

ICCS482 Deep Learning

Lecture 2: What is Deep Learning?

Sunsern Cheamanunkul, Sep 10, 2020.

Artificial Intelligence (AI)

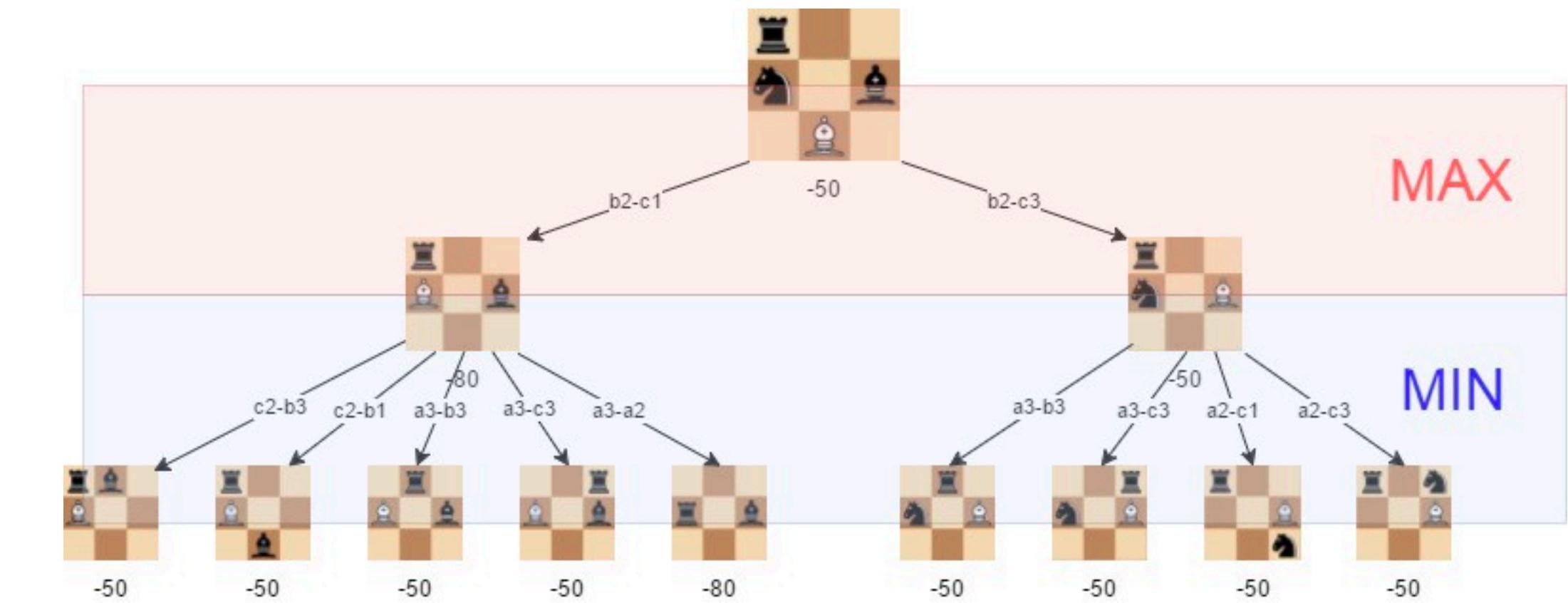


2017 Alpha Go

1950's Alan Turing

'Turing Test'

1955 AI is first introduced



1997 Deep Blue (IBM)

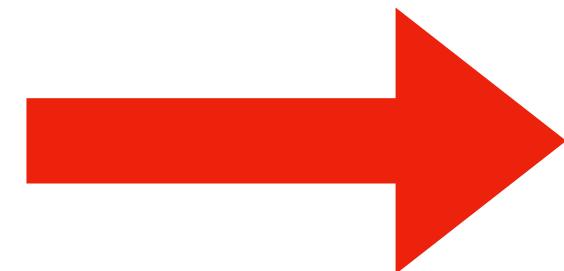
2000 RoboK

2011 Apple Siri

Machine Learning (ML)

Early AIs - rule-based
- search

ML - learning from past
observation

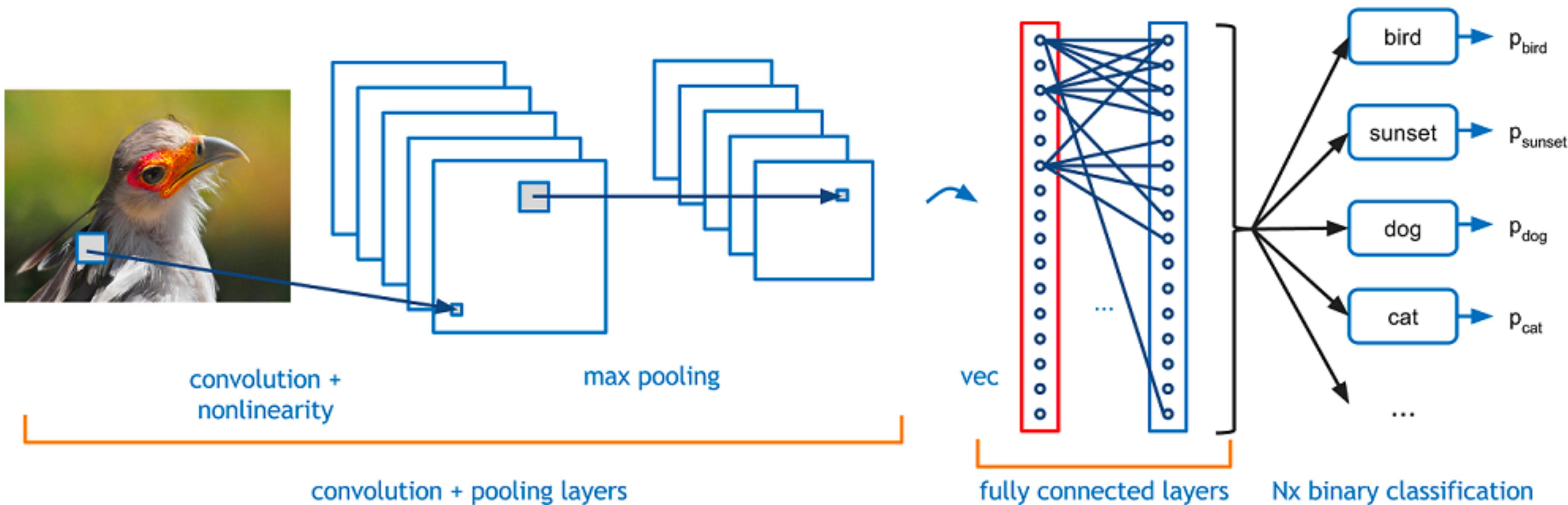


Deep Learning (DL)

