

# A Clip From The Today Show, 1994







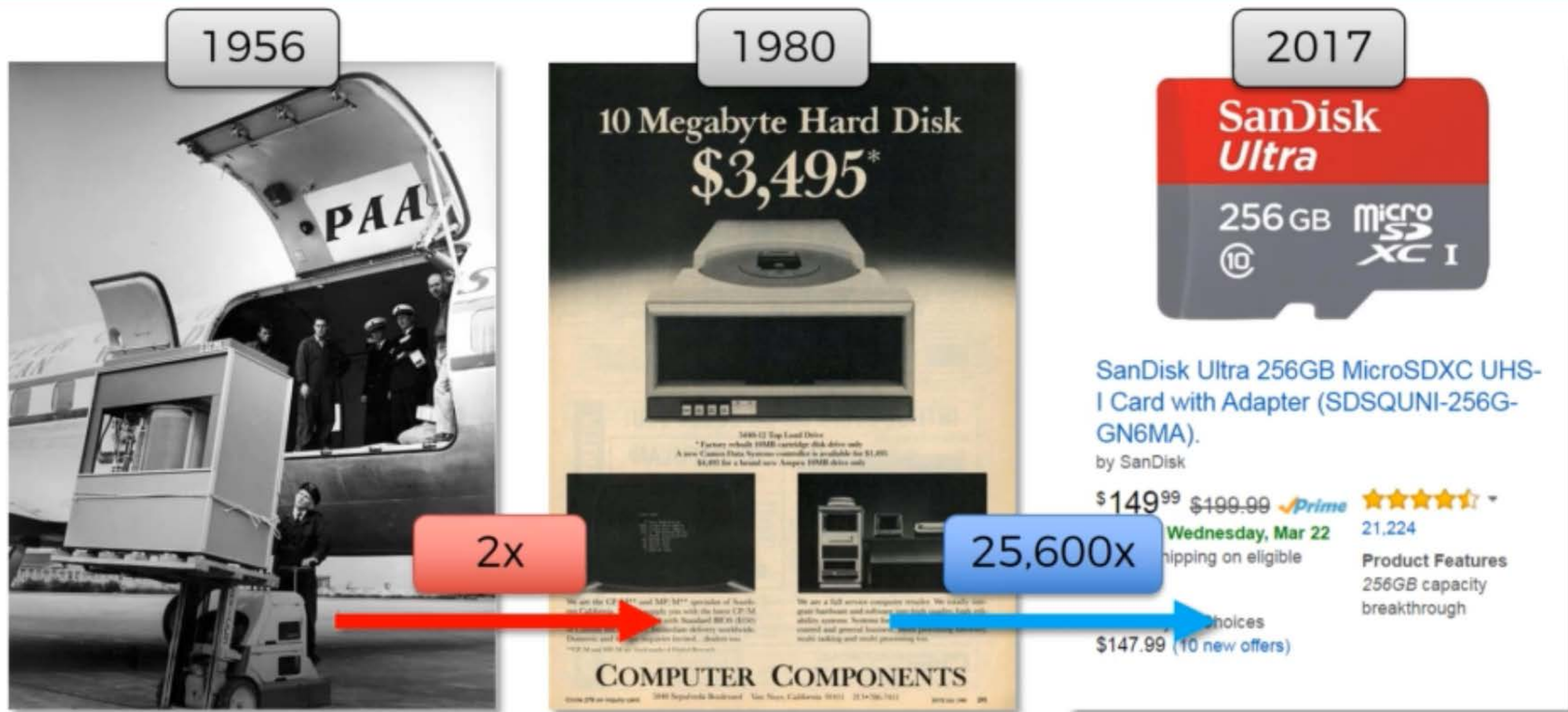
# What is Deep Learning?

