Neuroscience in Computer's Face Recognition Model

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https://www.cifar.ca/images/default-source/list-view/ai-pattern_listview.png?sfvrsn=6113833_2

Face recognition in Real Life

China

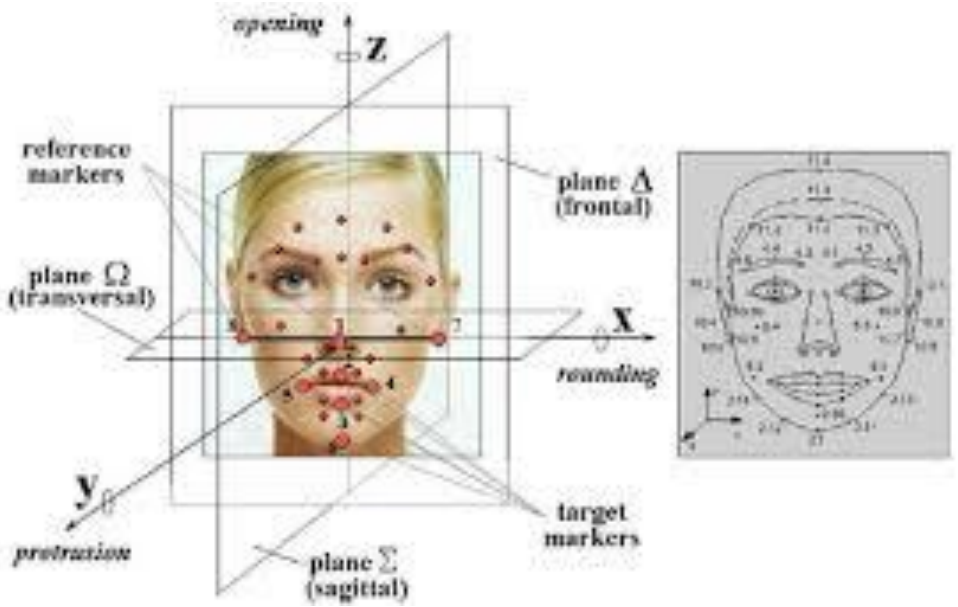
https://i.ndtvimg.com/i/2018-01/china_650x400_71515414733.jpg

Airports

https://th.thgim.com/sci-tech/technology/vy718v/article24903935.ece/alternates/FREE_660/09TH-US-POLITICS-TRANSPORT-SECURITY

180 years of innovation (Tucker, 2014)

- First Camera in 1873
- Manual face measuring in the 19th century in Paris
- First semi-automated computer based facial recognition1960 by Woodrow Bledsoe



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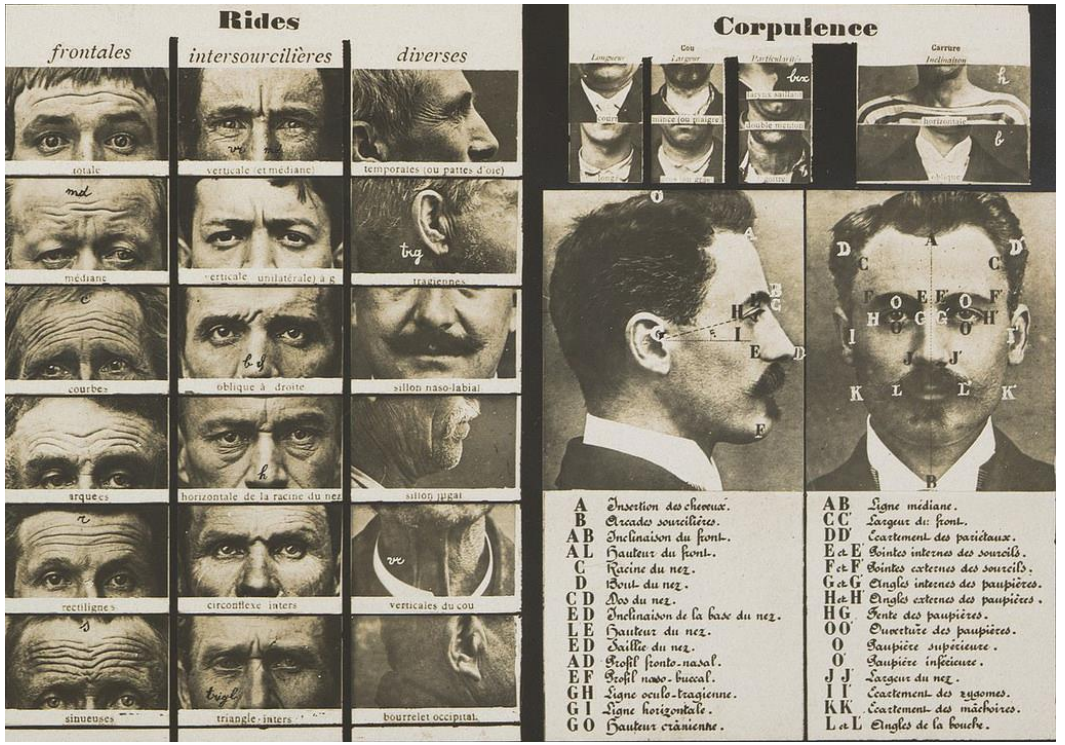