article writing

code writing

compose music



AI, ML, DL

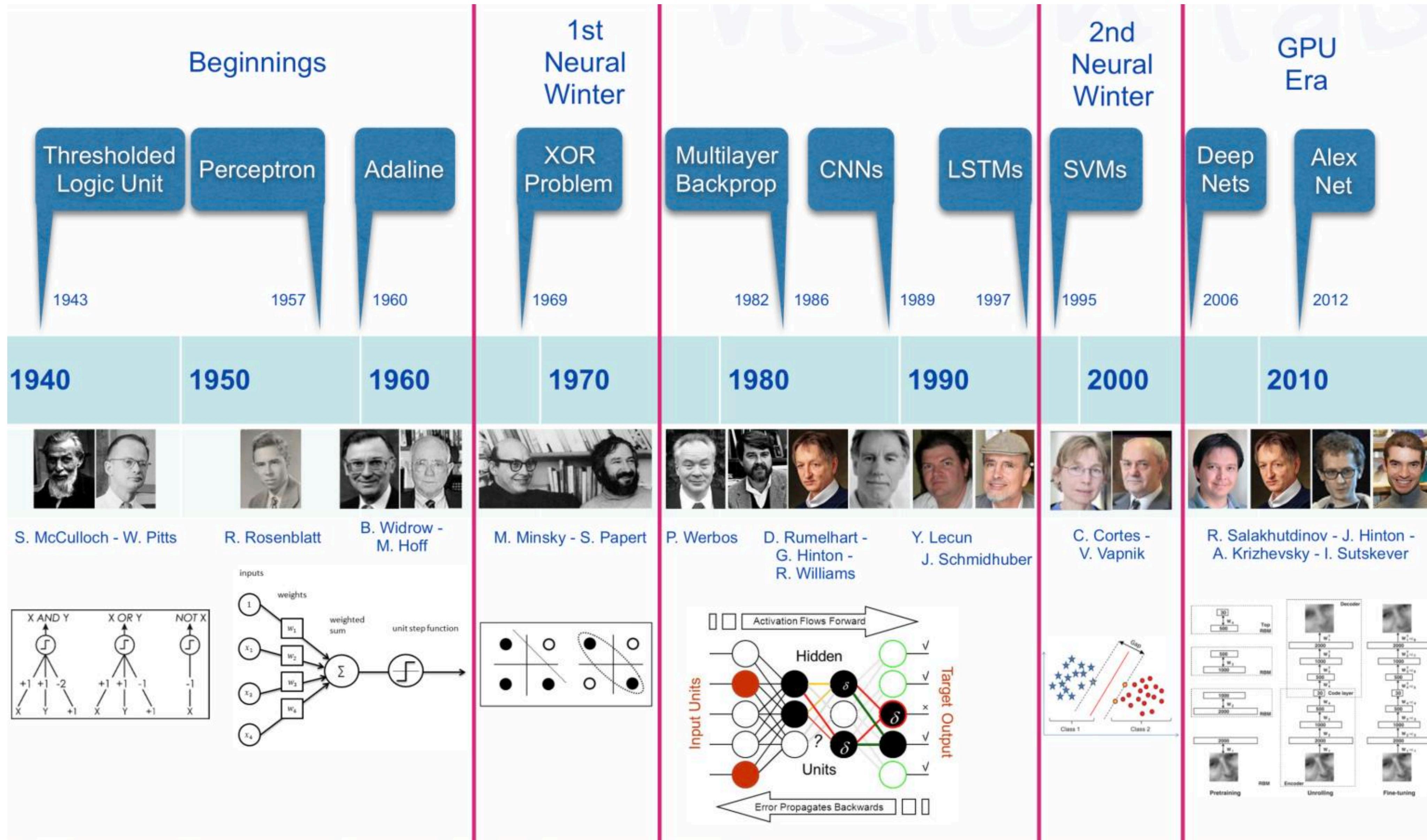
Artificial Intelligence

Any technique which enables computers to mimic human behavior

