

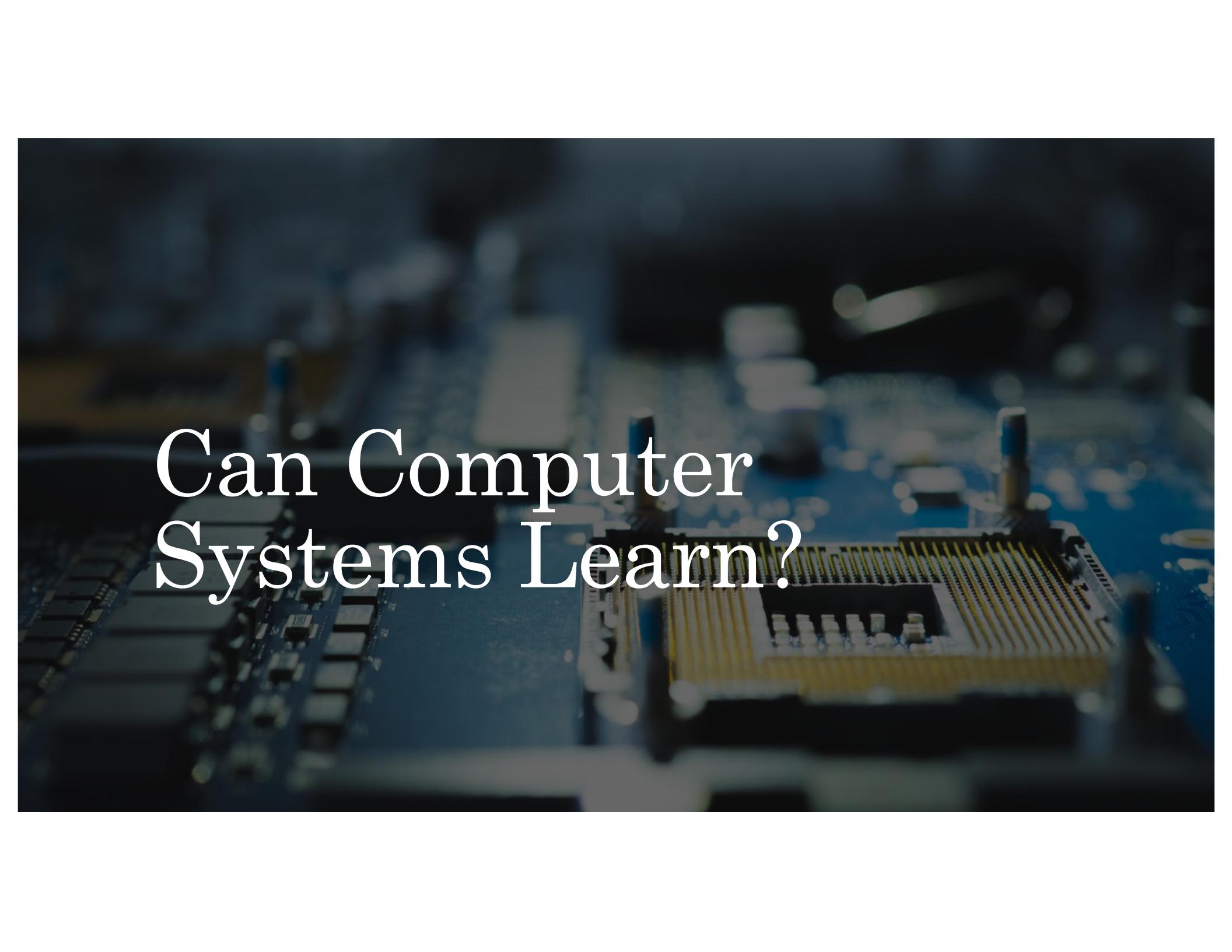
# Intro to Machine Learning





Paris





Can Computer  
Systems Learn?