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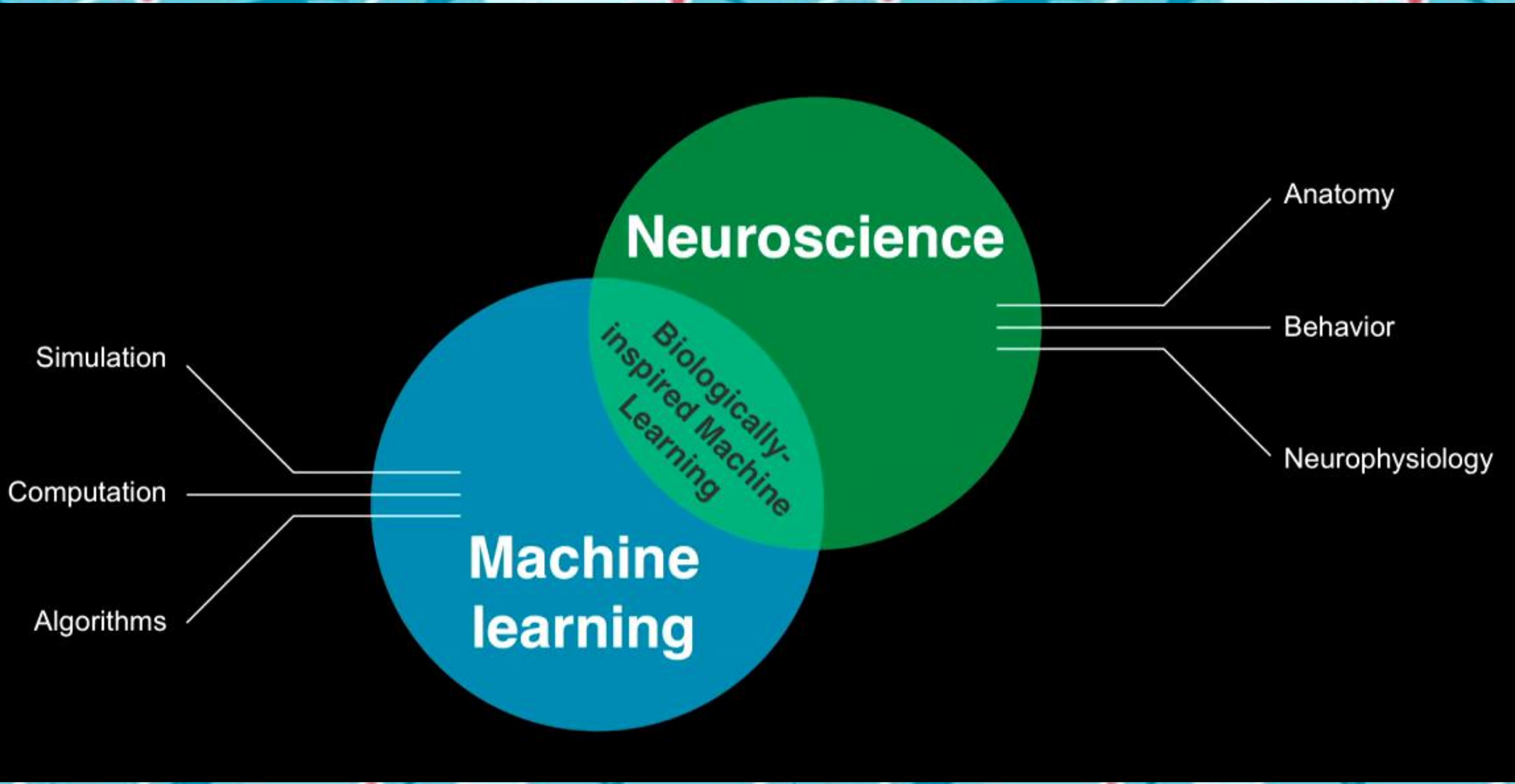
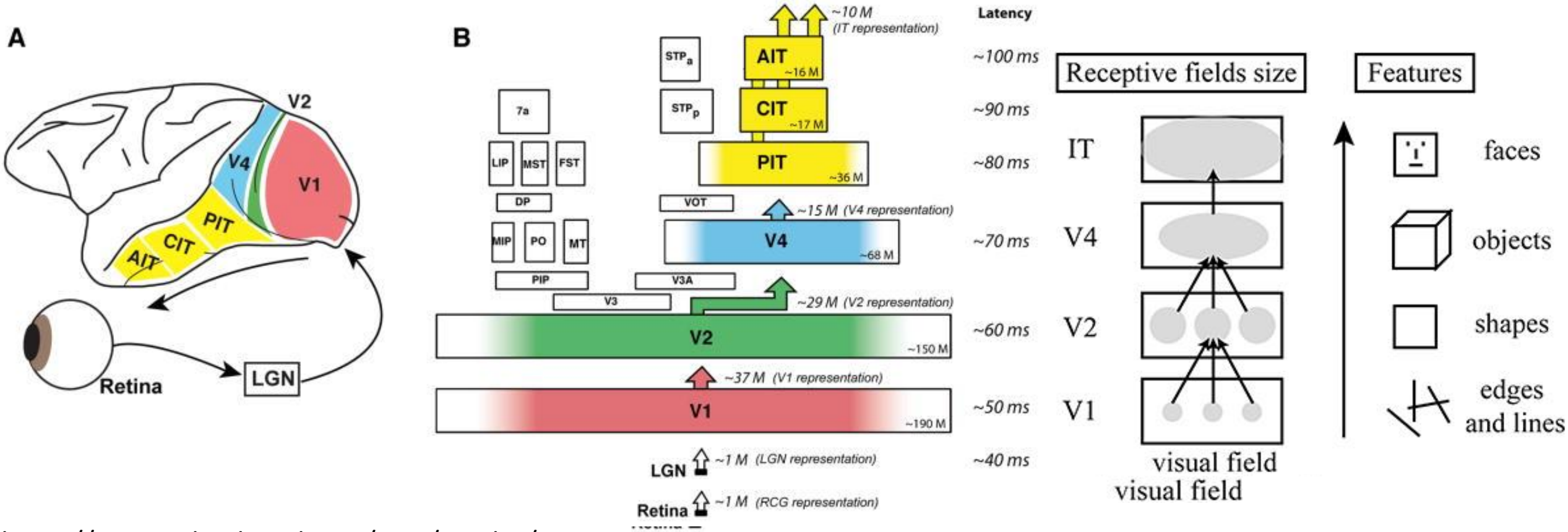


https://www.youtube.com/watch?v=iPdKMs9cEAs

How do our brains “detect” face?

(DiCarlo, James J et al., 2013)