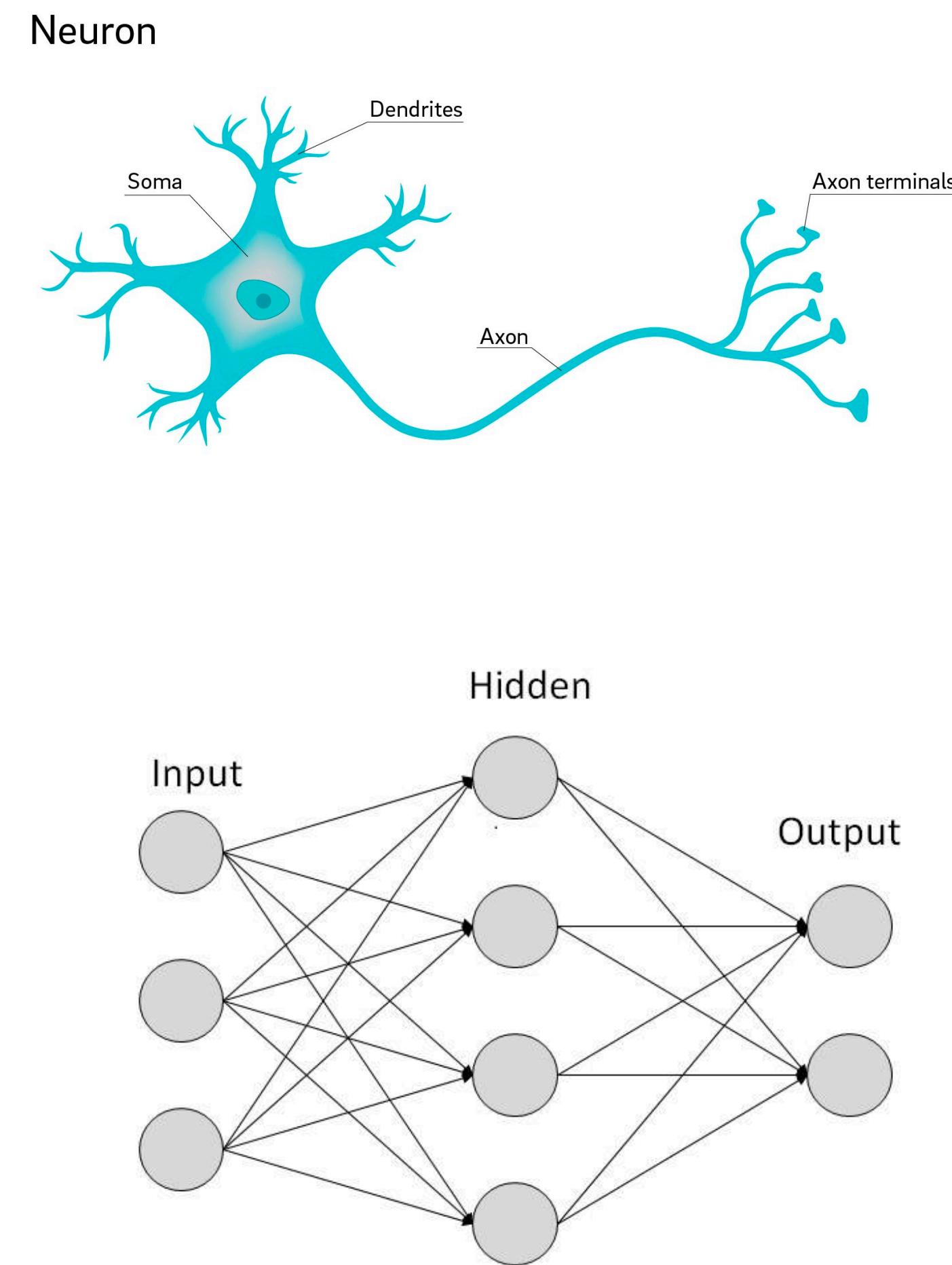
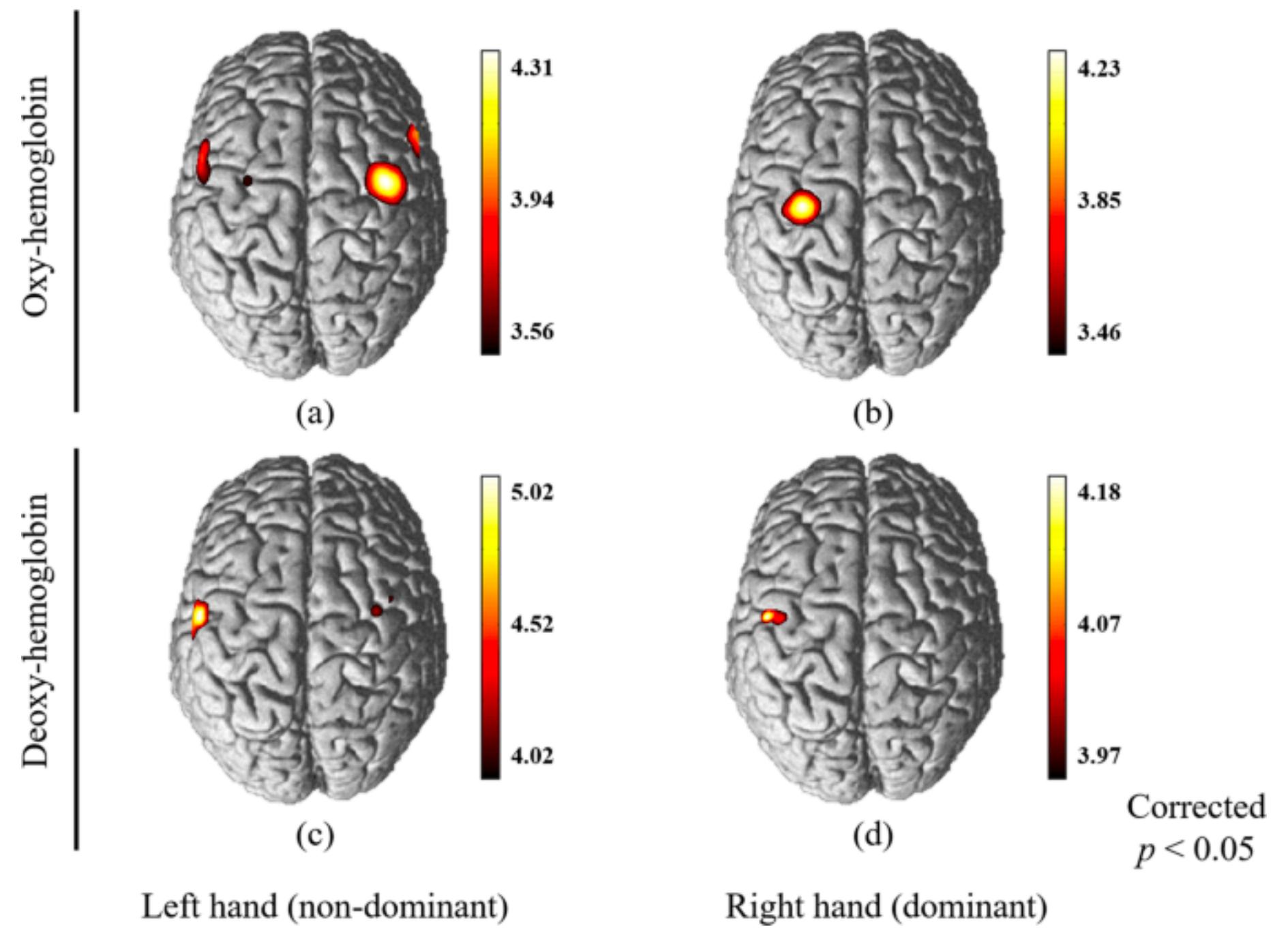
Machine Learning

AI-techniques that allow computers to automatically learn and improve from experience without being explicitly programmed

