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Deep Learning Fundamentals

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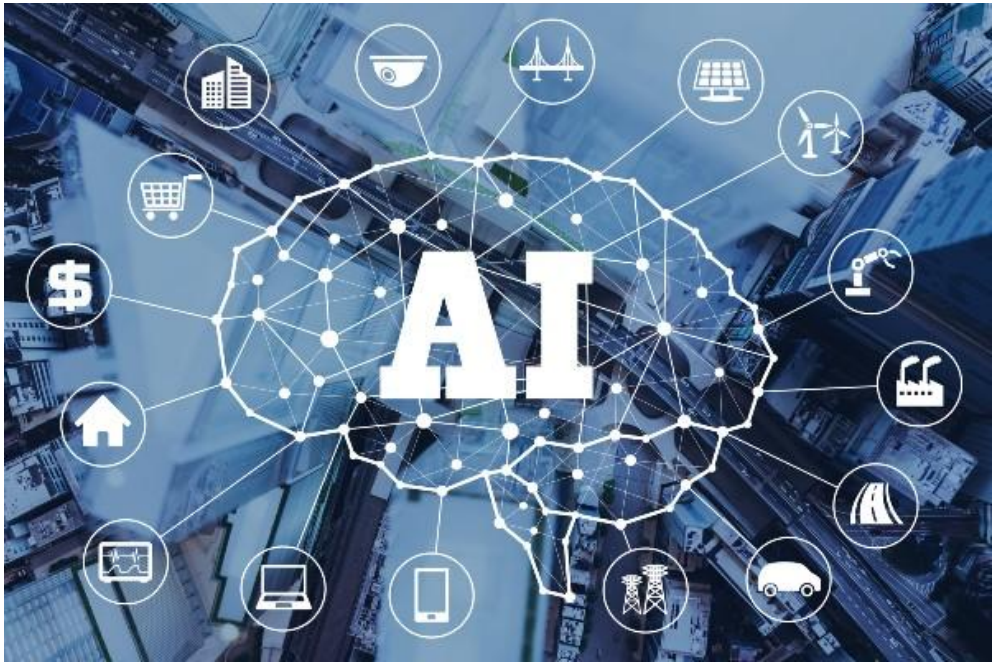
Women Techmakers

WOMEN IN RESEARCH IRELAND

Women in Research Ireland

Let's Start

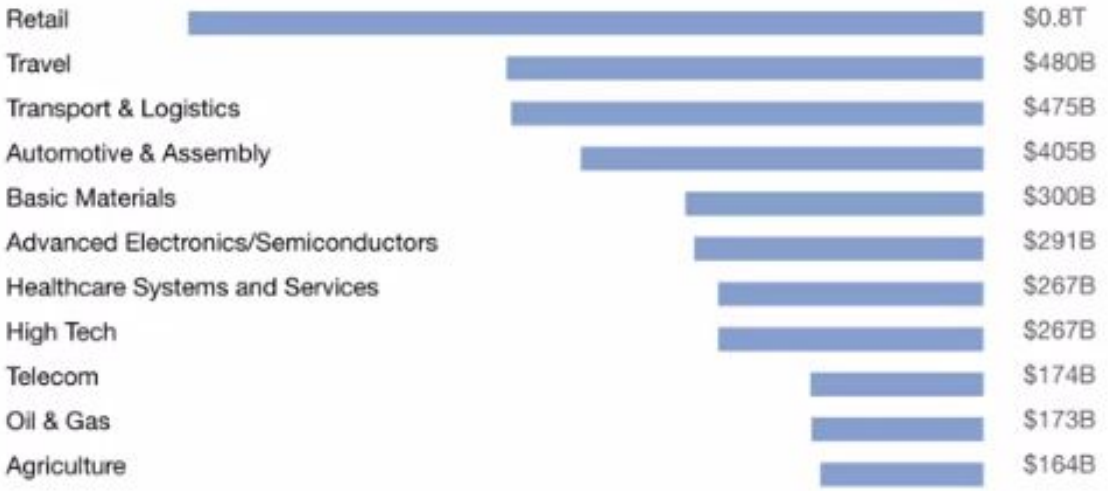
- What Comes to Mind When You Think of AI?