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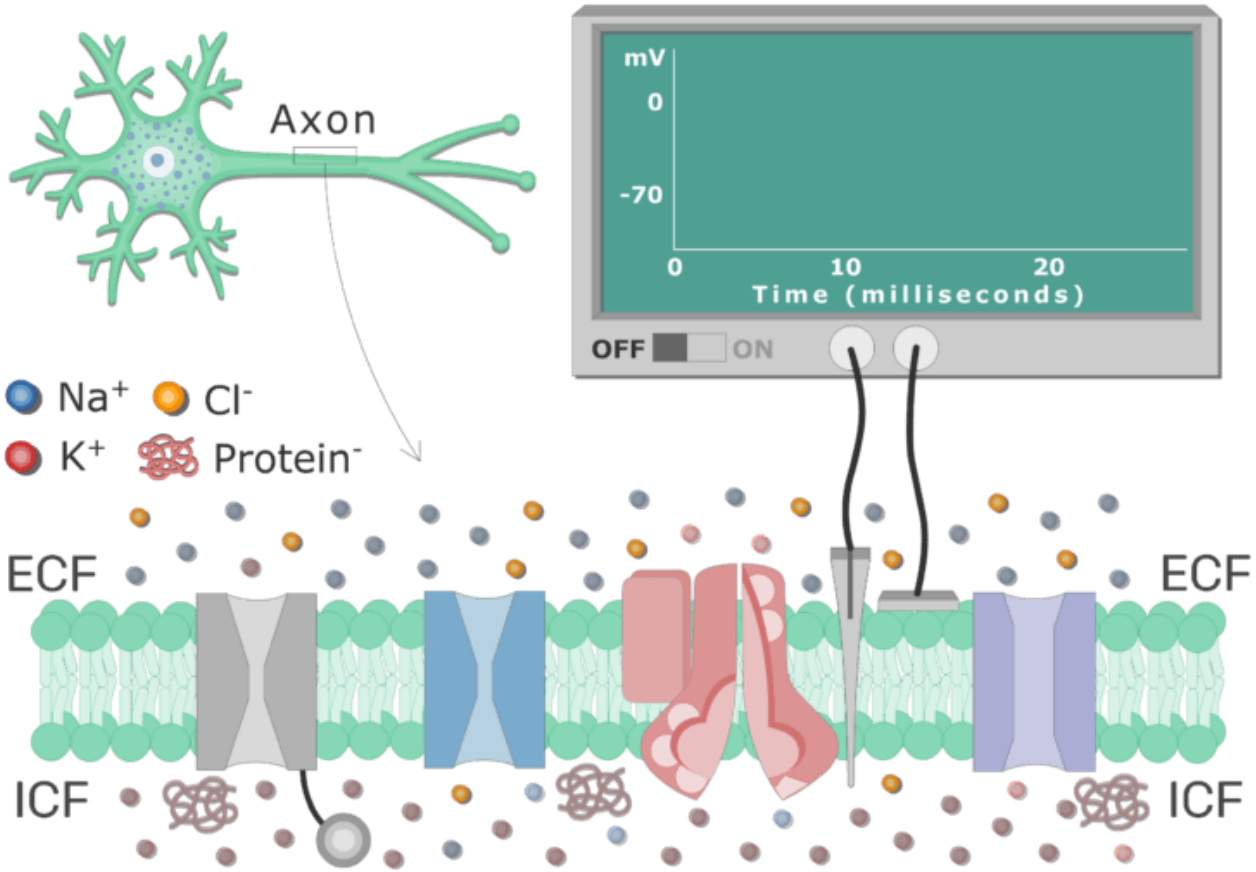
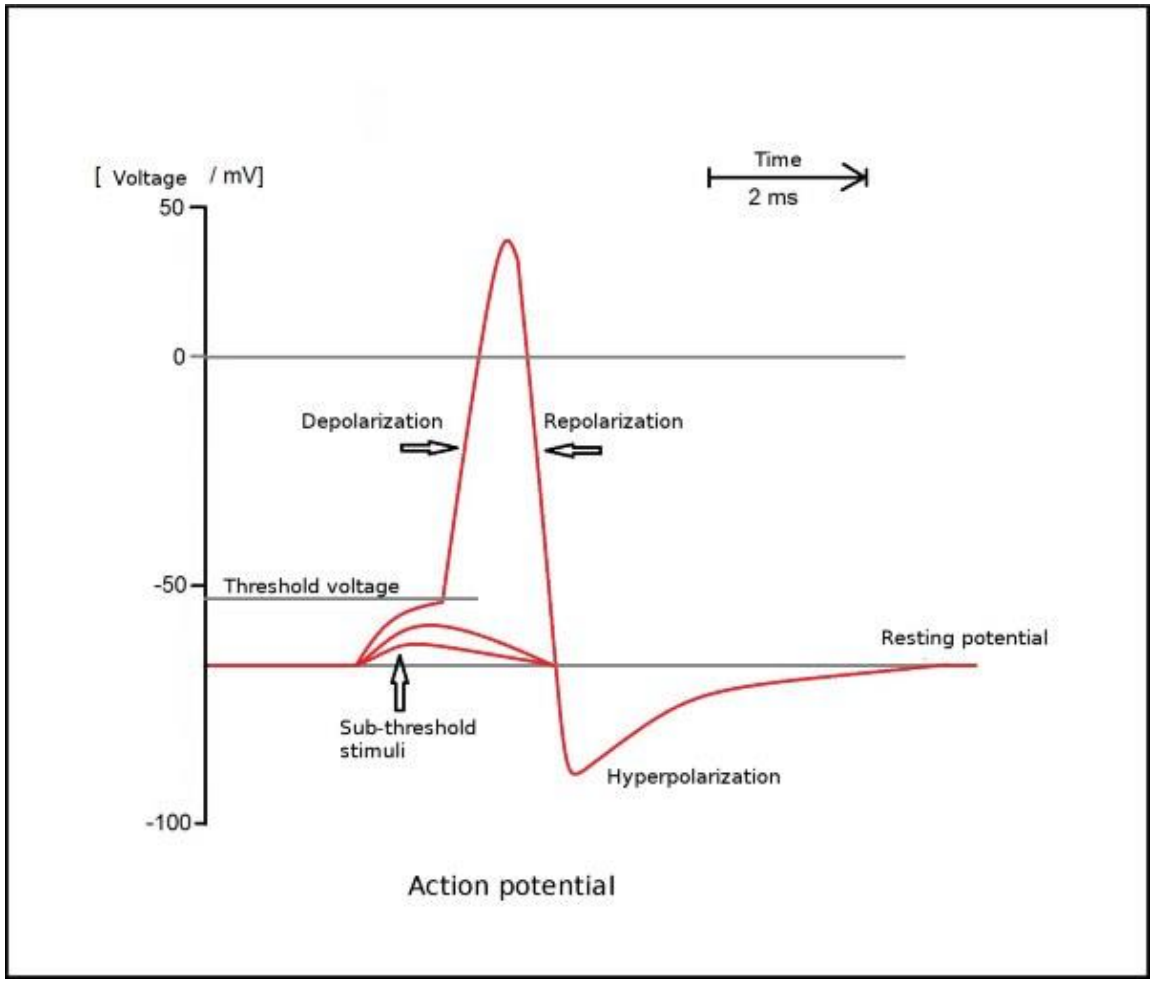
https://neurdiness.files.wordpress.com/2018/05/fncom-08-00135-g001.jpg



https://www.getbodysmart.com/wp-content/uploads/2017/10/Factors-That-Determine-the-Resting-Membrane-Potential-736x550.png



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How do our brains “recognize” face?