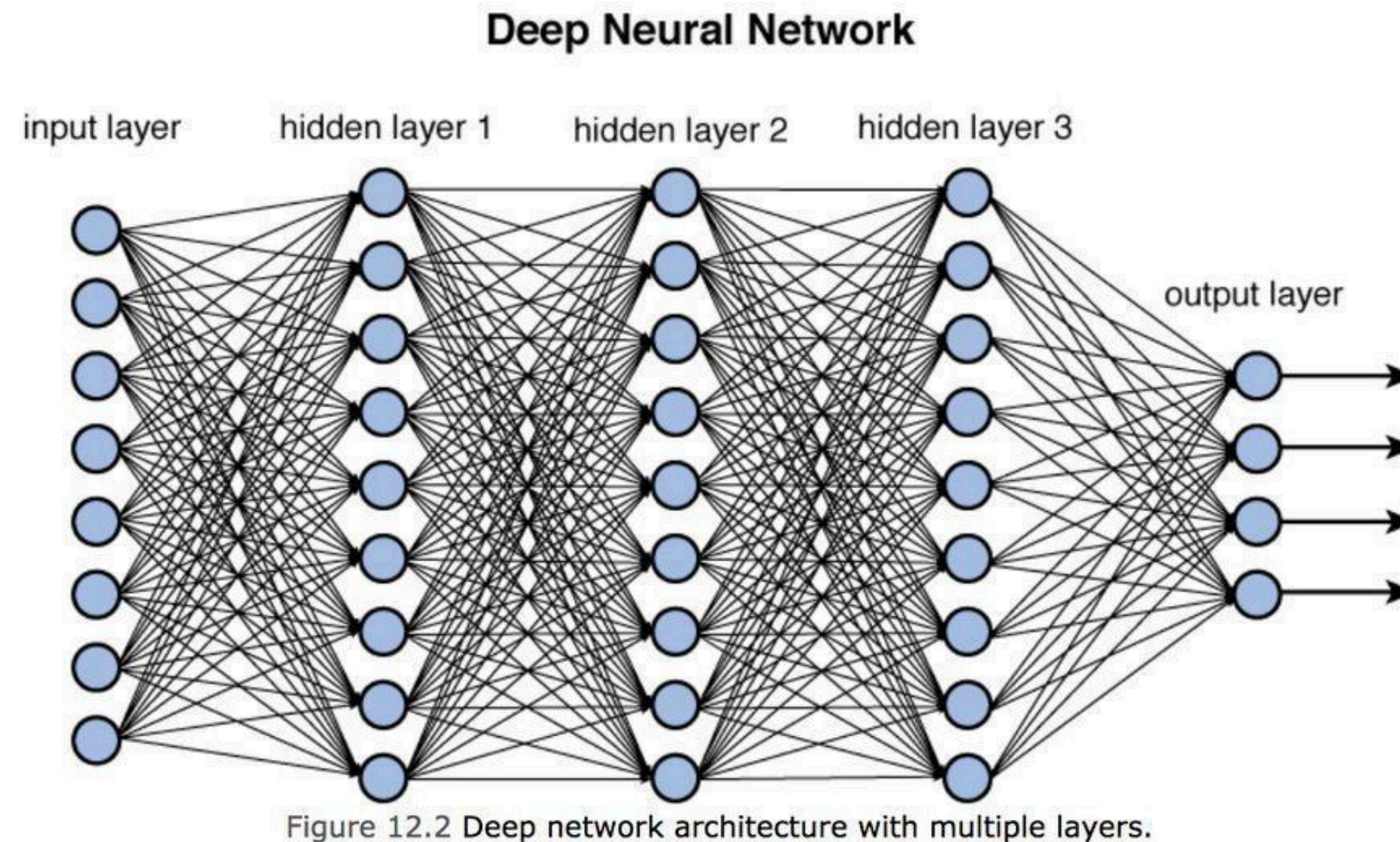
Deep
Learning



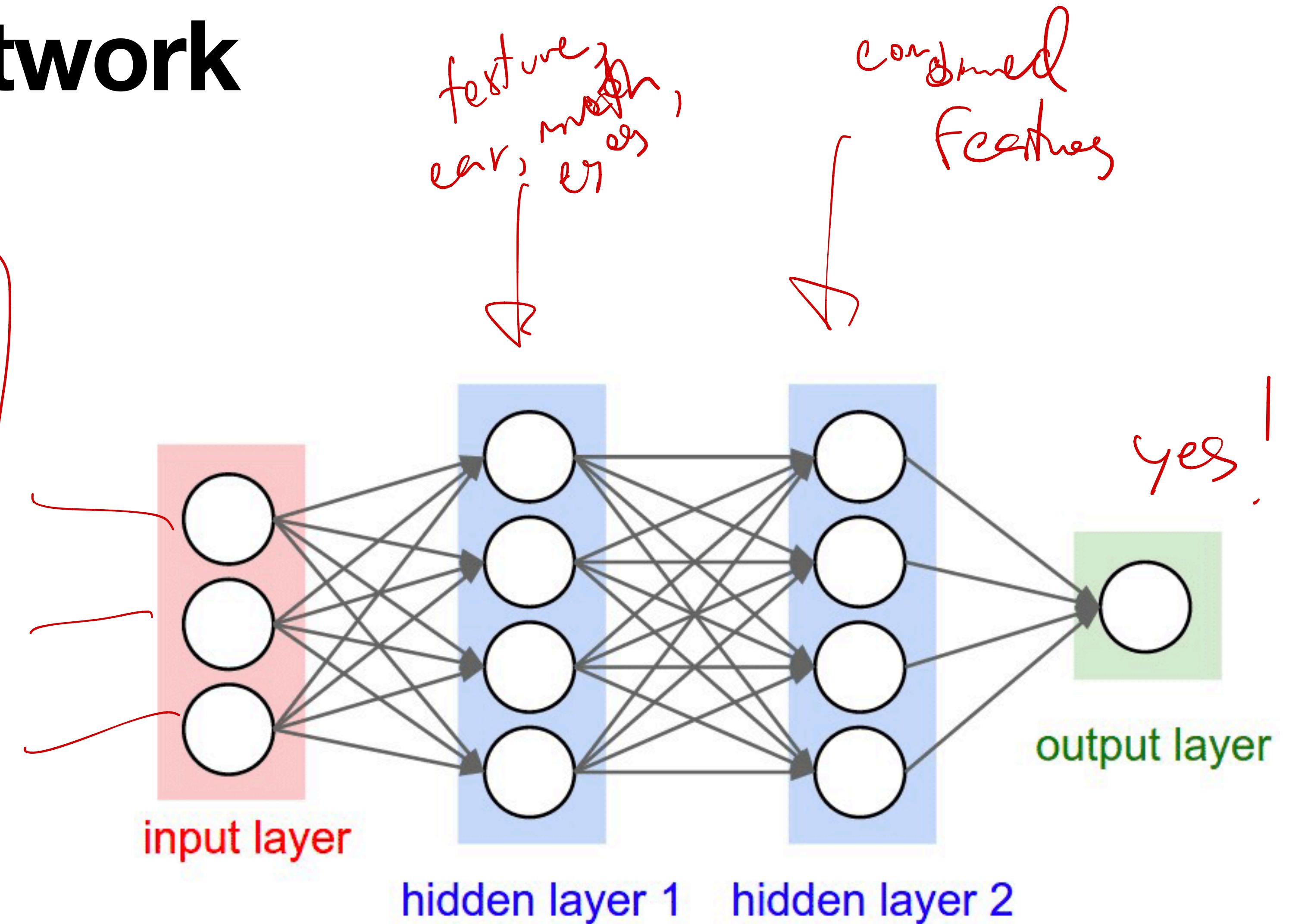