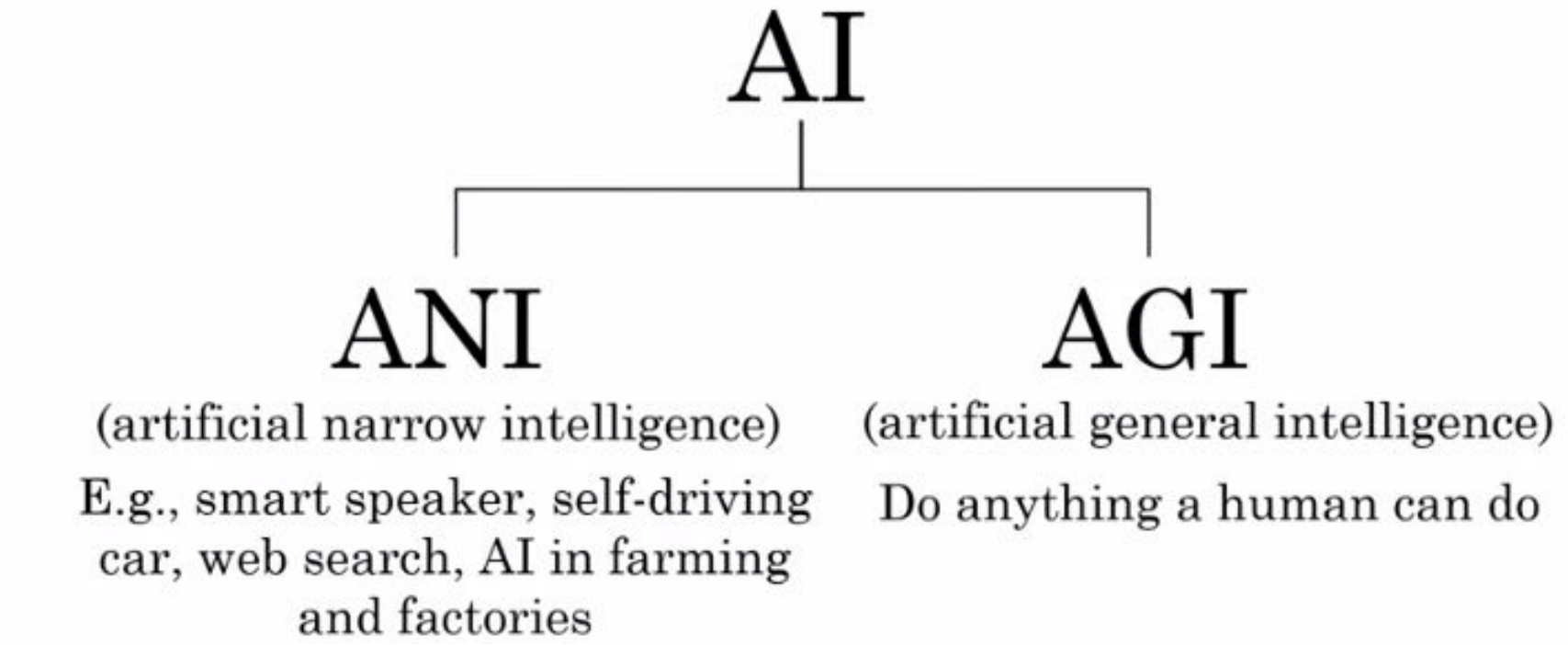
AI is Everywhere

AI value creation by 2030

$13 trillion



AI Myths and Irrational Fears



Artificial Intelligence: What is It? (1/2)

- Driven chiefly by ***machine learning***
  - Goal is to go from an input to output; news -> fake news; email -> spam; ad, user info -> click
  - Progress enabled by massive amounts of data