(Sinha, Pawan, et al., 2006)

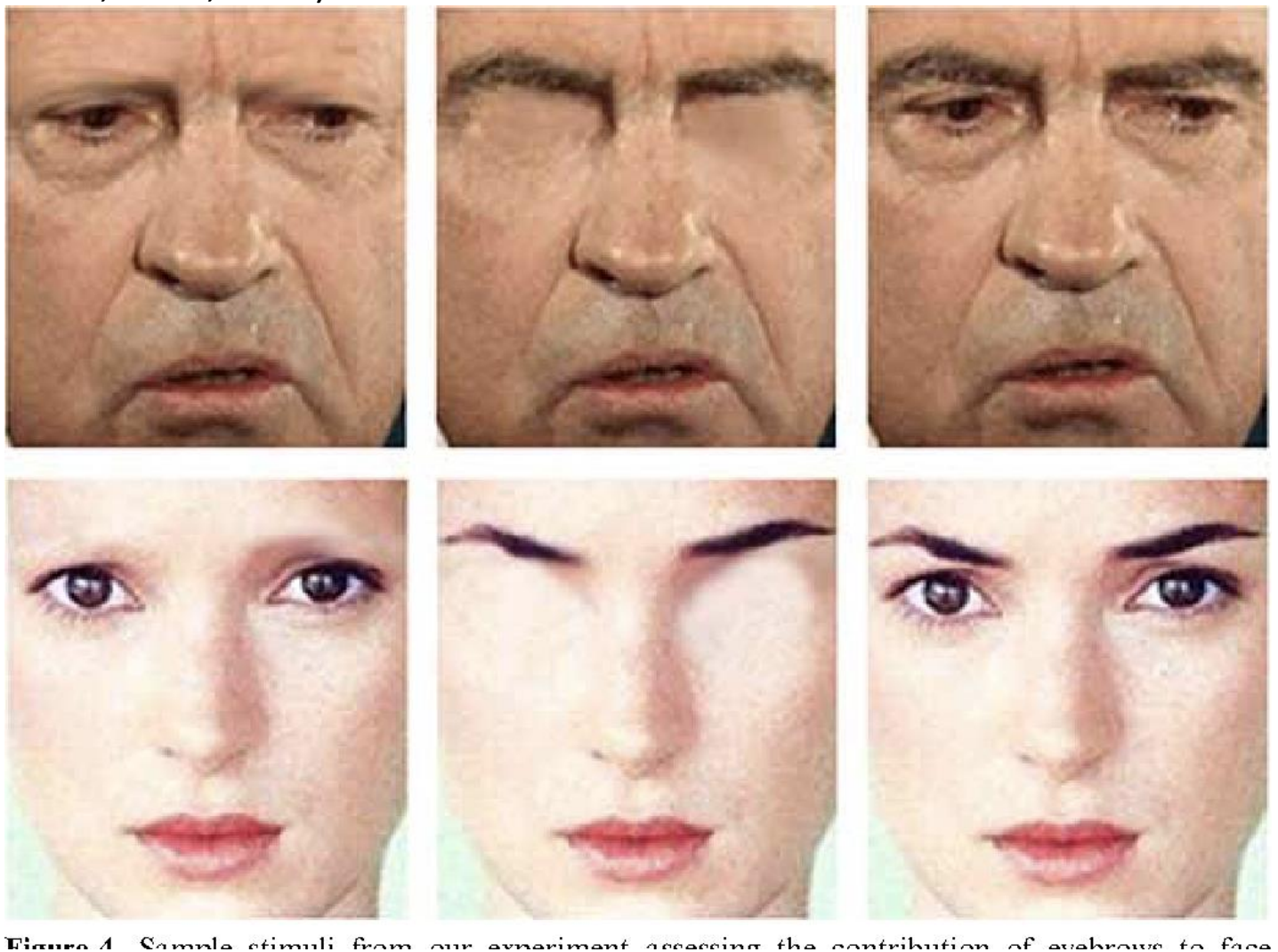


Figure 4. Sample stimuli from our experiment assessing the contribution of eyebrows to face

http://web.mit.edu/sinhalab/Papers/19results_sinha_etal.pdf

How do our brains “recognize” face?

(Sinha, Pawan, et al., 2006)

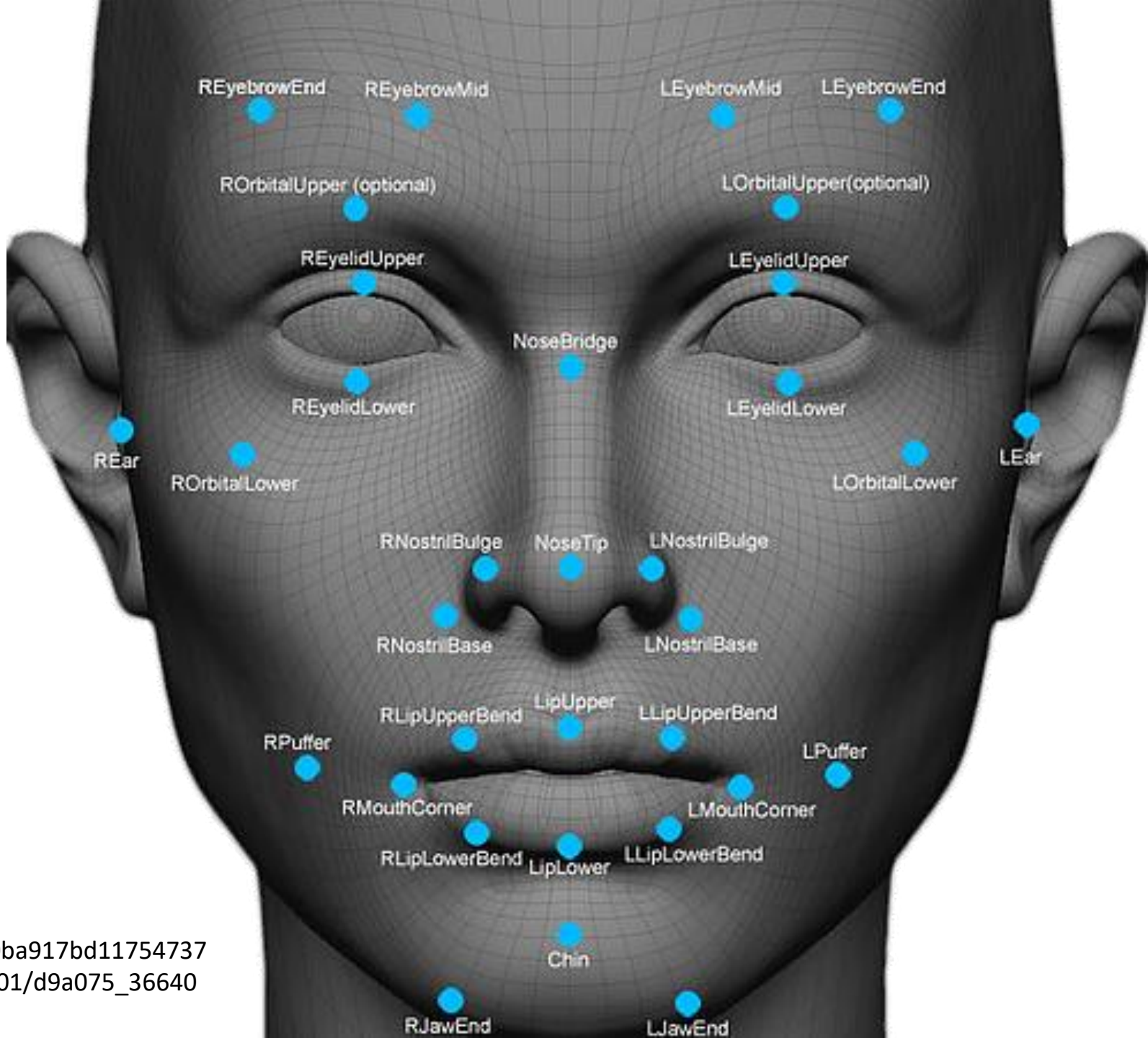
https://pics.me.me/eyebrows-are-important-11288354.png

How Computers ”detect” and “recognize” faces?

https://cdn-images-1.medium.com/max/800/1*woPojJbd6lT7CFZ9lHRVDw.gif

How Computers ”detect”faces?