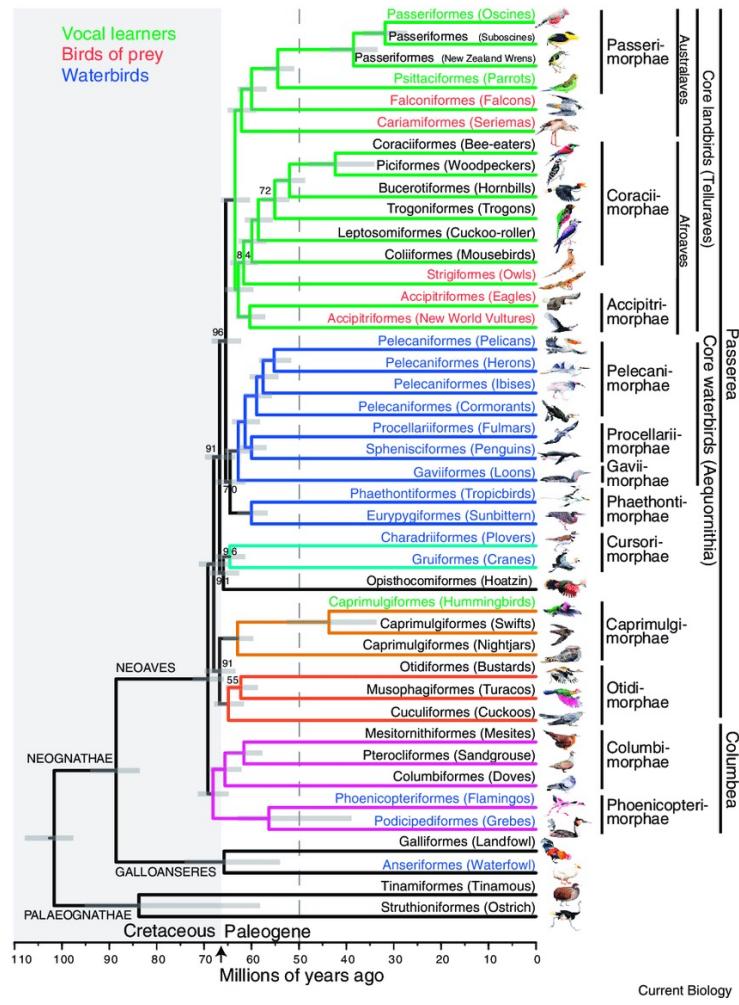
A black and white photograph showing a large room filled with rows of modern, shell-shaped chairs. The chairs are arranged in several rows, facing towards the right side of the frame. The room has a high ceiling and appears to be a lecture hall or a large conference room. The lighting is dramatic, with strong shadows and highlights on the chairs.