Home prices

size of house (square feet)	# of bedrooms	# of bathrooms	newly renovated	price (1000$)
523	1	2	N	115
645	1	3	N	150
708	2	1	N	210
1034	3	3	Y	280
2290	4	4	N	355
2545	4	5	Y	440

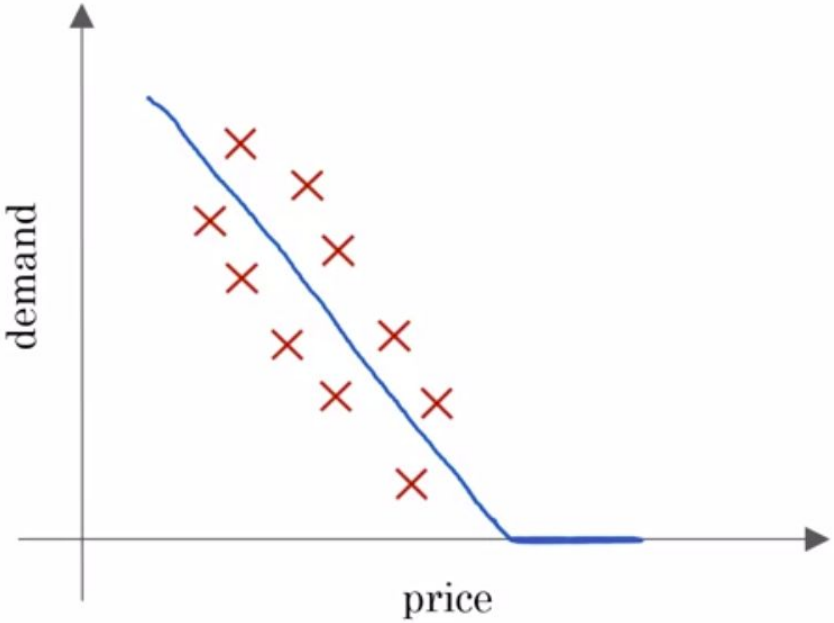
Artificial Intelligence: What is It? (2/2)

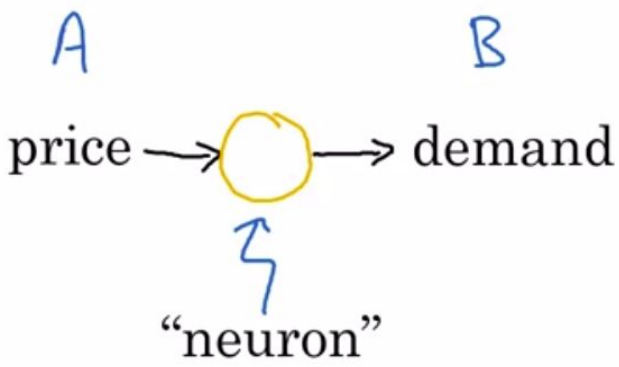
- Intelligence demonstrated by machines, unlike the natural intelligence displayed by humans and animals
  - What does intelligence mean however?
- In a machine context, decision-making such as
  - What ads to serve to whom?
  - Which treatment to prescribe based on medical symptoms?
  - What would house prices be in this area in 3 years?