(*Creoqode*, 2019)



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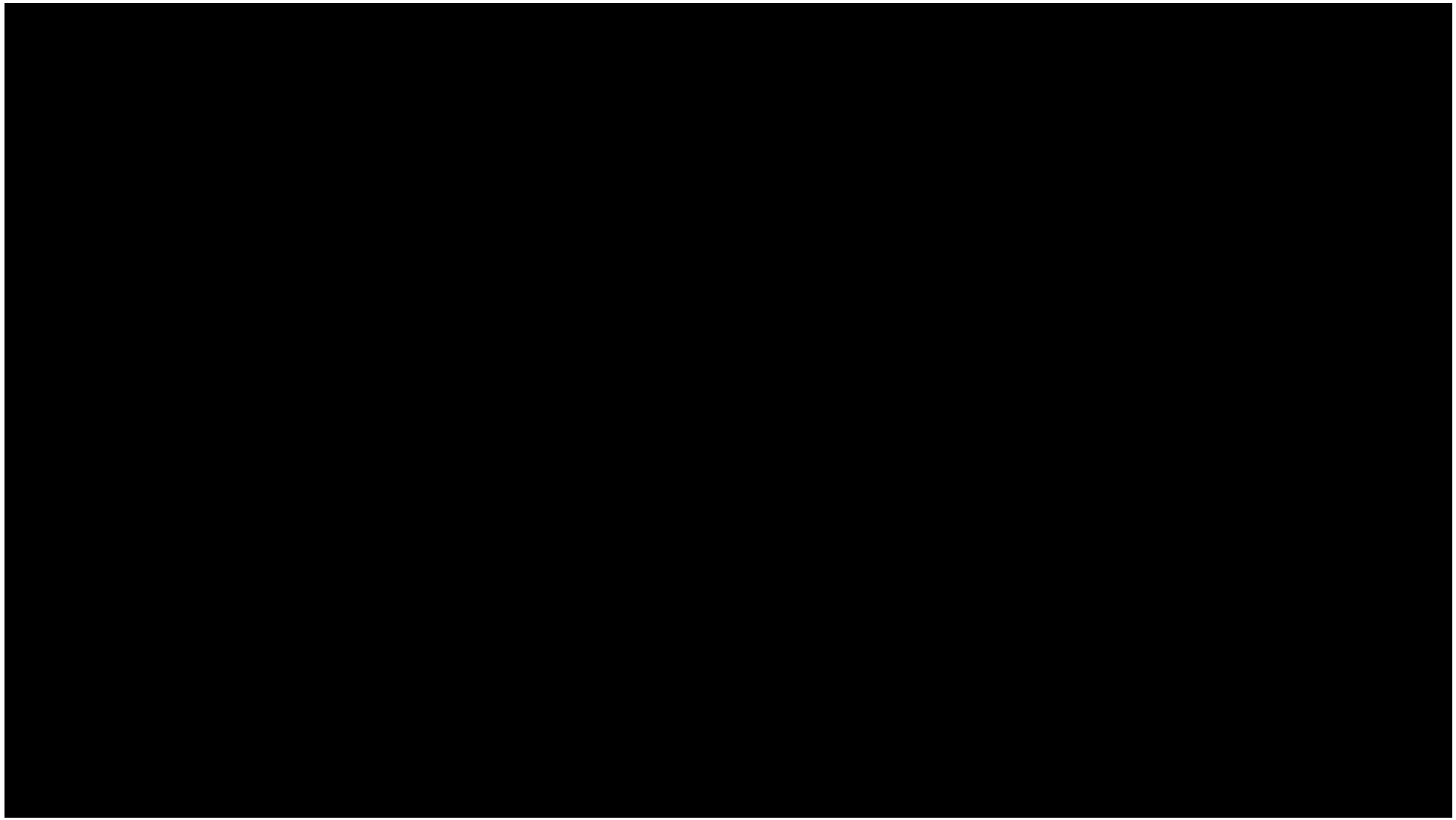
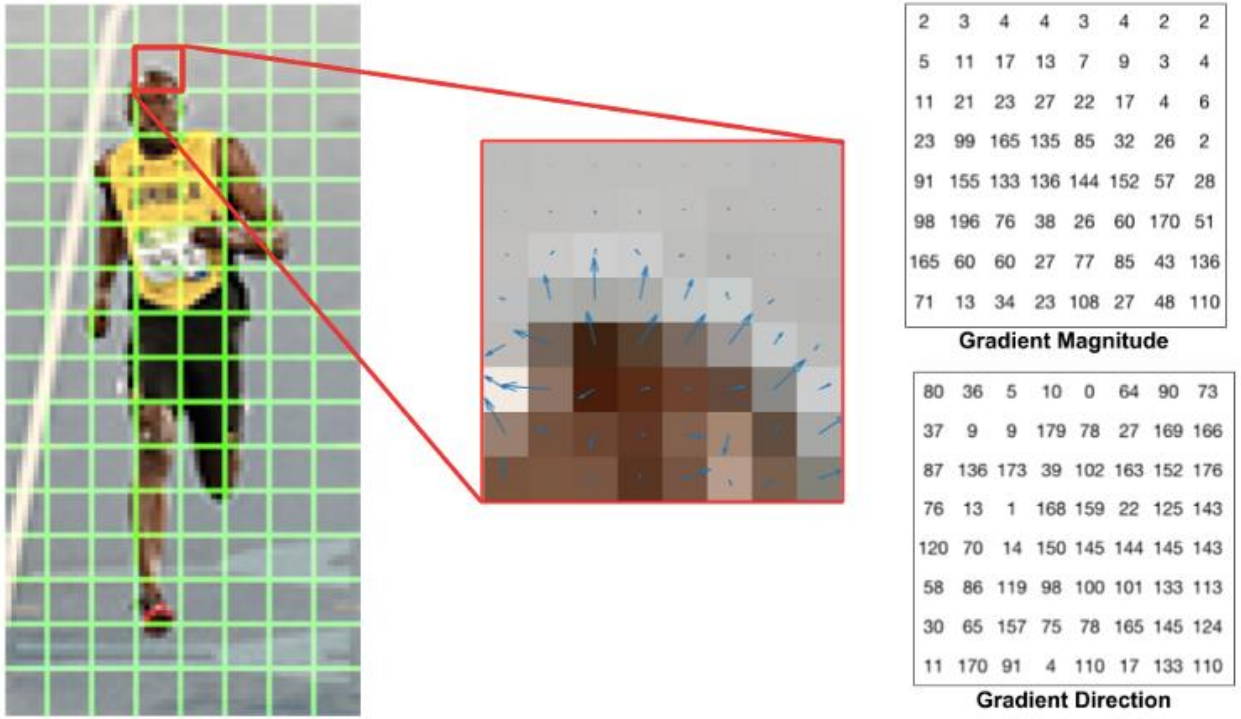
How Computers ”detect”faces?