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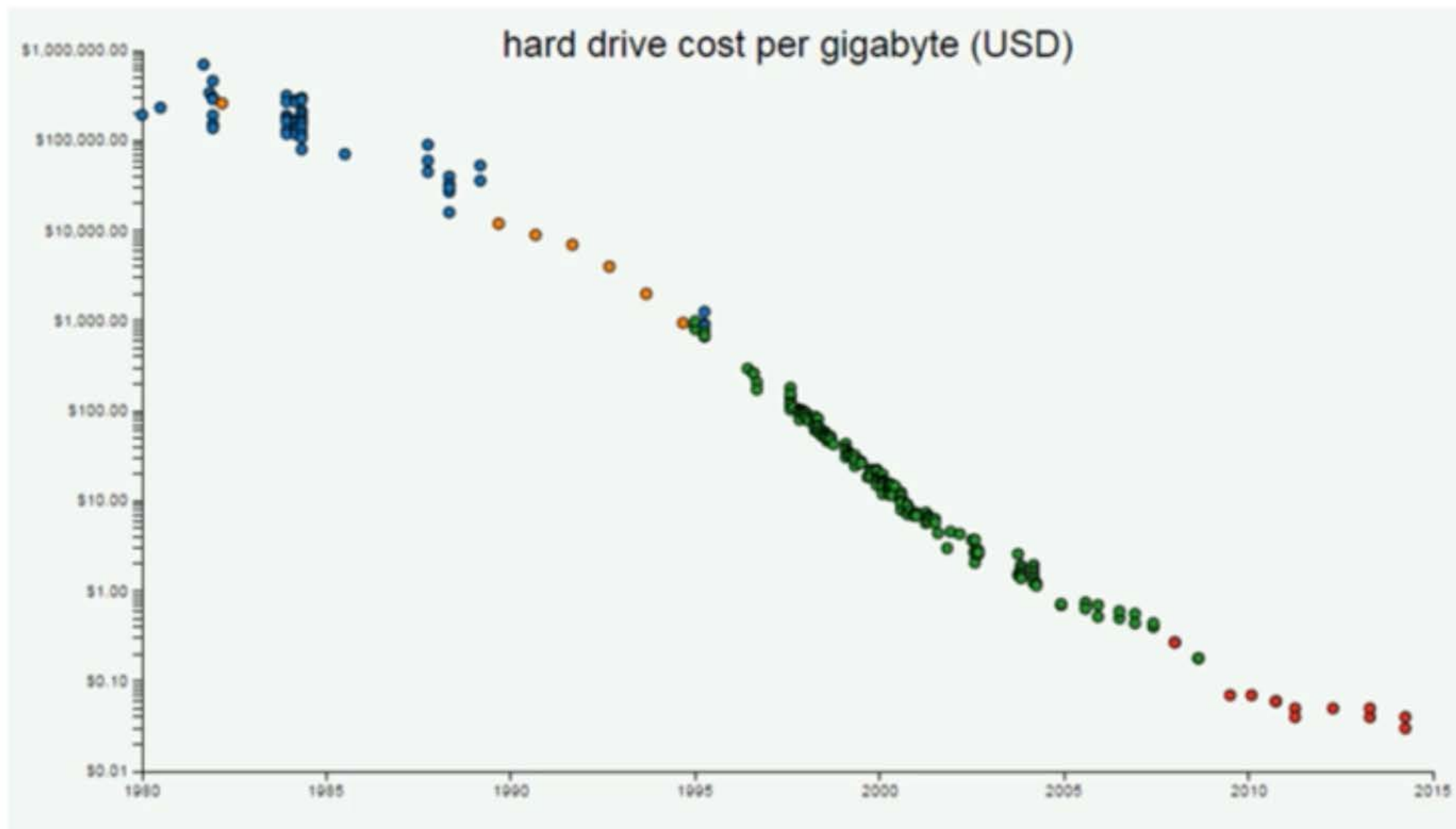


# What is Deep Learning?





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Source: mkomo.com



# What is Deep Learning?







Playback Rate



# What is Deep Learning?

## STORAGE LIMITS

Estimates based on bacterial genetics suggest that digital DNA could one day rival or exceed today's storage technology.