Neural Networks

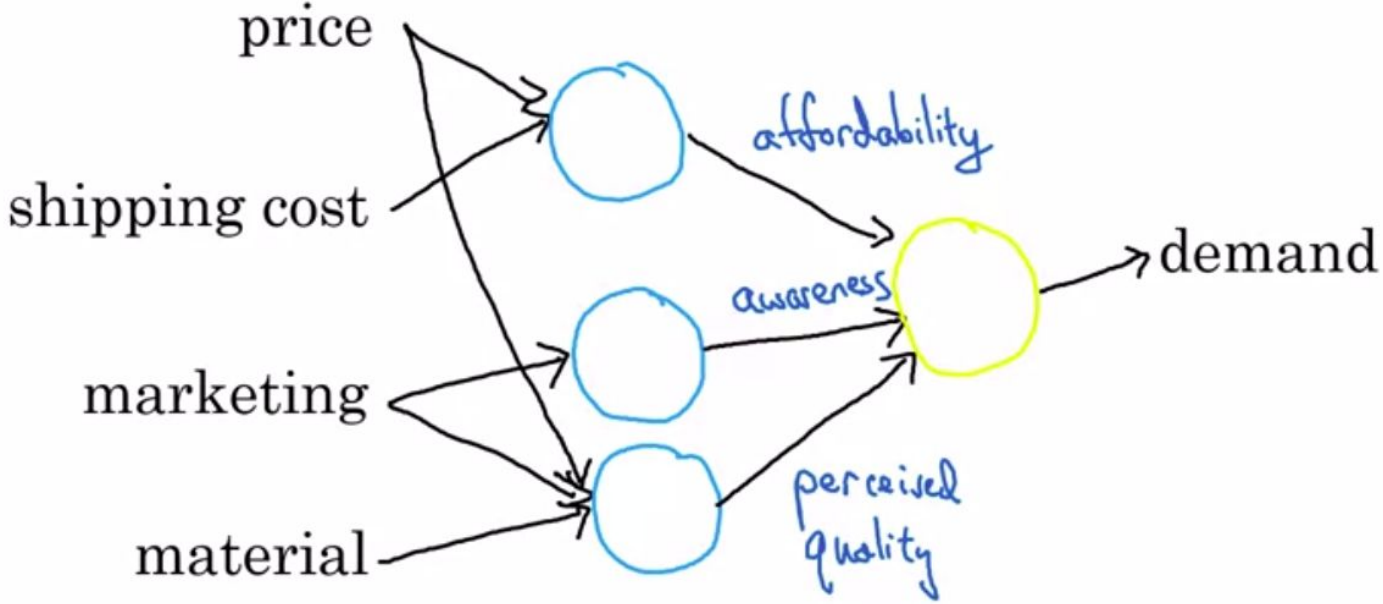
- Subset of machine learning
- At the heart of deep learning
- Inspired by human brain mimicking the way biological neurons signal to one another

Demand Prediction Example (1/3)