(Zhang, Kaipeng, et al., 2016)



https://towardsdatascience.com/how-does-a-face-detection-program-work-using-neural-networks-17896df8e6ff

“signal” and “threshold”



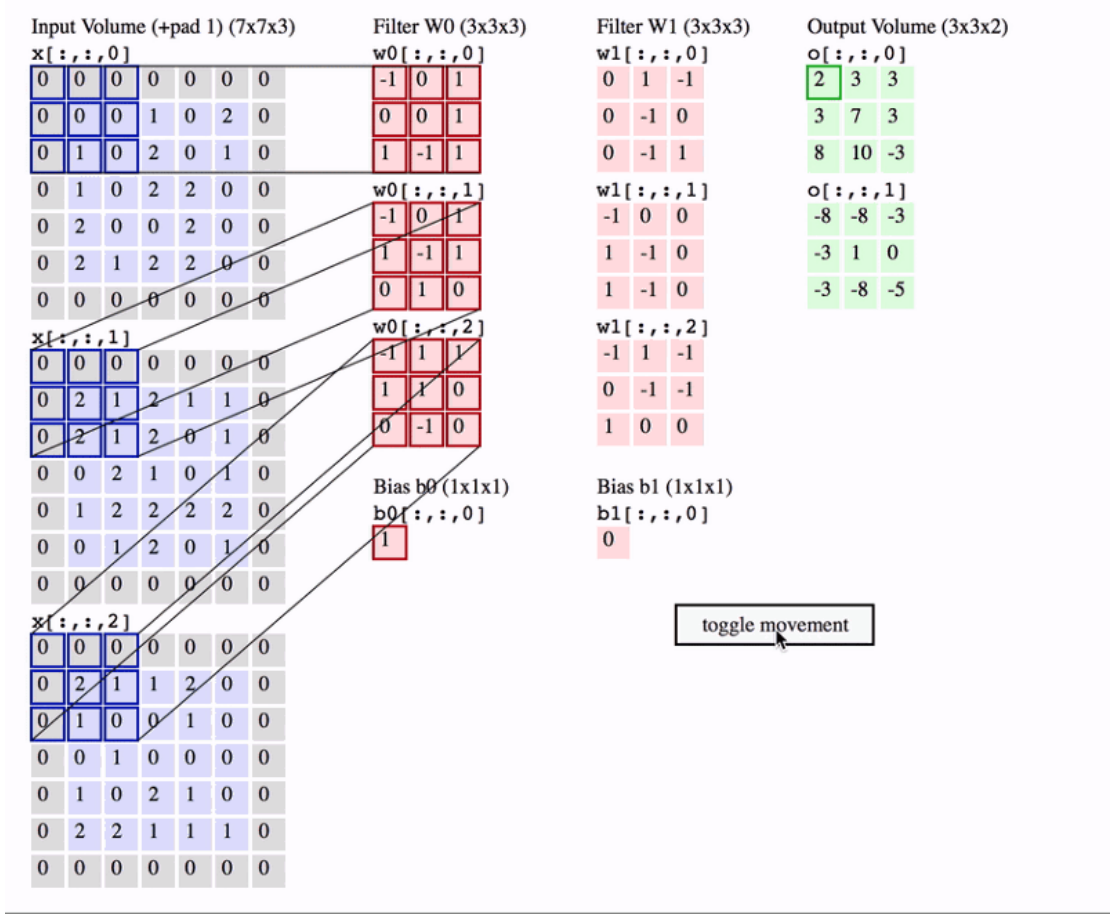
2	3	4	4	3	4	2	2
5	11	17	13	7	9	3	4
11	21	23	27	22	17	4	6
23	99	165	135	85	32	26	2
91	155	133	136	144	152	57	28
98	196	76	38	26	60	170	51
165	60	60	27	77	85	43	136
71	13	34	23	108	27	48	110

Gradient Magnitude

80	36	5	10	0	64	90	73
37	9	9	179	78	27	169	166
87	136	173	39	102	163	152	176
76	13	1	168	159	22	125	143
120	70	14	150	145	144	145	143
58	86	119	98	100	101	133	113
30	65	157	75	78	165	145	124
11	170	91	4	110	17	133	110