	 Hard disk	 Flash memory	 Bacterial DNA	WEIGHT OF DNA NEEDED TO STORE WORLD'S DATA  ~1 kg ©nature
Read-write speed (μs per bit) >	~3,000–5,000	~100	<100	
Data retention (years) >	>10	>10	>100	
Power usage (watts per gigabyte) >	~0.04	~0.01–0.04	<10 <sup>-10</sup>	
Data density (bits per cm <sup>3</sup> ) >	~10 <sup>13</sup>	~10 <sup>16</sup>	~10 <sup>19</sup>	

Source: nature.com



# What is Deep Learning?

## 1 The accelerating pace of change ...



## 2 ... and exponential growth in computing power ...

Computer technology, shown here climbing dramatically by powers of 10, is now progressing more each hour than it did in its entire first 90 years

### COMPUTER RANKINGS

By calculations per second per \$1,000



**Analytical engine**  
Never fully built, Charles Babbage's invention was designed to solve computational and logical problems



**Colossus**  
The electronic computer, with 1,500 vacuum tubes, helped the British crack German codes during WW II



**UNIVAC I**  
The first commercially marketed computer, used to tabulate the U.S. Census, occupied 943 cu. ft.

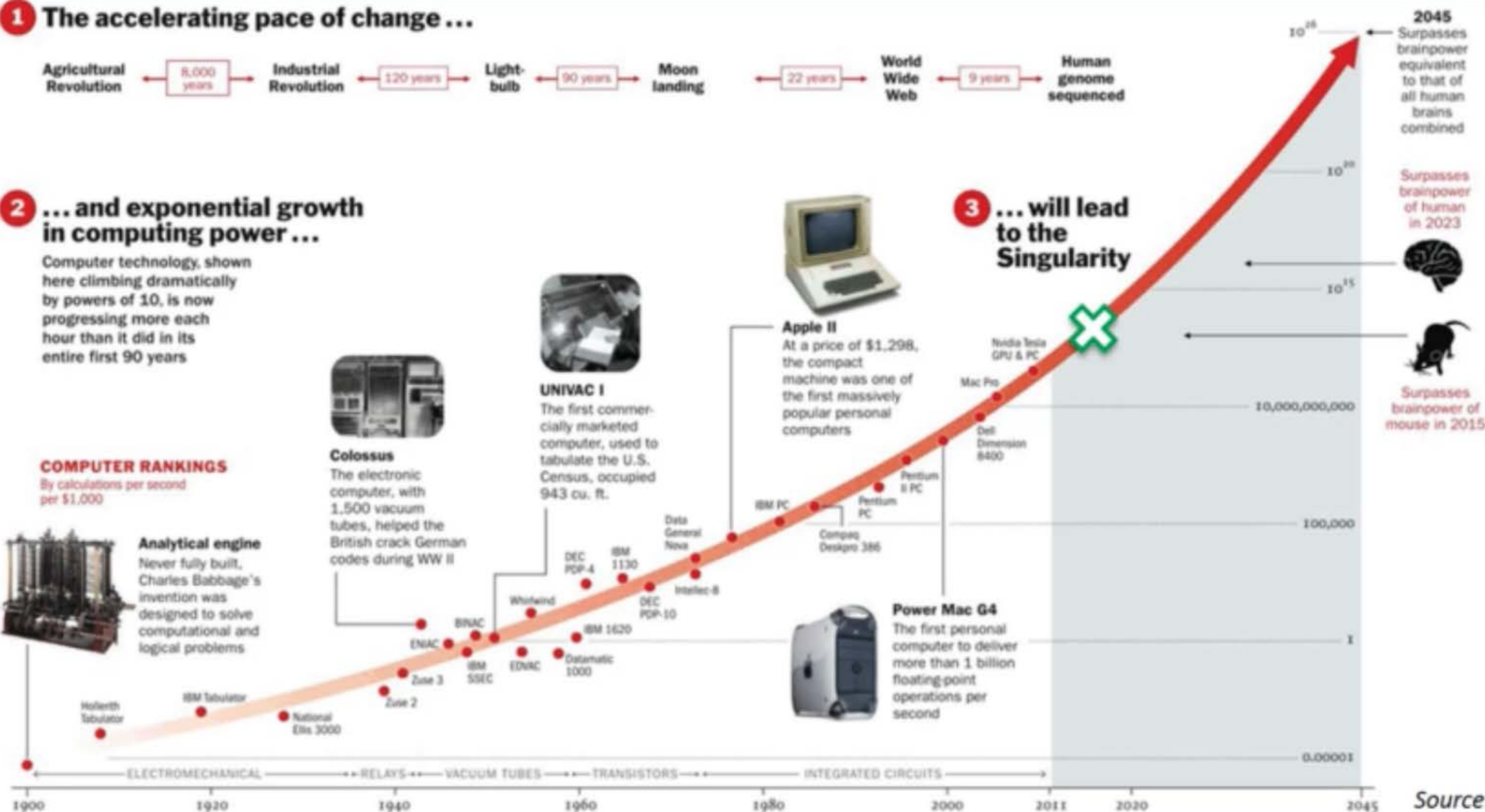


**Apple II**  
At a price of \$1,298, the compact machine was one of the first massively popular personal computers



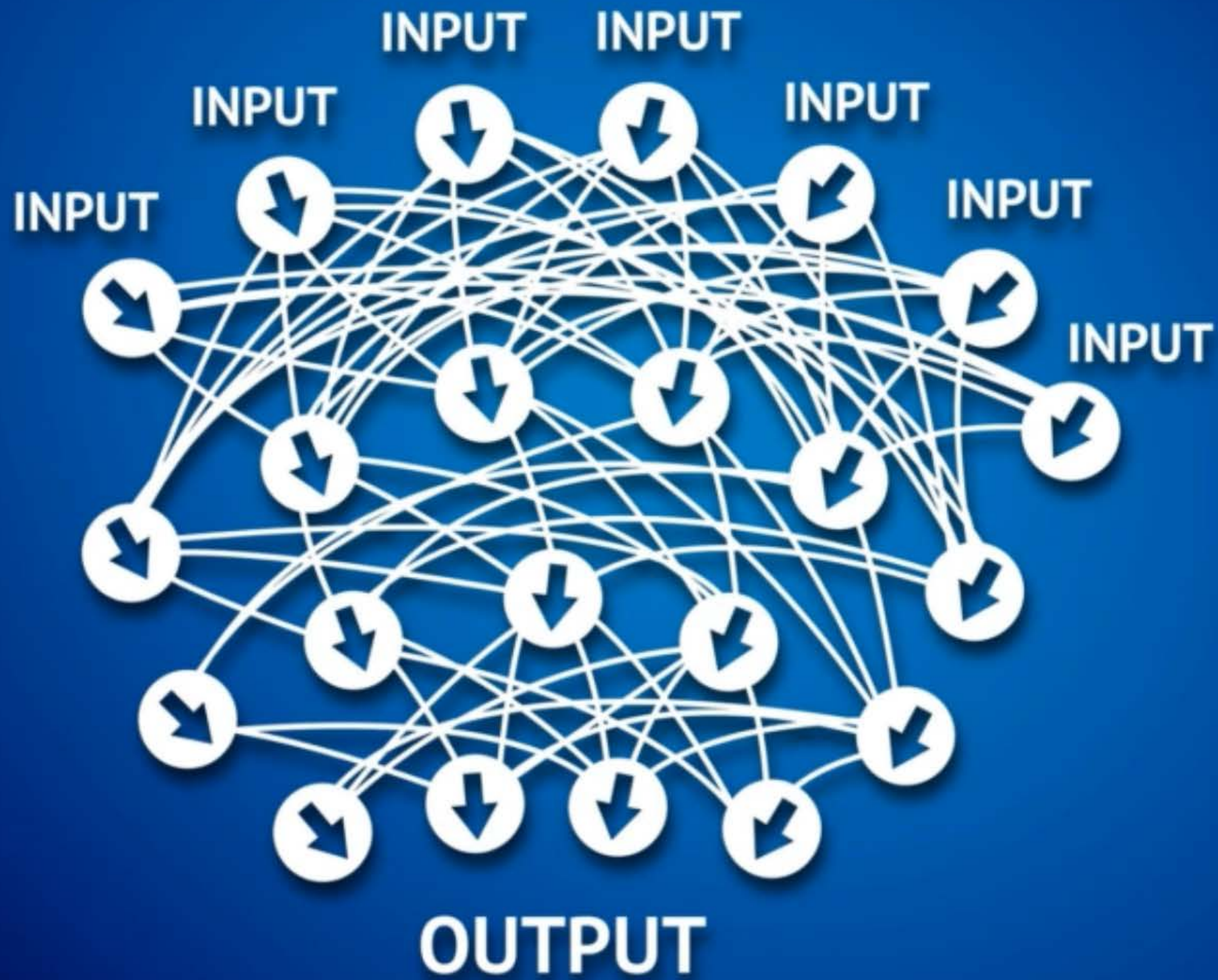
**Power Mac G4**  
The first personal computer to deliver more than 1 billion floating-point operations per second