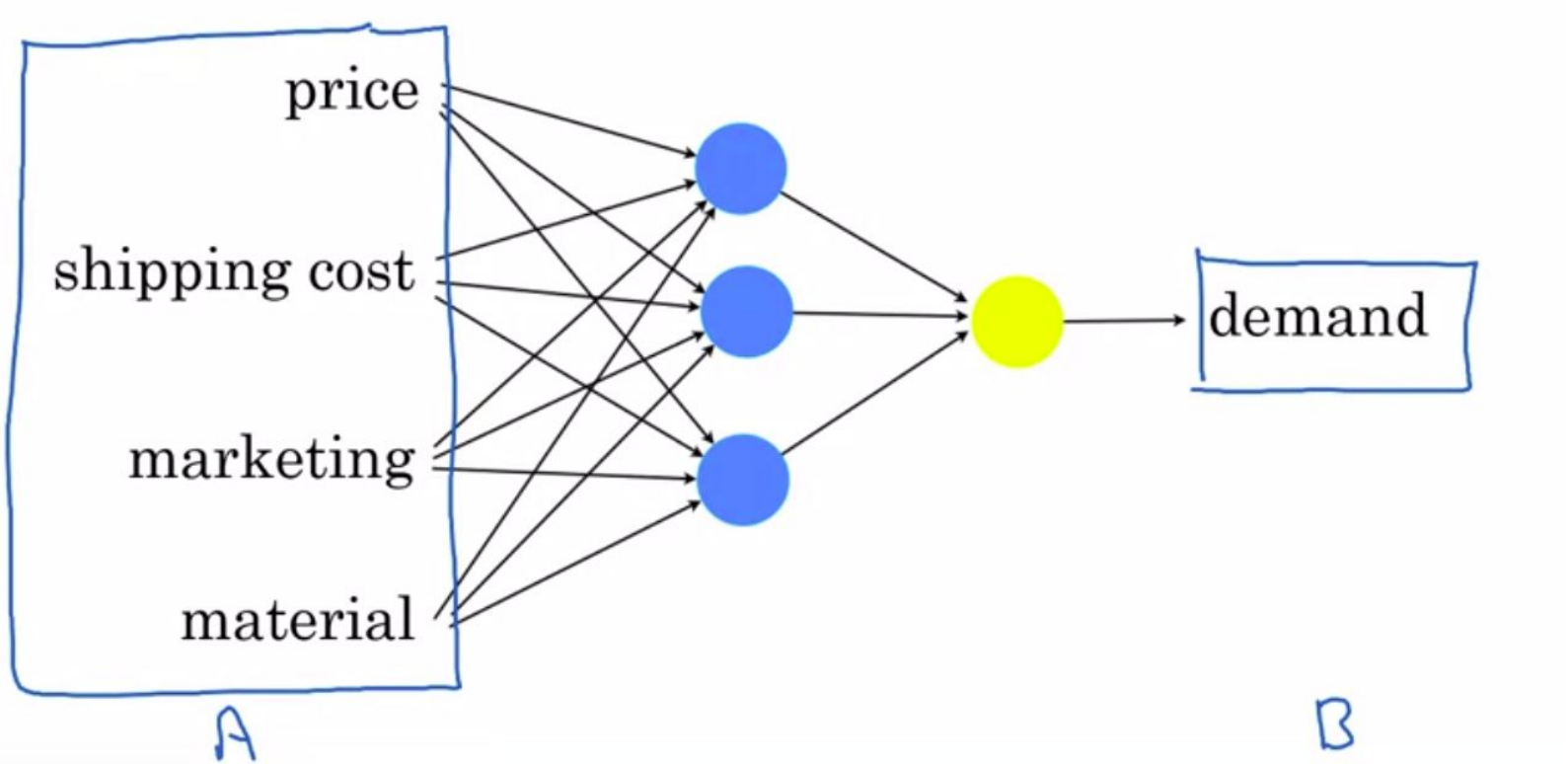




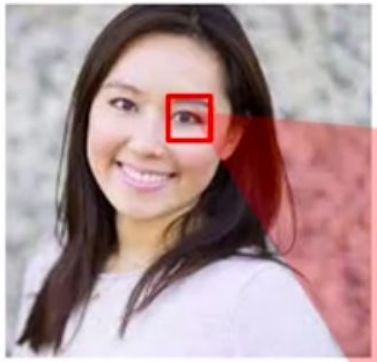
Demand Prediction Example (2/3)



Demand Prediction Example (3/3)