Gradient Direction

https://cdn-images-1.medium.com/max/800/0*gM1-zaeS8_XRd7gA.png



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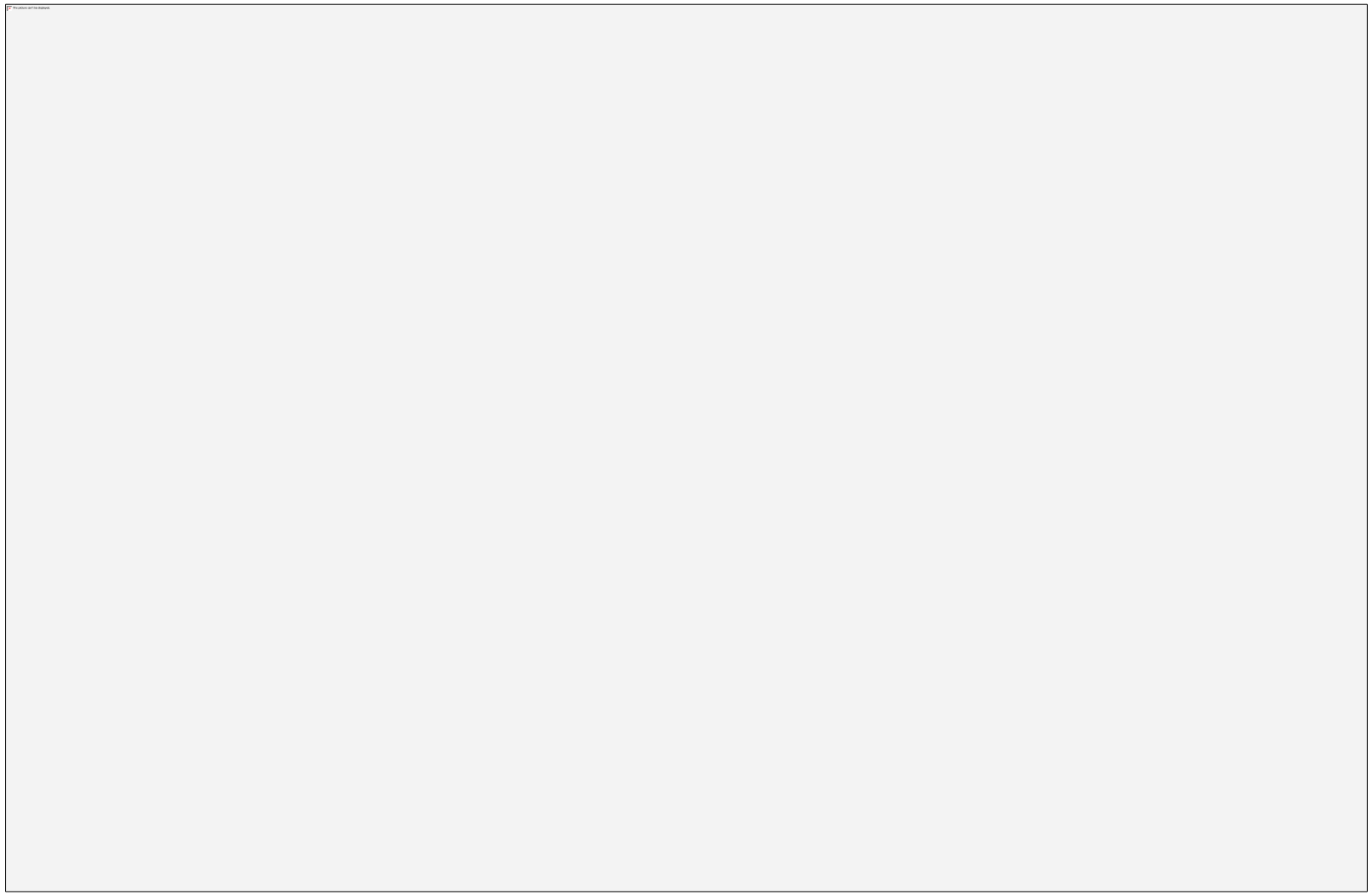
Neurons in the brains and in ANN (Artificial Neural Network)