## 3 ... will lead to the Singularity



Source: Time Magazine







# What is Deep Learning?



**Geoffrey Hinton**



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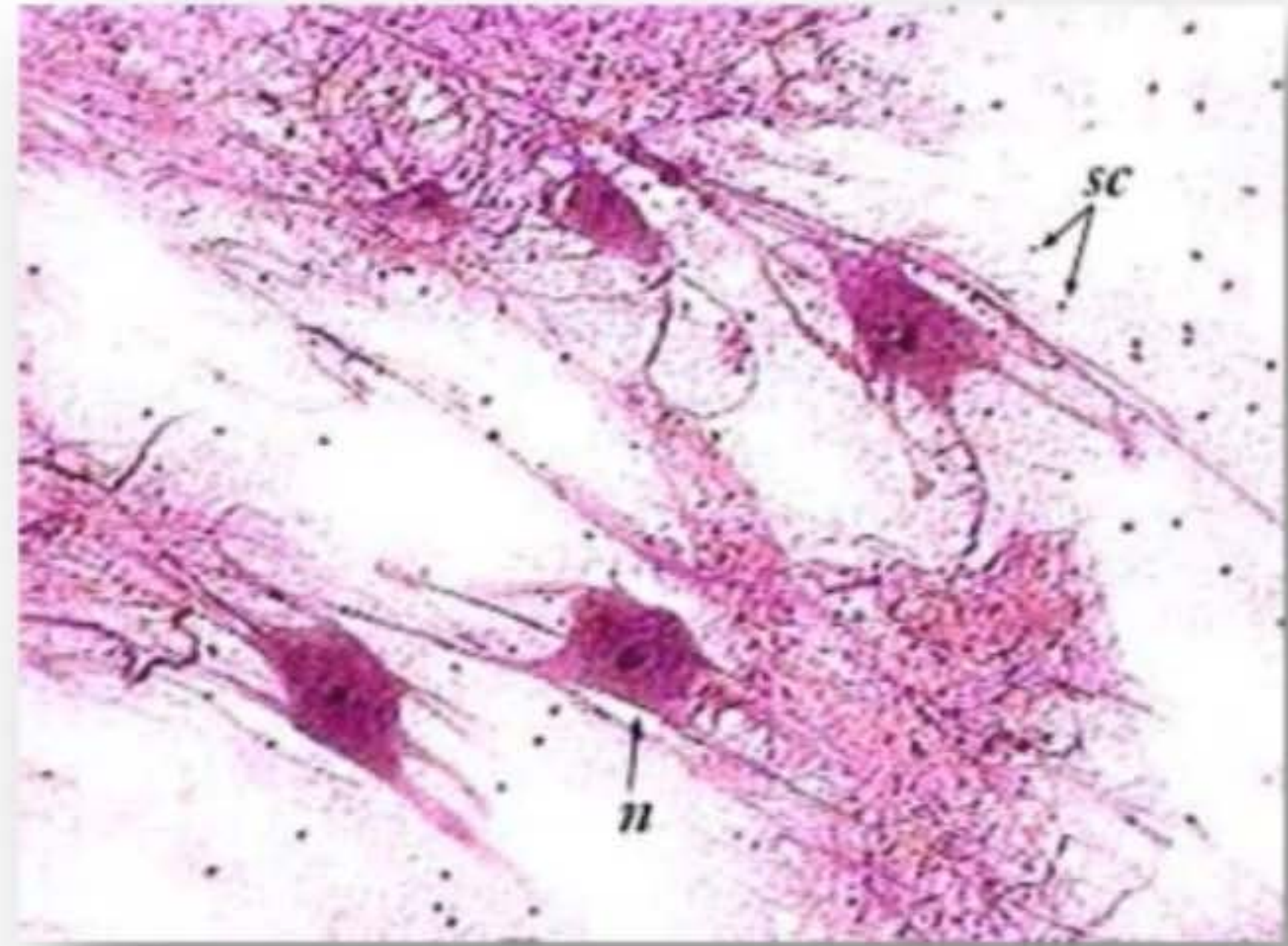