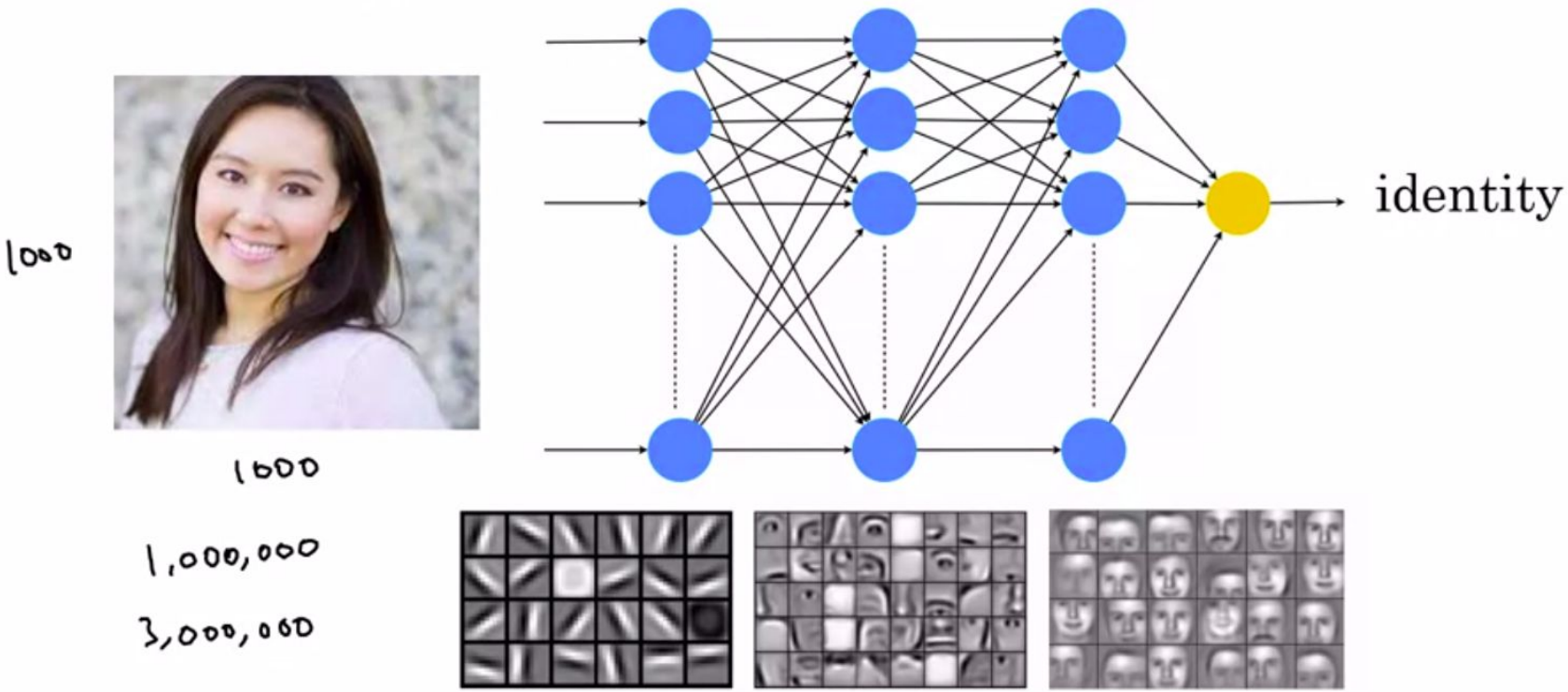


Face Recognition (1/2)



30	32	22	12	10	10	12	33	35	30
12	11	12	234	170	176	13	15	12	12
234	222	220	230	200	222	230	234	56	78
190	220	186	112	110	110	112	180	30	32
49	250	250	250	4	2	254	200	44	6
55	250	250	250	3	1	250	245	25	3
189	195	199	150	110	110	182	190	199	55
200	202	218	222	203	200	200	208	215	222
219	215	220	220	222	214	215	210	220	220
220	220	220	220	221	220	221	220	220	222