Learn





# Bird Types



# Features of Birds for a Kid



WINGS



FEATHERS



FLIES



2 EYES



2 FEET



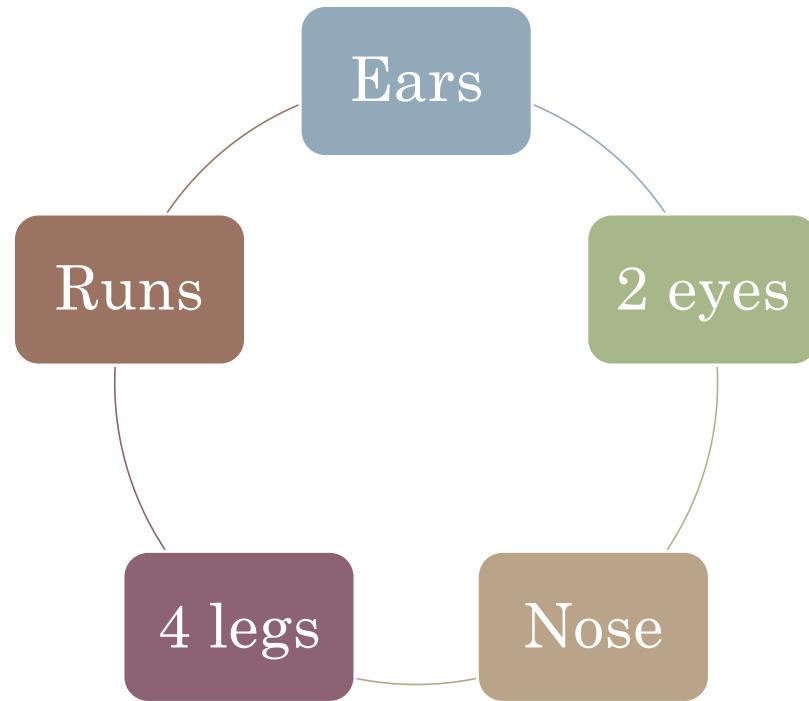
BILL



• Ducks and Birds



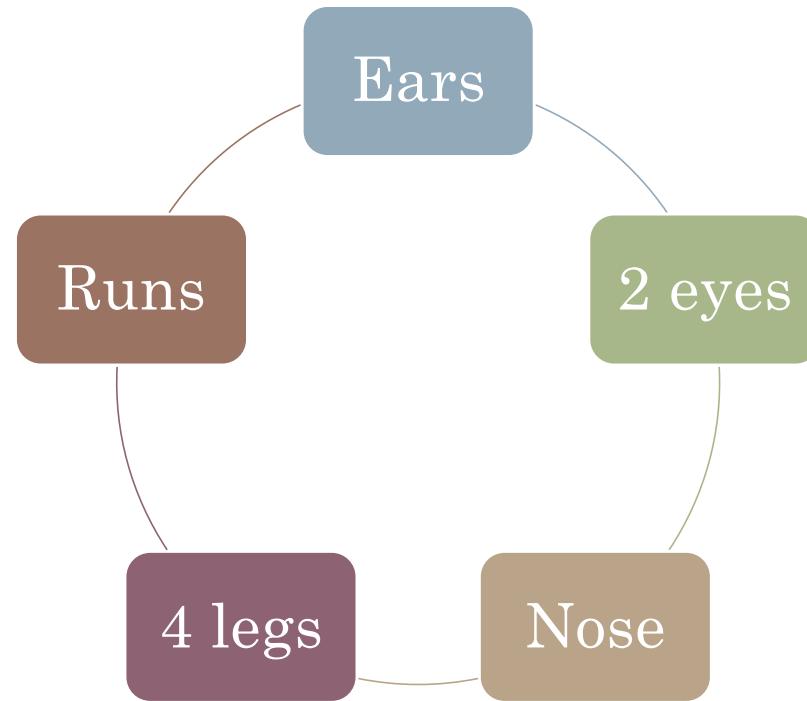
# Features of a Dog to a Kid





# Cats

# Features of a Cat to a Kid



# What Separates Cats and Dogs to a Kid?

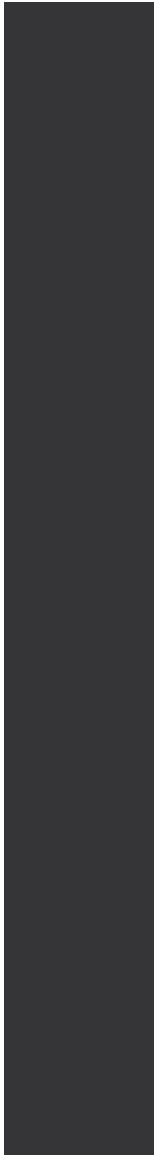








Paris

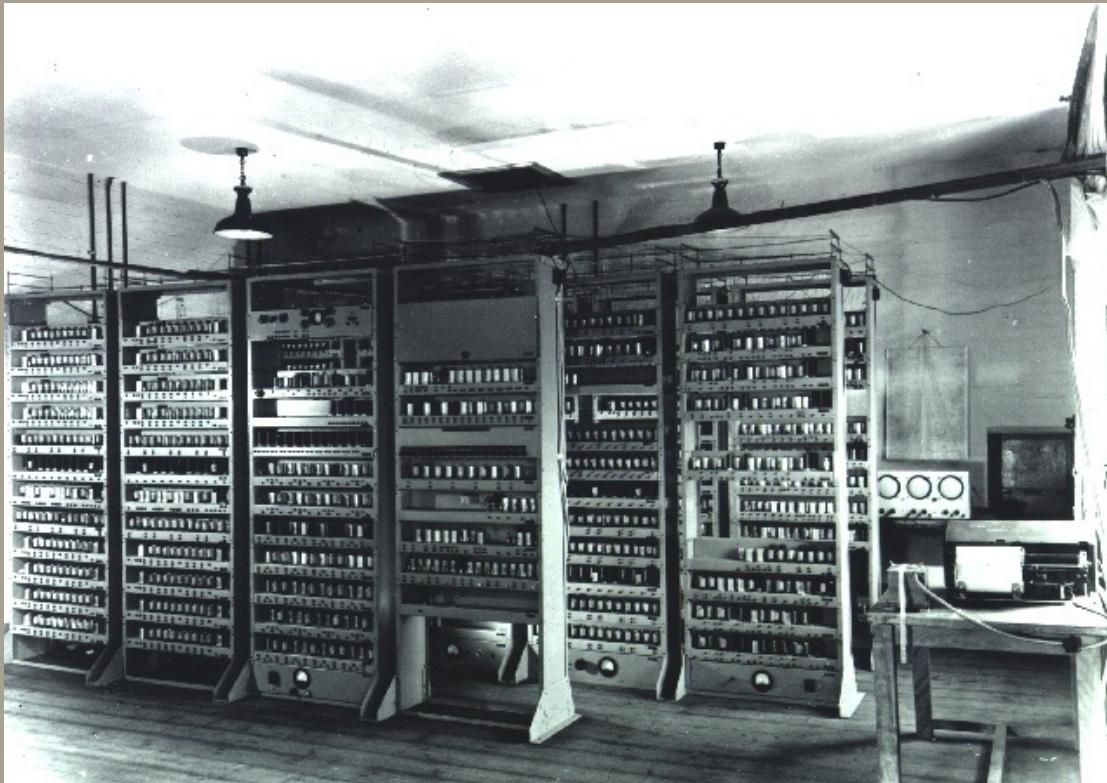


# Part Two: Artificial Intelligence vs. ML vs. Deep Learning

---

AI  
Brute  
Force

OXO  
(1952)





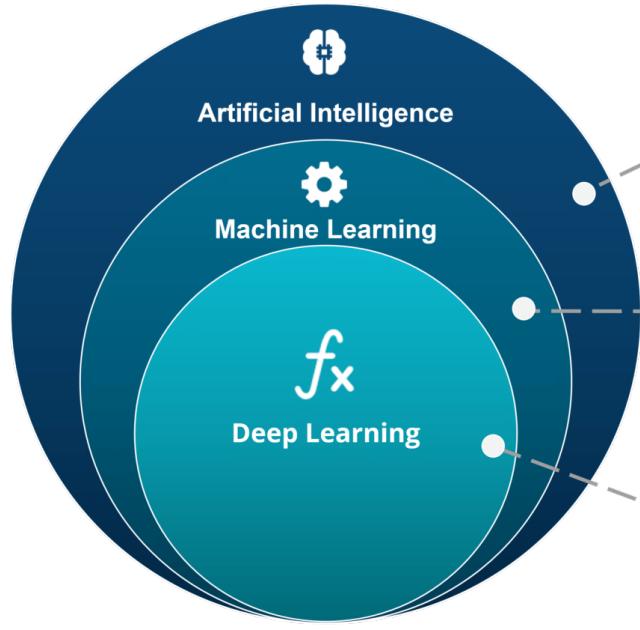
# Chess and Shannon Number



# AI and Deep Blue (1997)



# ML Approach (2016)



### **ARTIFICIAL INTELLIGENCE**

A technique which enables machines to mimic human behaviour

### **MACHINE LEARNING**

Subset of AI technique which use statistical methods to enable machines to improve with experience

### **DEEP LEARNING**

Subset of ML which make the computation of multi-layer neural network feasible

# Deep Learning

# AI with Text

- Sentence 1: “Basketball is a great sport.”
- Sentence 2: “Baseball is a fun thing to play.”
- Sentence 3: “I enjoy tacos.”
  
- If a sport is referenced in a sentence, then the sentence deals with sports

---

Sentence 1: “Basketball is a great sport.”

---

Sentence 2: “Baseball is a fun thing to play.”

---

Sentence 3: “I enjoy tacos.”

---

1) Break down the sentence into key words relative to the corpus (TF-IDF)

---

2) Use those key words as features to hone an ML model with each word receiving a 0 or 1 whether it is in the sentence or not.

---

## ML with Text

Sentence 1: **"John has some cats"**

Sentence 2: **"Cats eat fish"**

Sentence 3: **"I eat a big fish"**



After Stop-words removal,  
Lemmatization and Tokenization

Sentence 1: **{ "John", "cat" }**

Sentence 2: **{"cat", "eat", "fish"}**

Sentence 3: **{"eat", "big", "fish"}**

# Deep Learning with Text



Sentence 1: "Basketball is a great sport."



Sentence 2: "Baseball is a fun thing to play."



Sentence 3: "I enjoy tacos."