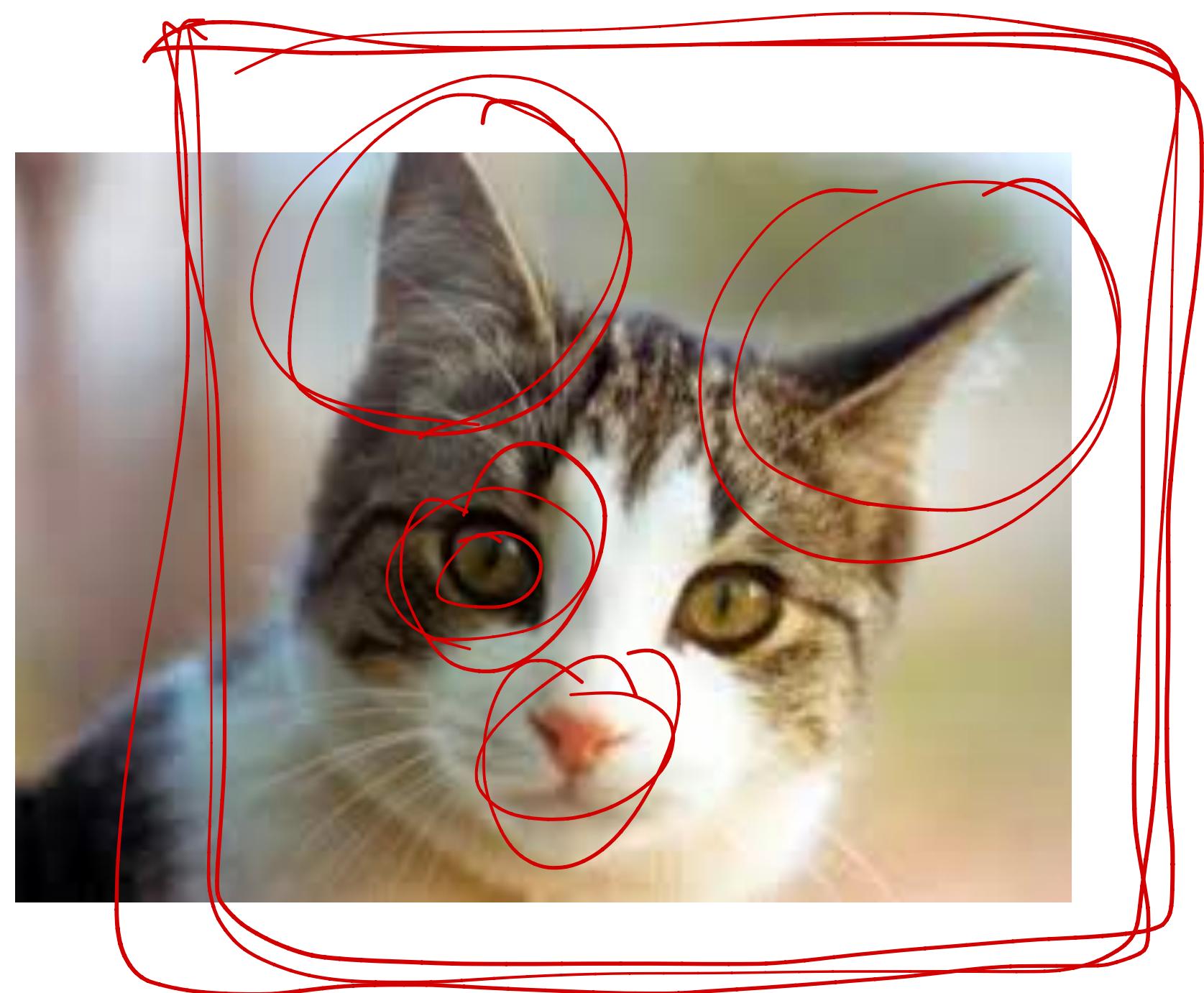
Neural Network