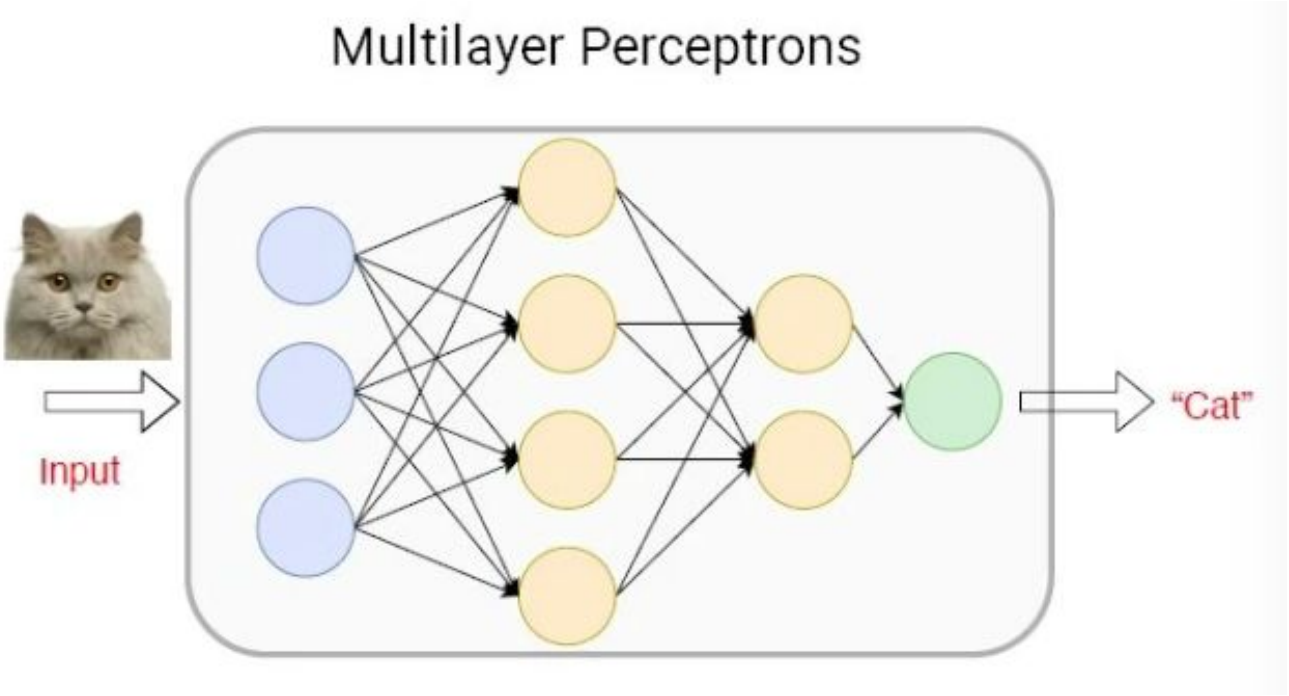
Face Recognition (2/2)