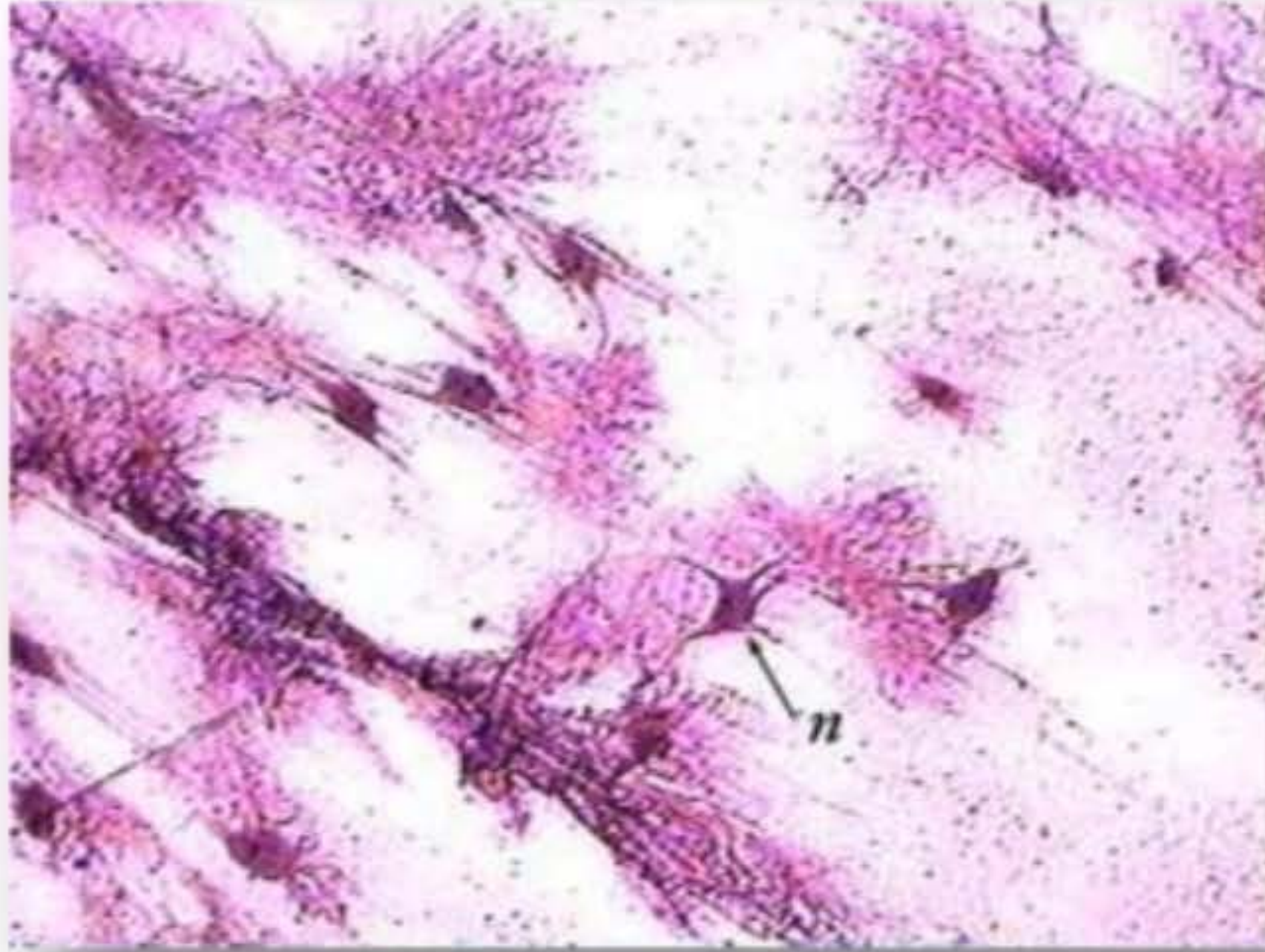
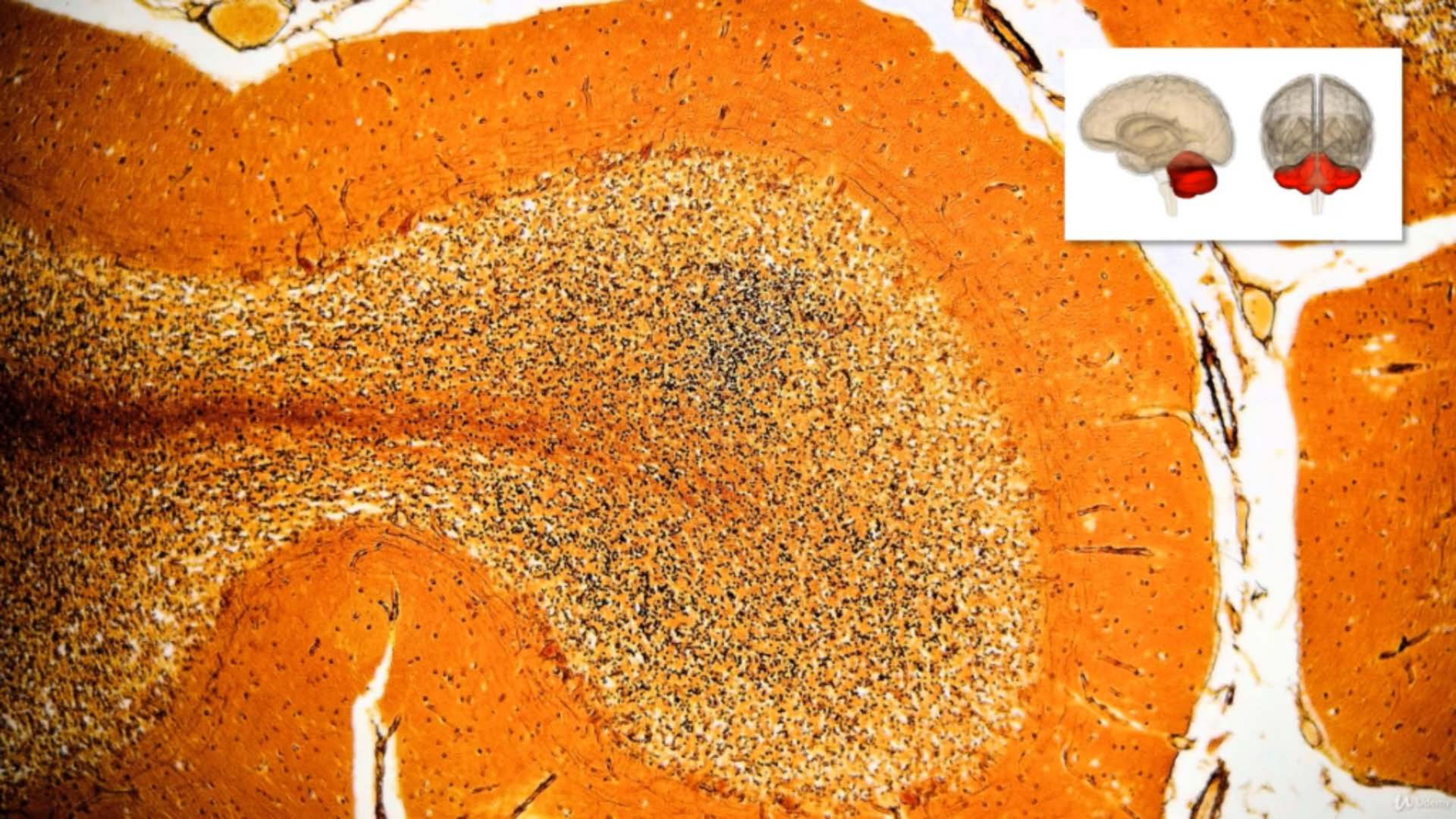