1) Convert all texts and all words into numbers

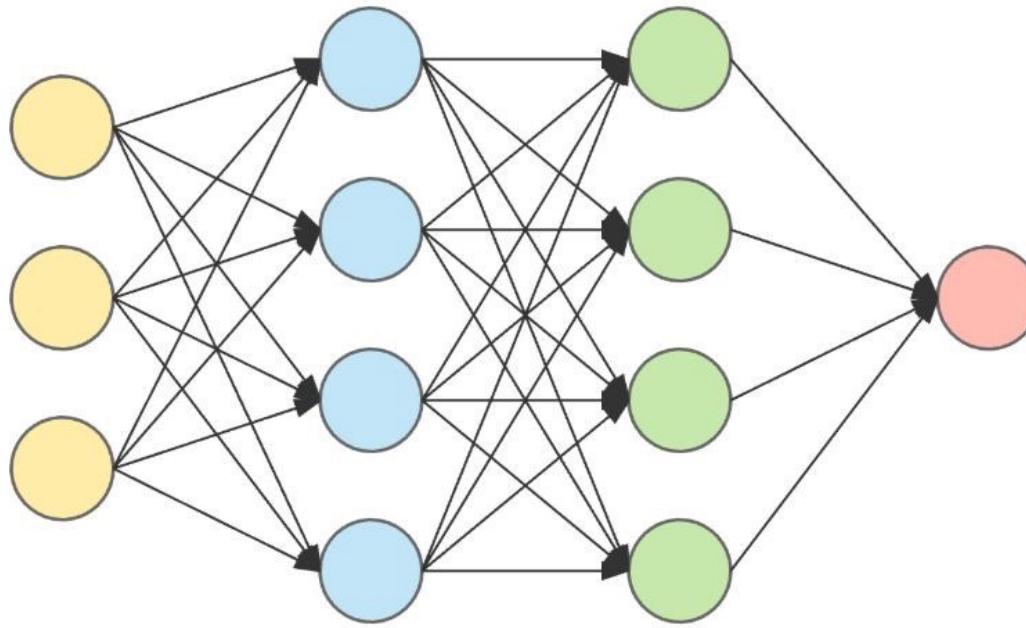


2) Provide some labeled data

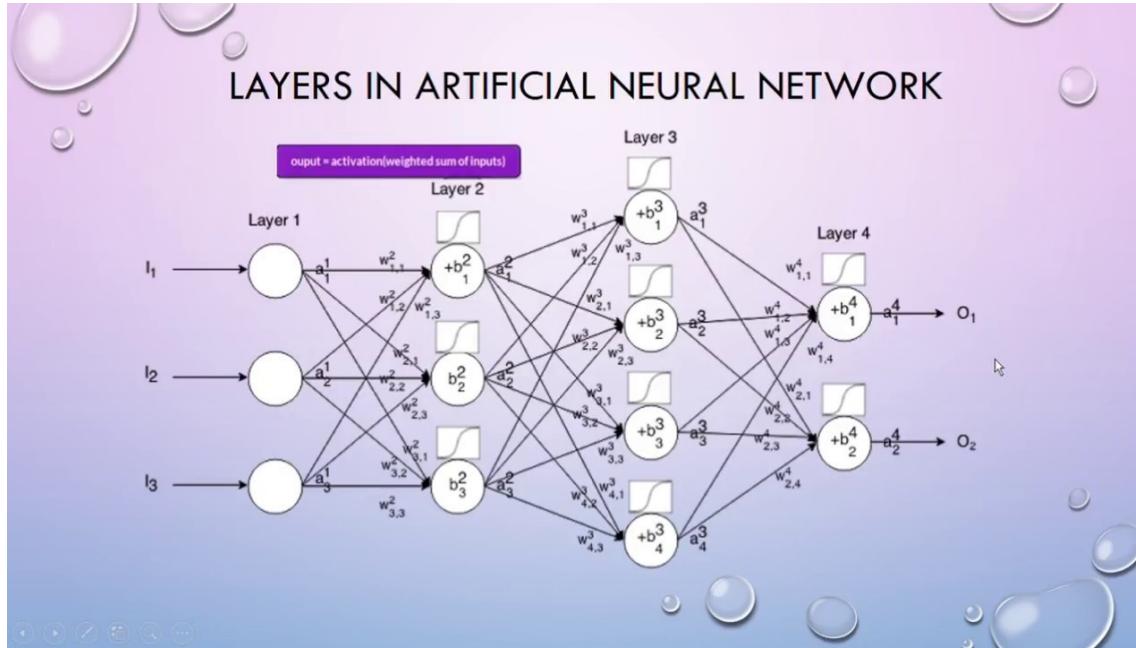


3) Allow the deep learning model to learn the texts (and the language) broadly.