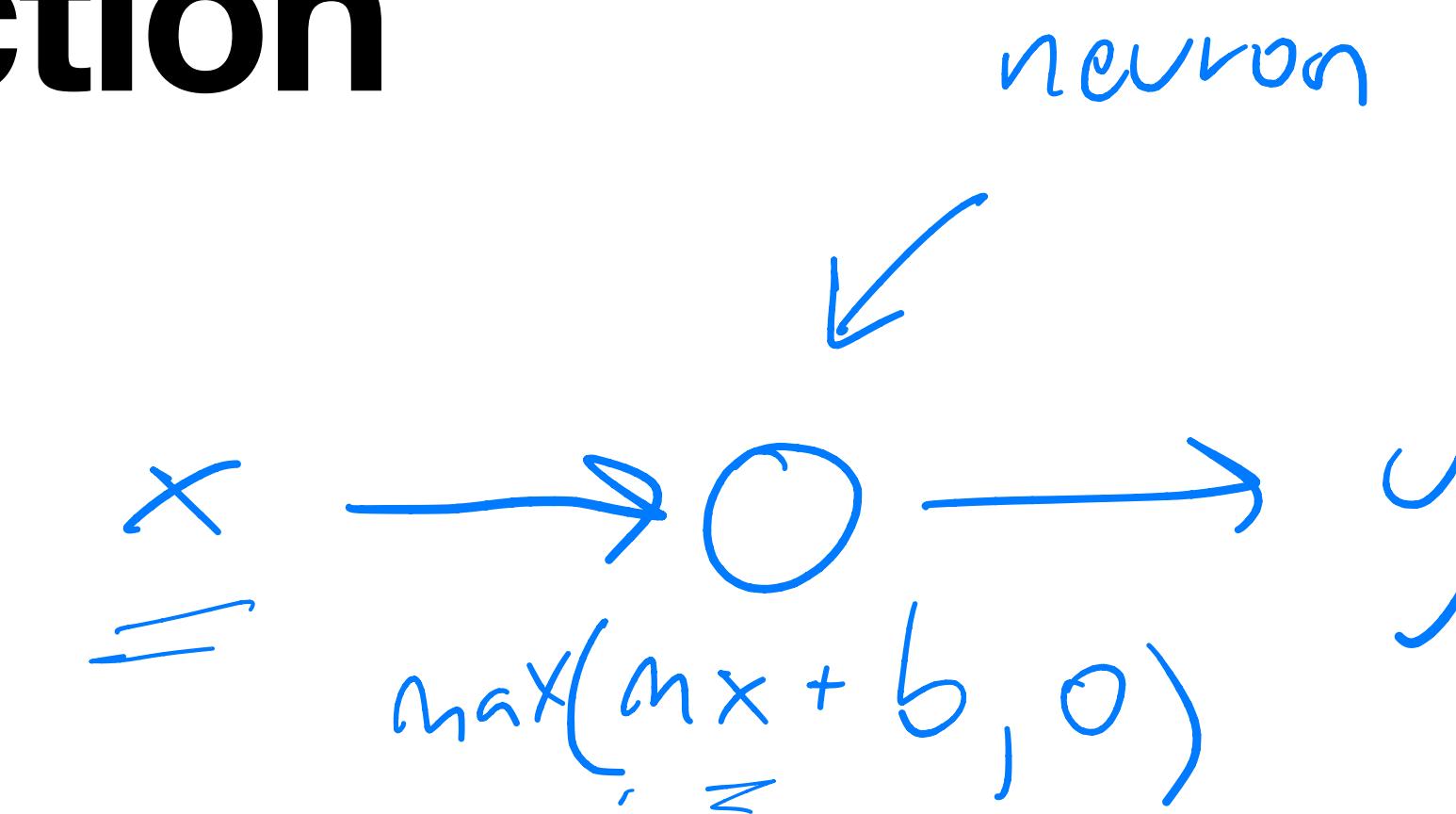
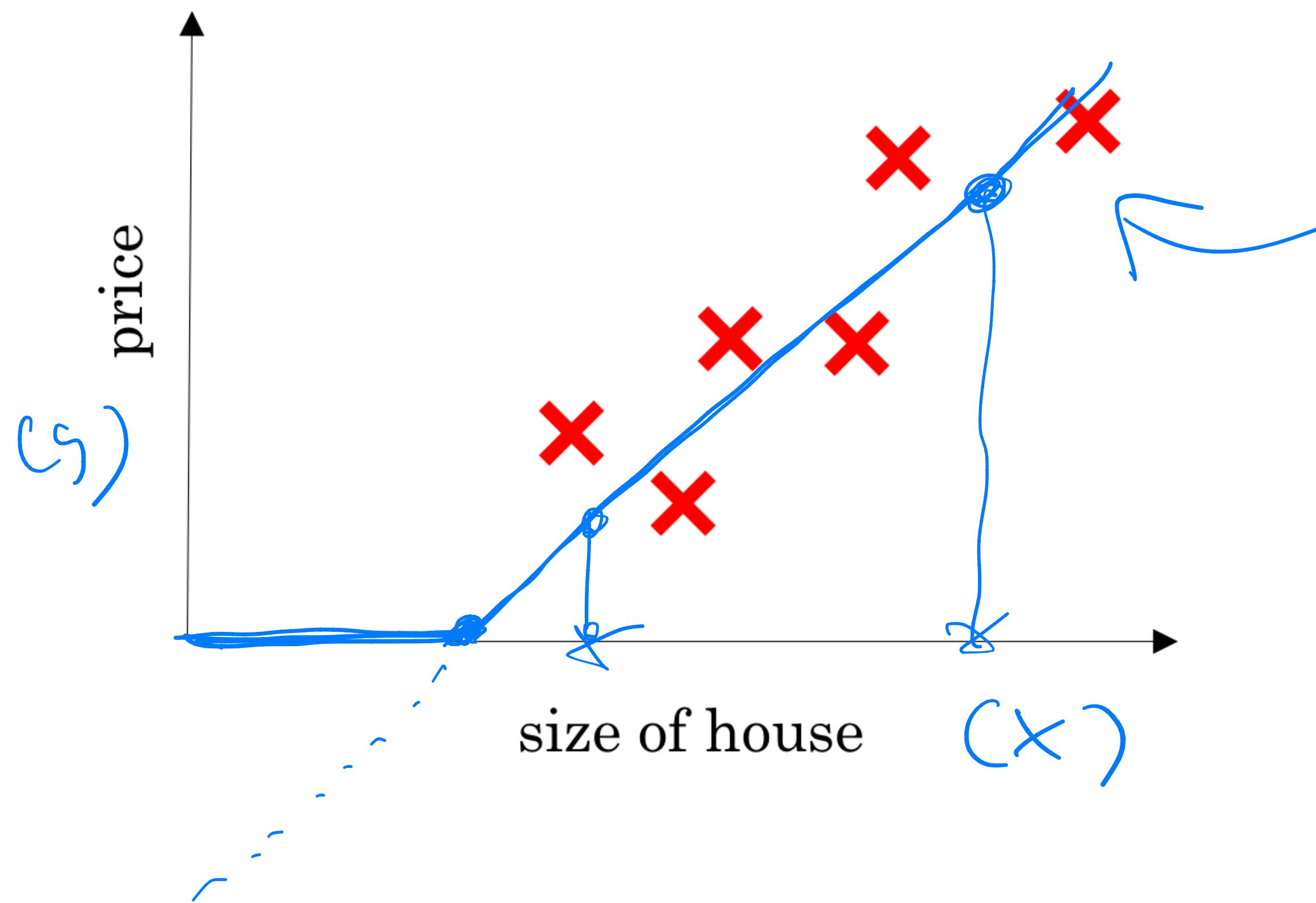
Deep Neural Network