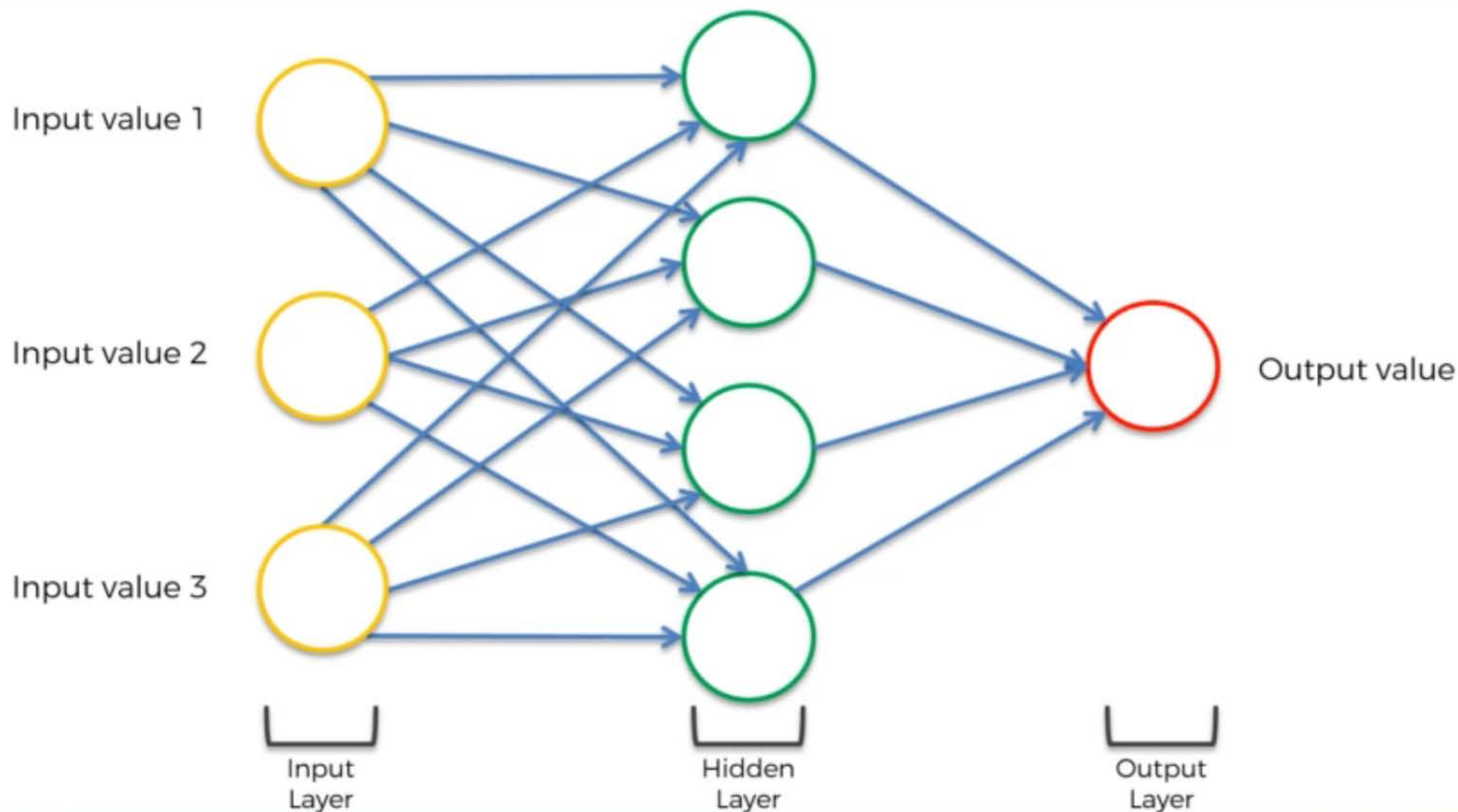
Image Source: [www.austincc.edu](http://www.austincc.edu)







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