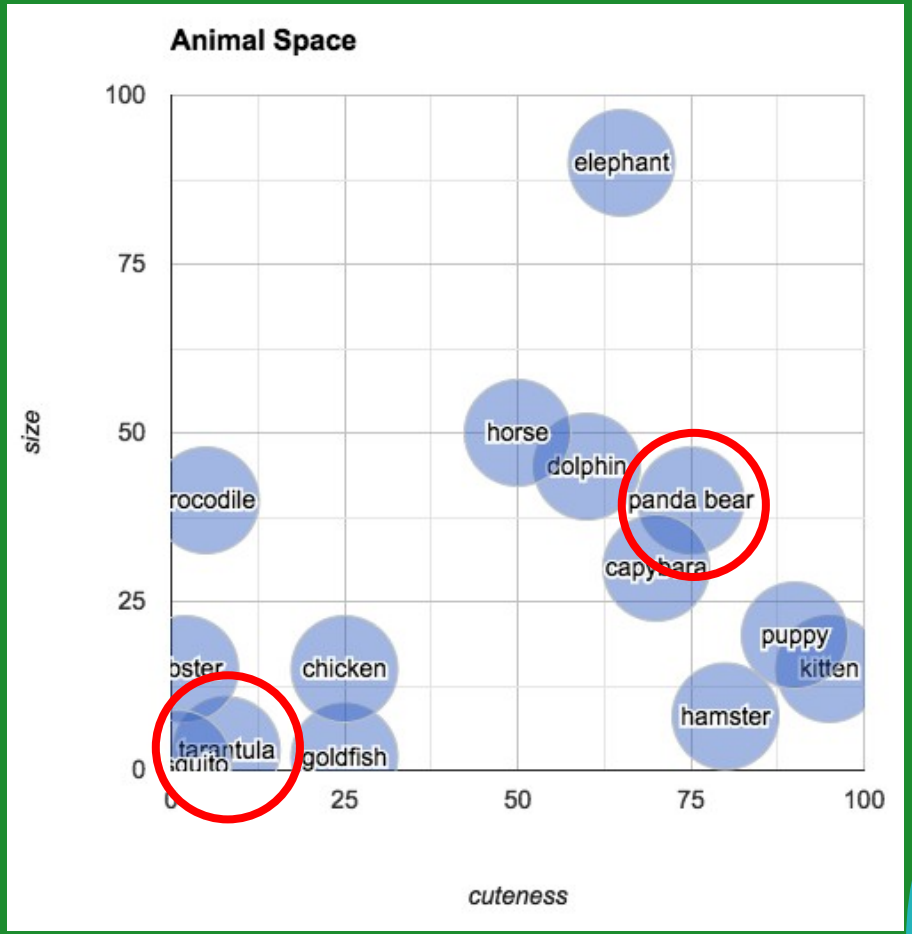
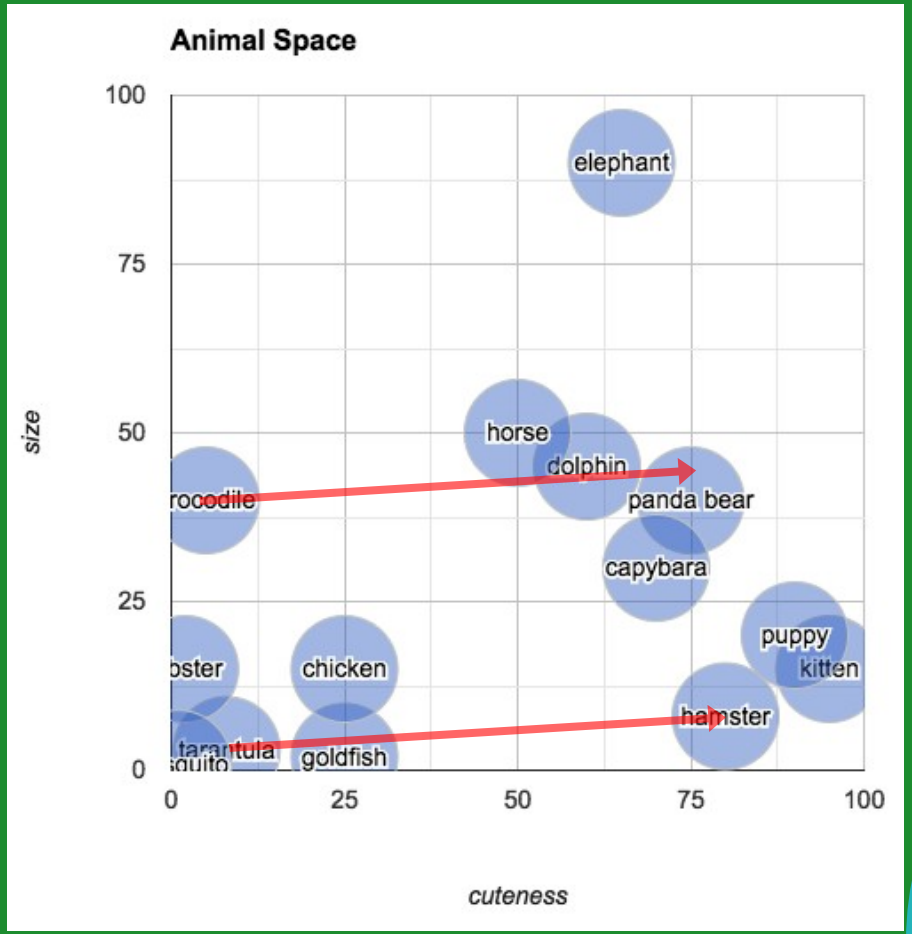


Table and plot of animals made Allison Parish and used under CC BY 4.0

Unsupervised Learning

We can extract analogous relationships.