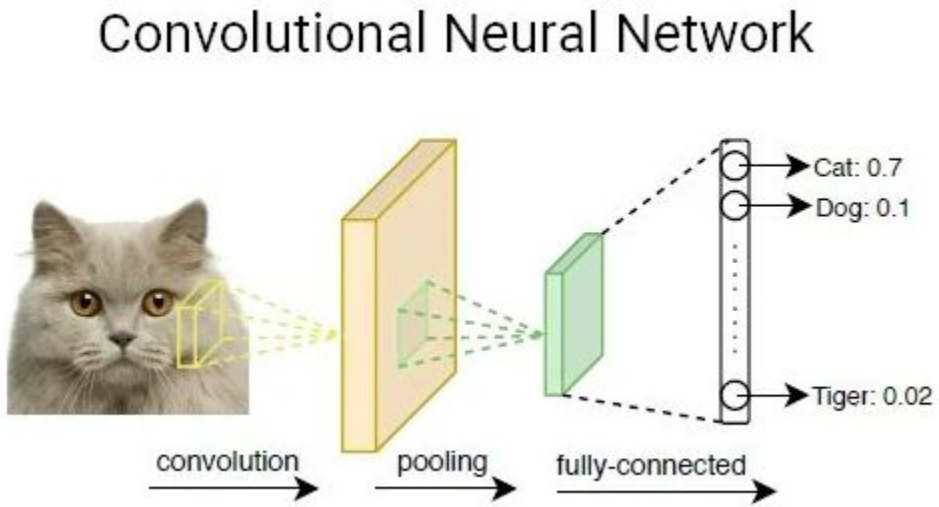
Supervised Learning

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

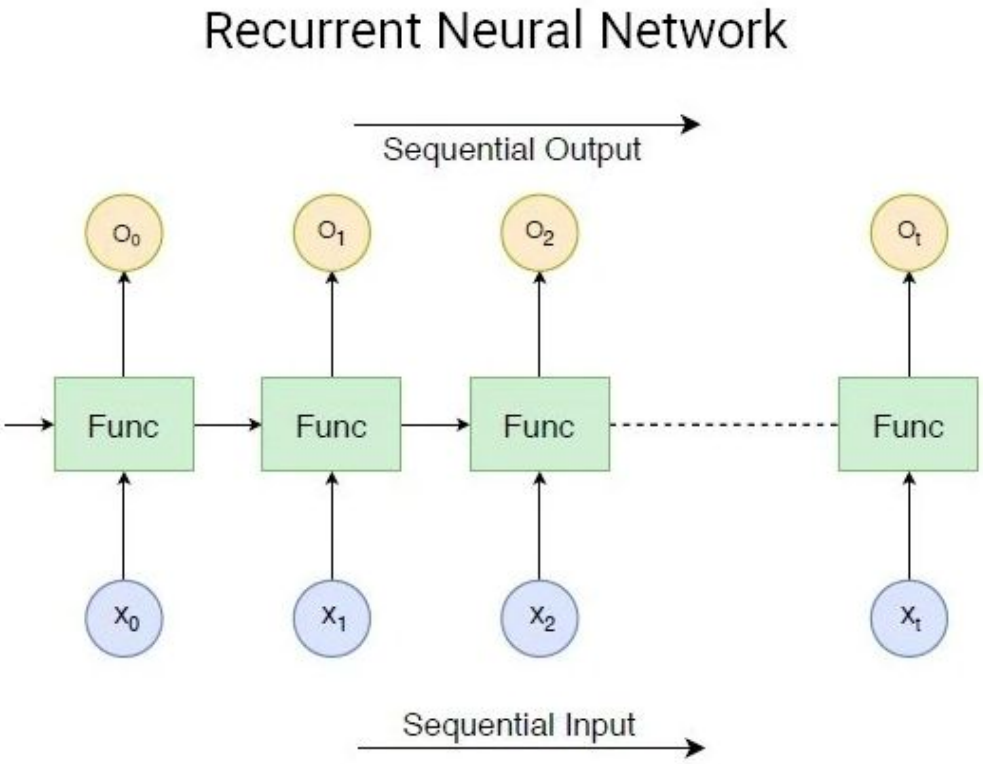
Types of Deep Neural Networks (1/3)



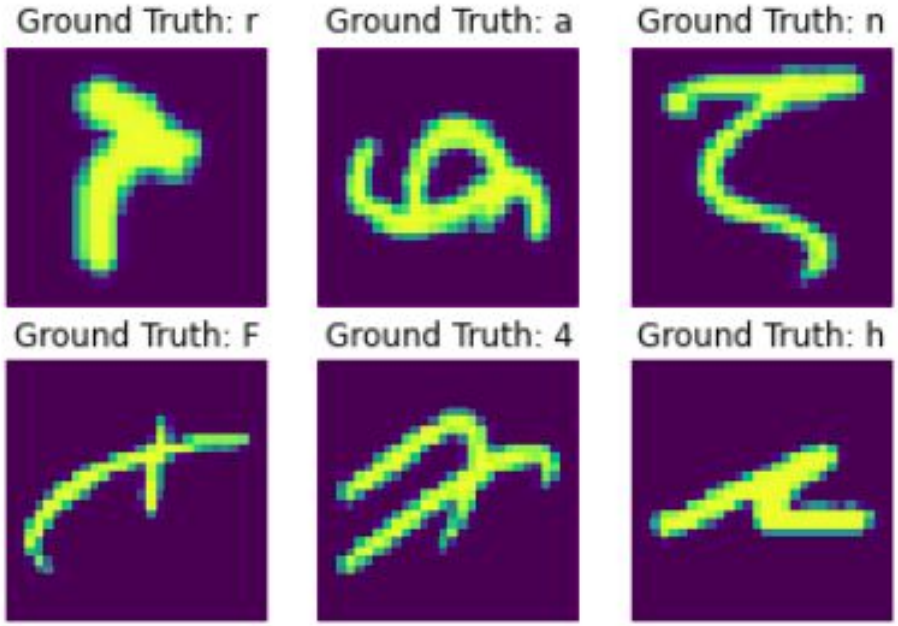
Types of Deep Neural Networks (2/3)



Types of Deep Neural Networks (3/3)



PyTorch Example



Thank You!!!

Reach out on @ArjumandYounus (Twitter)