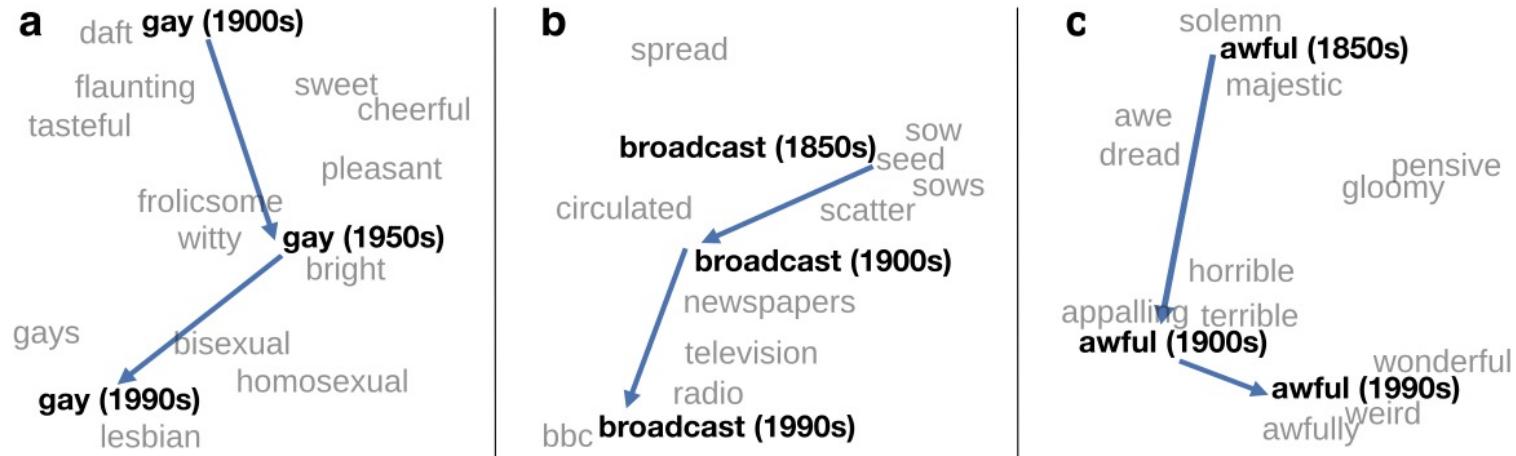
# Part Three: Deep Learning & Neural Network Methods



# Neural Network (Simple)



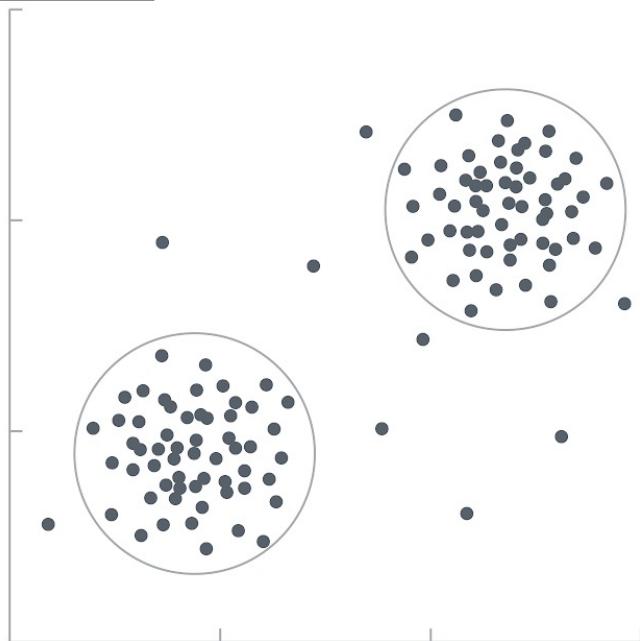
# Neural Network (Complex)



# Word Embedding

Data Labels  
Unknown

**UNSUPERVISED**



**SUPERVISED**

Data Labels  
Known