Deep Neural Network

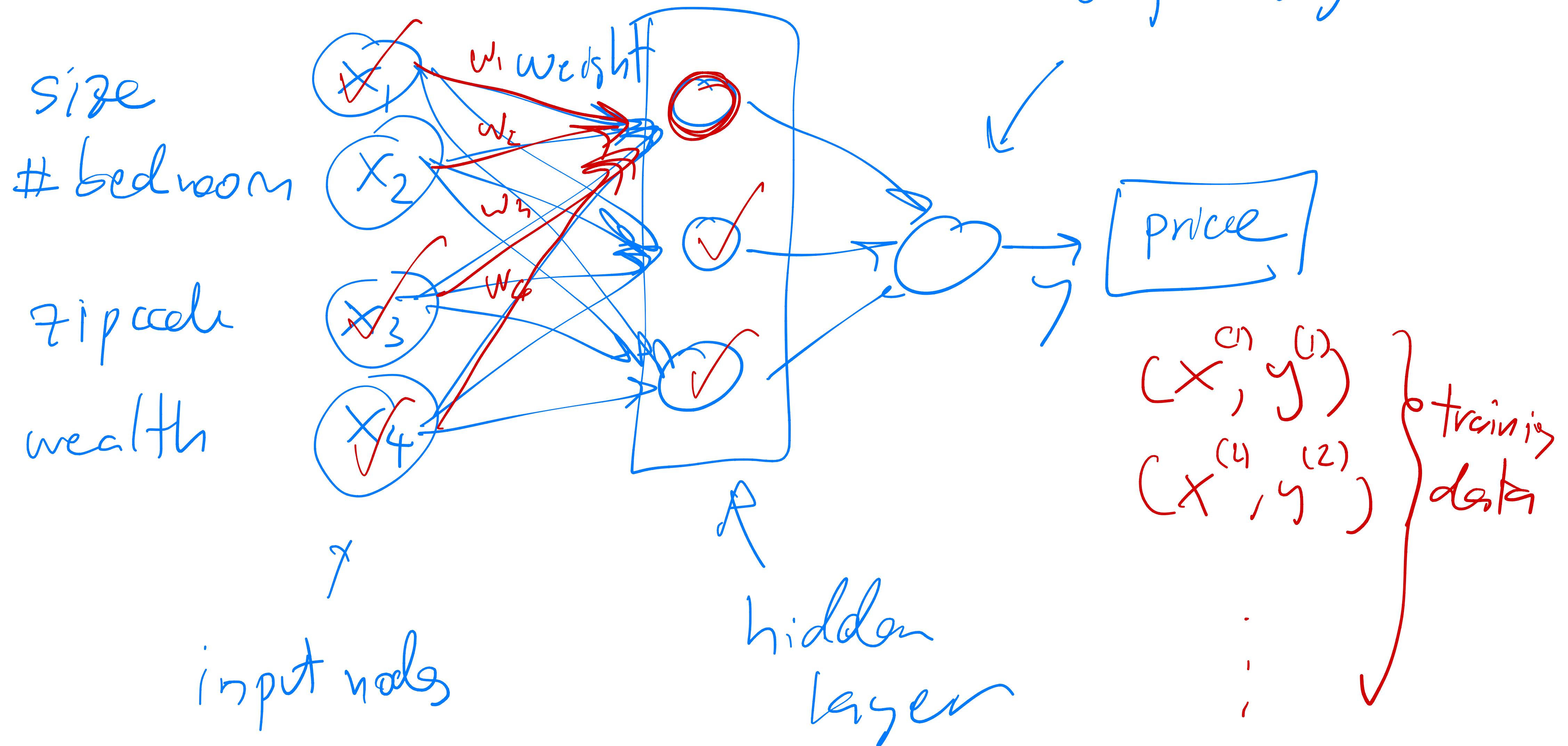


House Price Prediction



ReLU — an activation function
Rectified Linear Unit

House Price Prediction

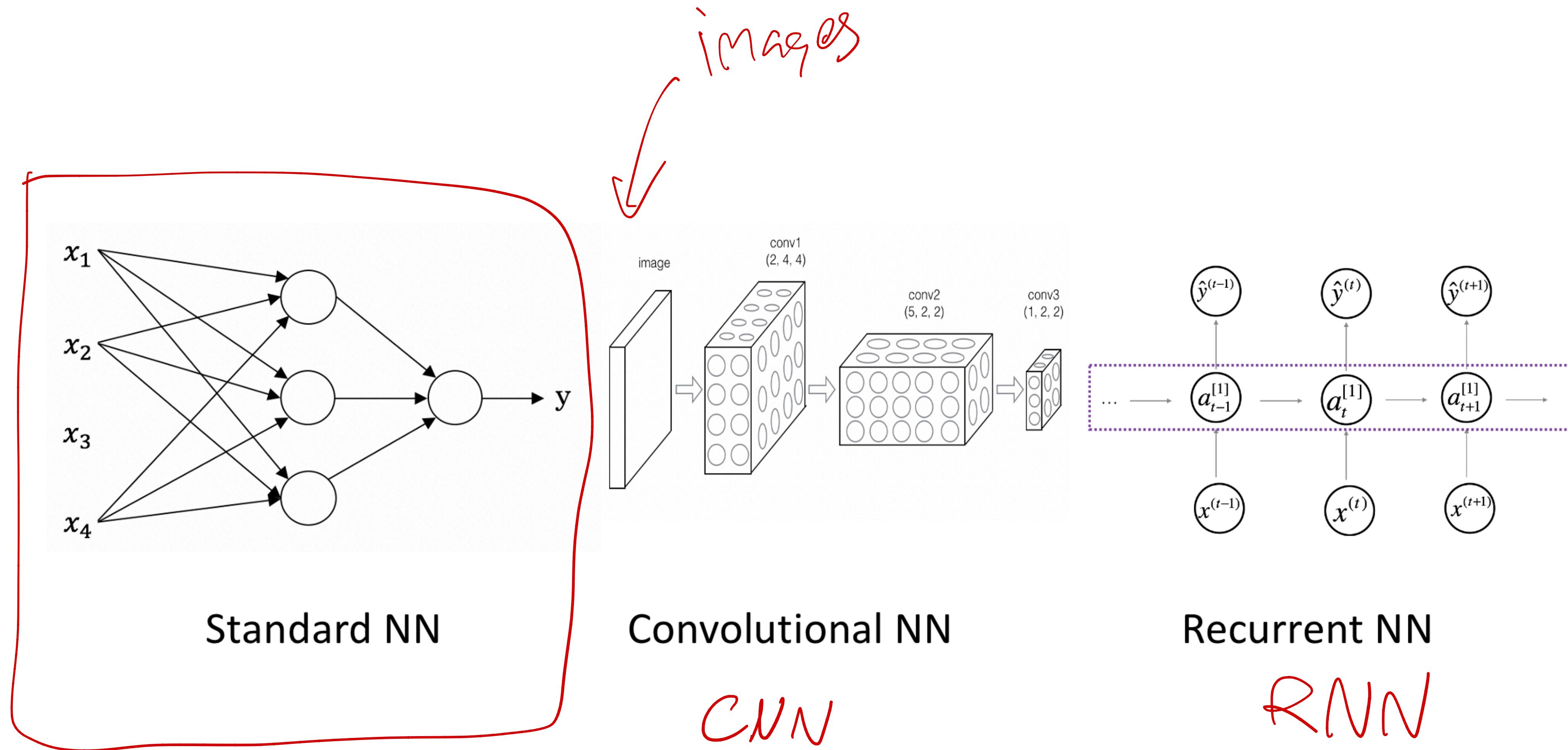


Supervised Learning

Unsupervised learning
- topic grouping

Input(x)	Output (y)	Application	
Home features	Price $\rightarrow R$	Real Estate	Regression
Ad, user info	Click on ad? (0/1)	Online Advertising	Binary Classification
Image	Object (1,...,1000)	Photo tagging	Image recognition
Audio	Text transcript	Speech recognition	RNN
English	Chinese	Machine translation	RNN
Image, Radar info	Position of other cars	Autonomous driving	

Different Type of NNs



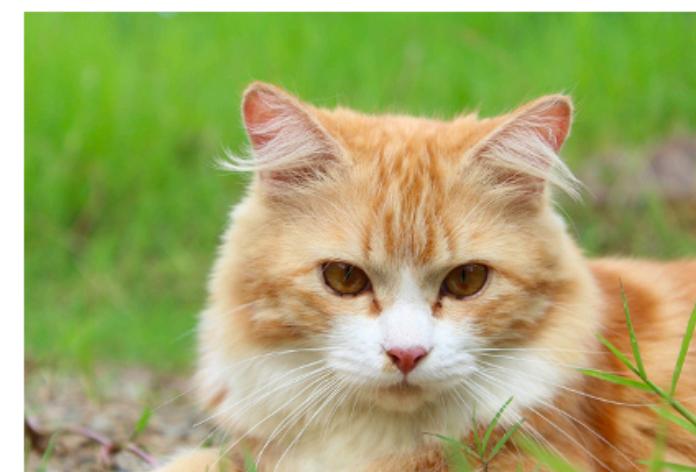
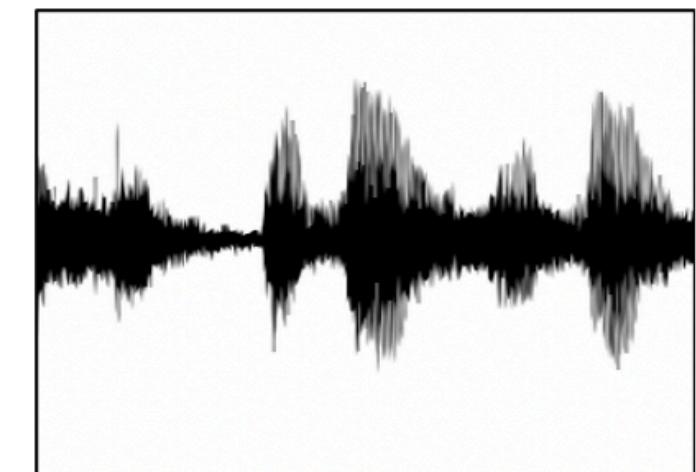
Structured vs Unstructured Data

Structured Data

Size	#bedrooms	...	Price (1000\$)
2104	3		400
1600	3		330
2400	3		369
:	:		:
3000	4		540