“Tarantulas are to hamsters as crocodiles are to pandas”

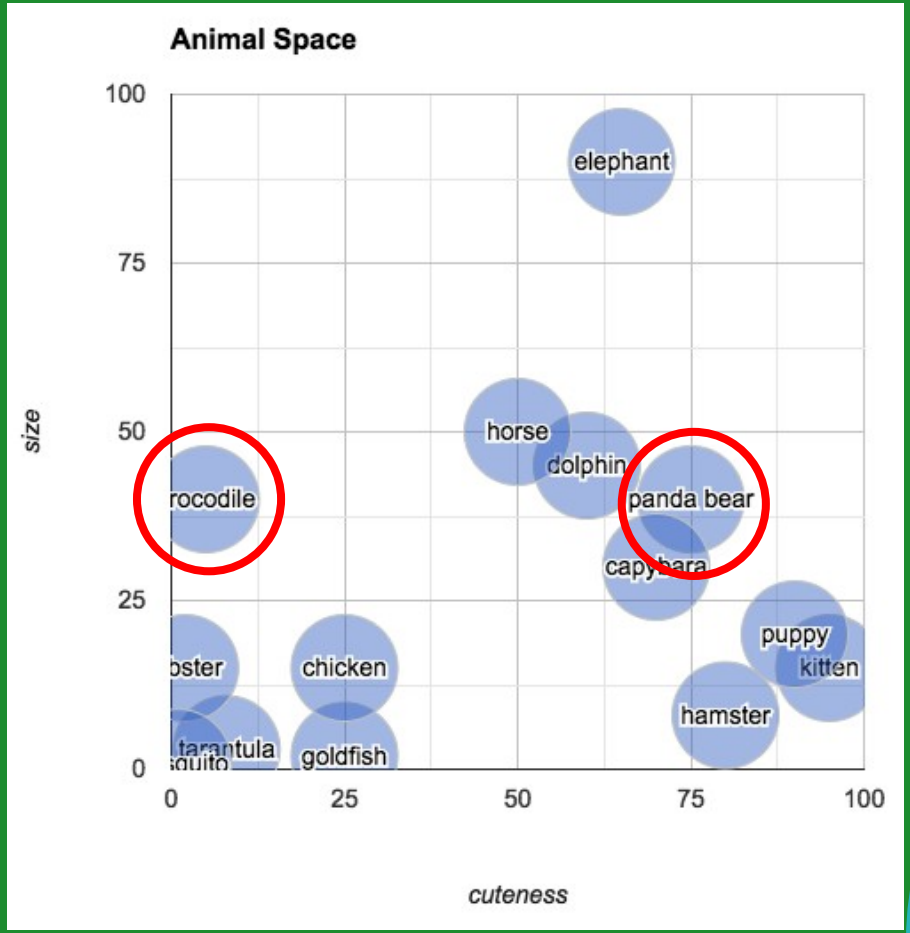


Unsupervised Learning

We can also perform arithmetics.

Panda – Crocodile
= 70 cuteness, 0 size

This tells us the the essence of the difference between them is mainly cuteness.



Features from Words

- Distributional hypothesis
  - Linguistic items with similar distributions have similar meanings.

Features from Words

- Example:

  It was really cold yesterday.

  It will be really warm today, though.

  It'll be really hot tomorrow!

  Will it be really cool Tuesday?

Features from Words

- Example:

  It was really cold yesterday.

  It will be really warm today, though.

  It'll be really hot tomorrow!

  Will it be really cool Tuesday?

The words, “cold”, “warm”, “hot”, “cool” are probably related. They are all in the same context; between “really” and a word for a day.

Features from Words

- Count how many times each word appears in a context and use the count as our vector
- What is a context is not set in stone
- Researchers are still exploring different ways to determine context
- Vectors usually have a 100s of dimensions

AI with Words

- Generally not practical to generate your own words vectors
- Make use of models created by other researchers (eg. FastText)

Demo and Experiments

- https://ecraft2learn.github.io/ai/snap/snap.html?project=words&editMode

Biasness

- AI is trained using words and sentences written by human
- It may have captured societal biases
- Unlike a human, the AI doesn’t understand the words, nor does it understand what it means to be bias
- It’s up to us to use these AI in a responsible manner

A POSTERIORI

Play · Experience · Learn

- Created by A Posteriori LLP
- Visit http://aposteriori.com.sg/ for more tips and tutorials
-
- Some vector art created by freepik - www.freepik.com

PLAY · EXPERIENCE · LEARN

A POSTERIORI