User Age	Ad Id	...	Click
41	93242		1
80	93287		0
18	87312		1
:	:		:
27	71244		1

Unstructured Data



Audio

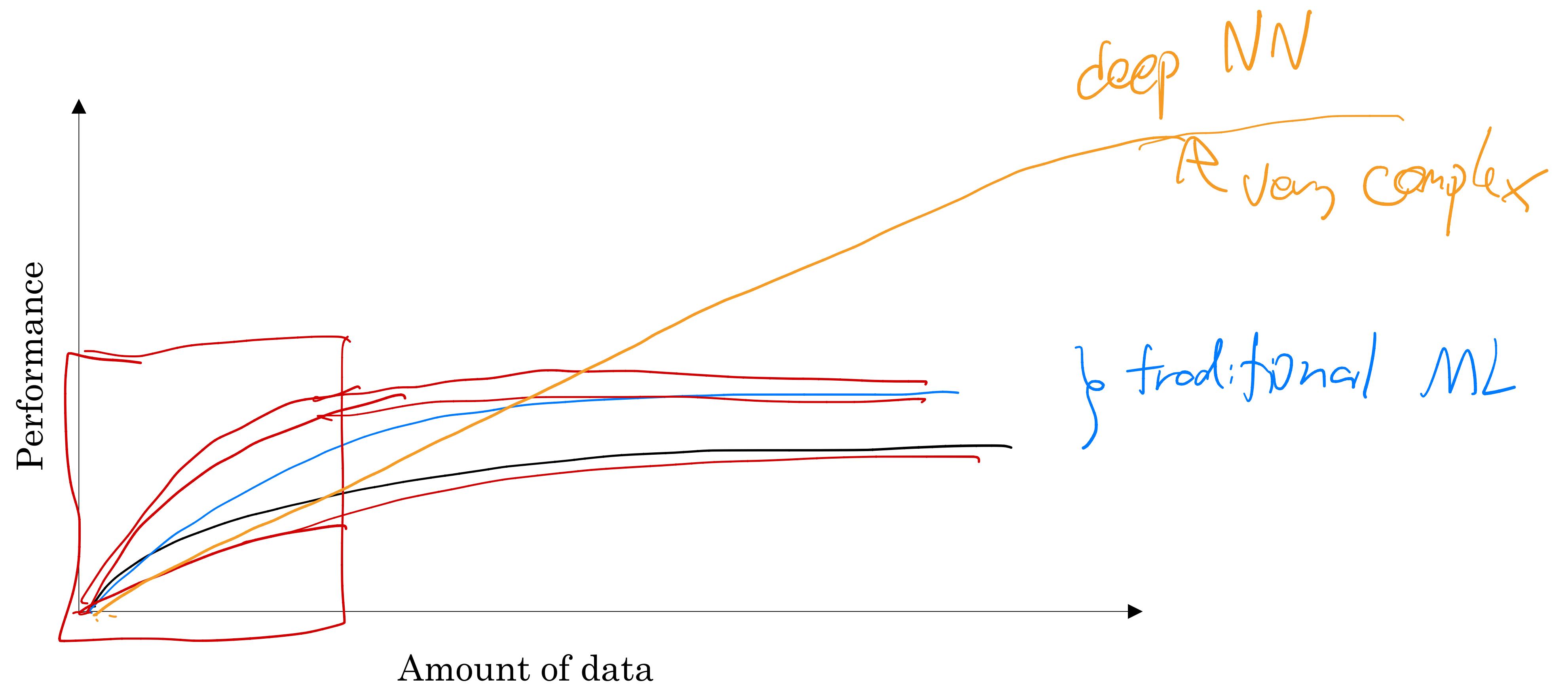
Image

Four scores and seven years ago...

Text

Deep Learning

Deep Learning vs Other learning algorithms

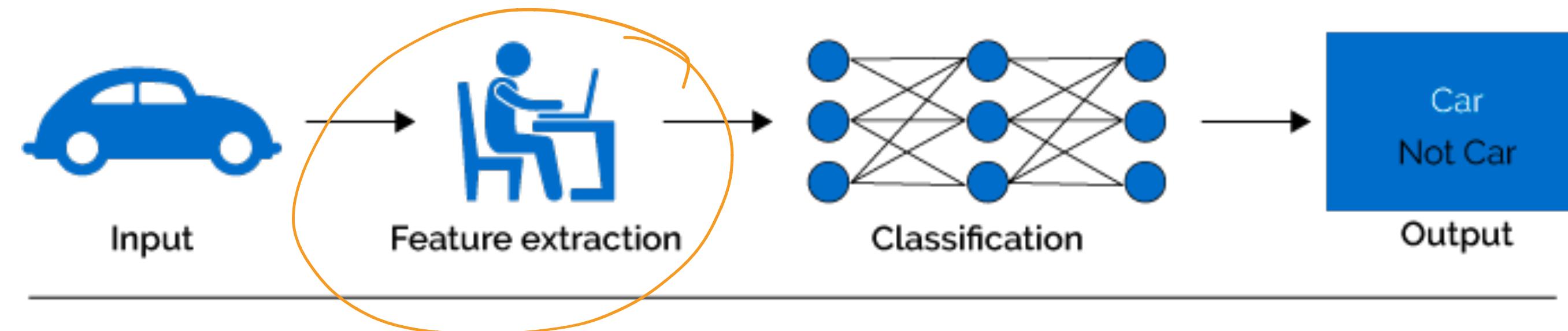


Deep Learning vs Other learning algorithms

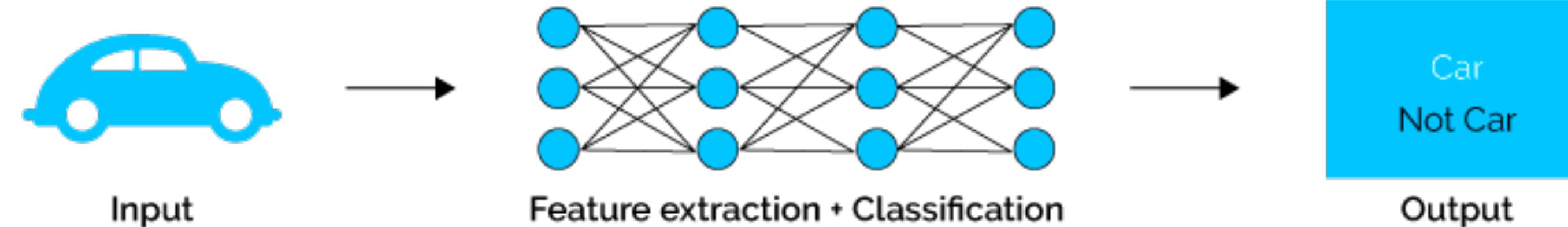
Variance - bias tradeoff

traditional

Machine Learning



Deep Learning



Key success factors

1. Data
2. Hardware
3. Algorithms

Weaknesses of DL

- Requires a large amount of data
- Requires a lot of computation power
- No theoretical guarantees
- Low model explainability