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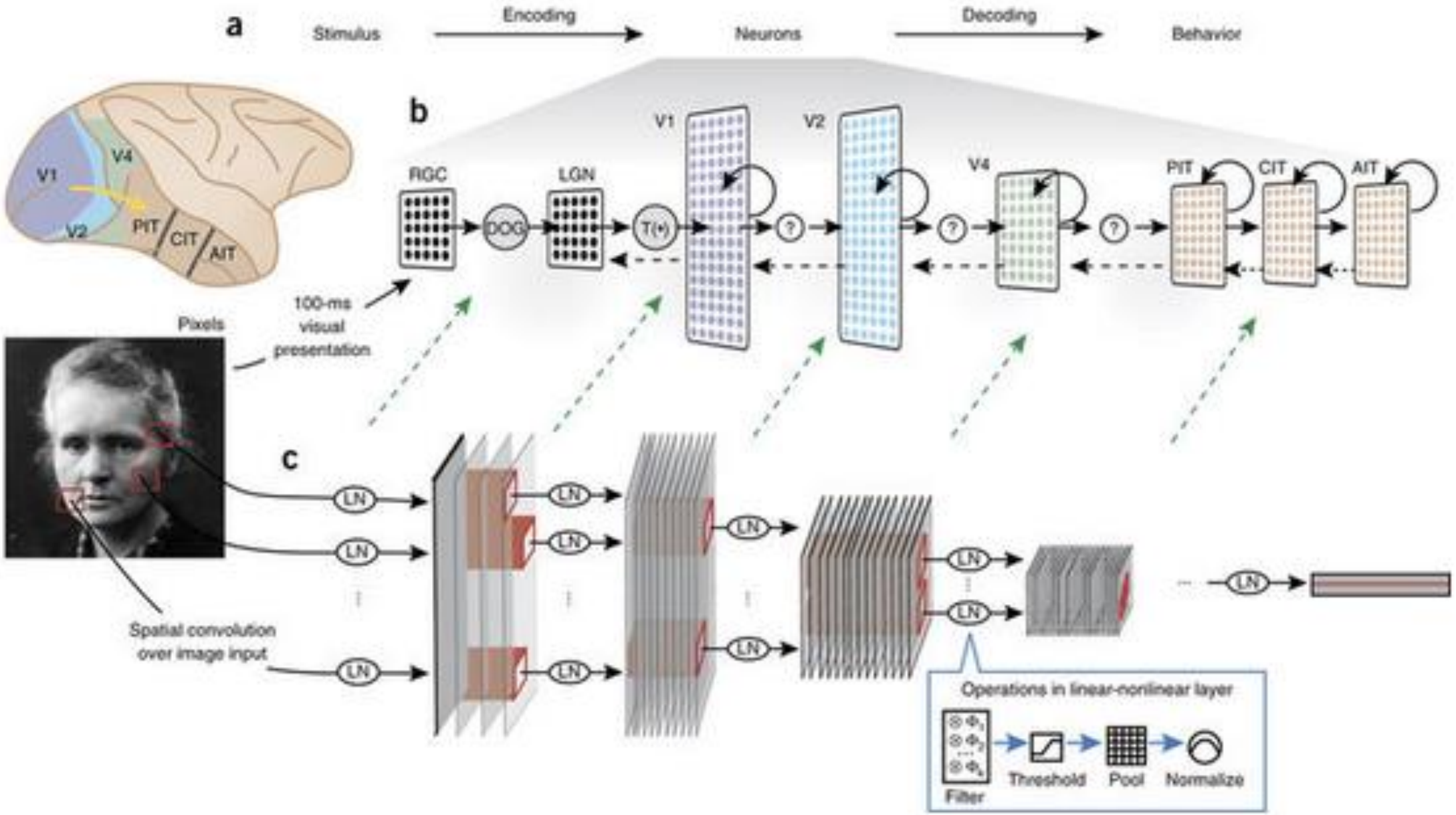
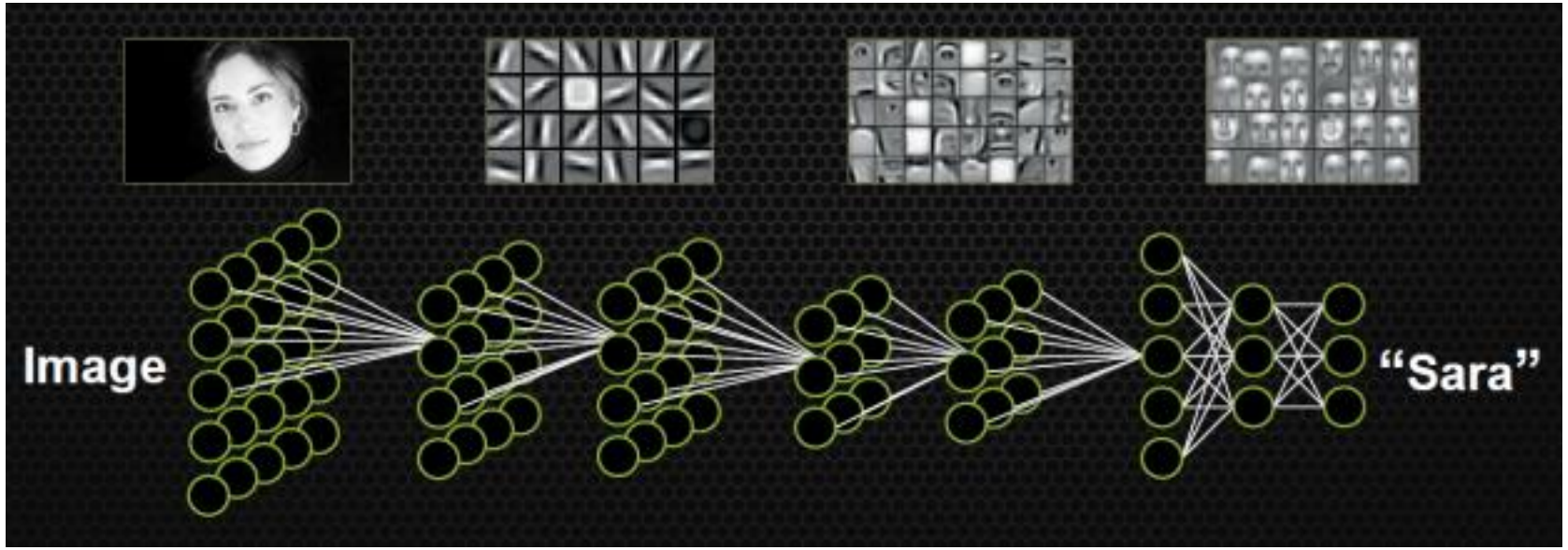
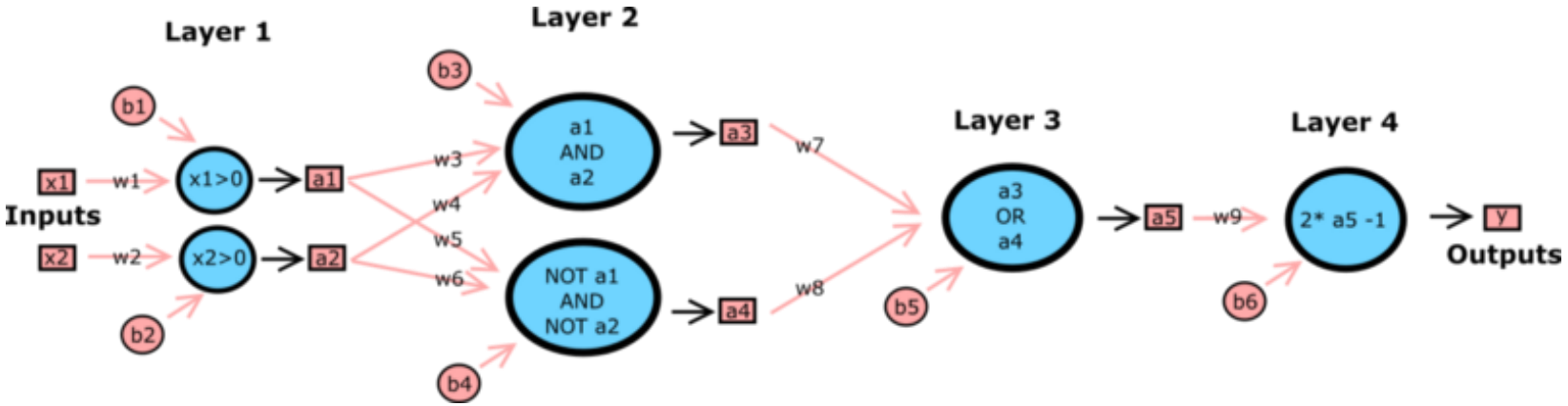


https://neurdiness.files.wordpress.com/2018/05/screenshot-from-2018-05-17-20-24-45.png



https://devblogs.nvidia.com/wp-content/uploads/2014/09/nn_example-624x218.png



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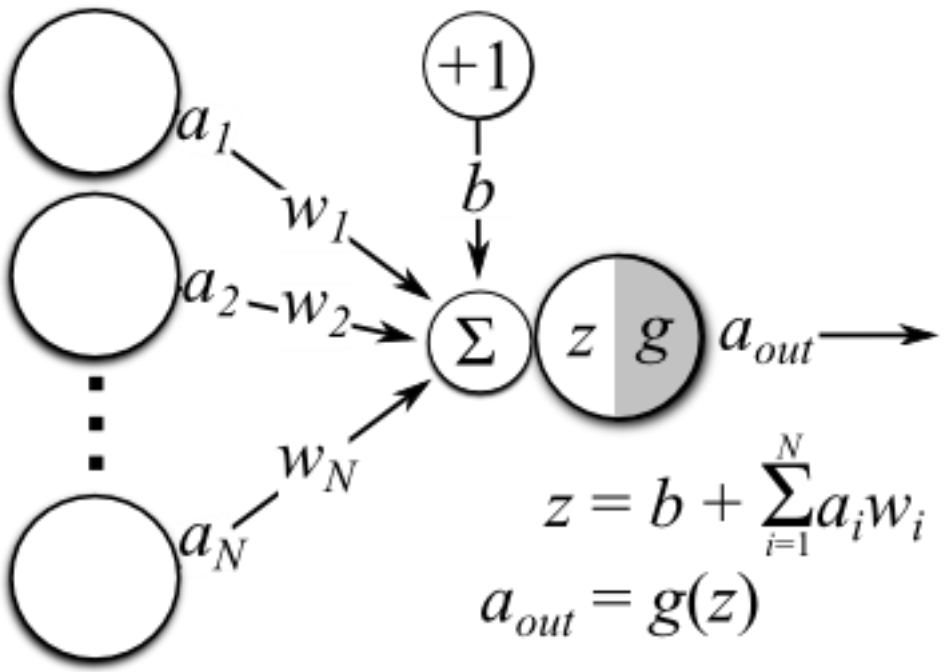

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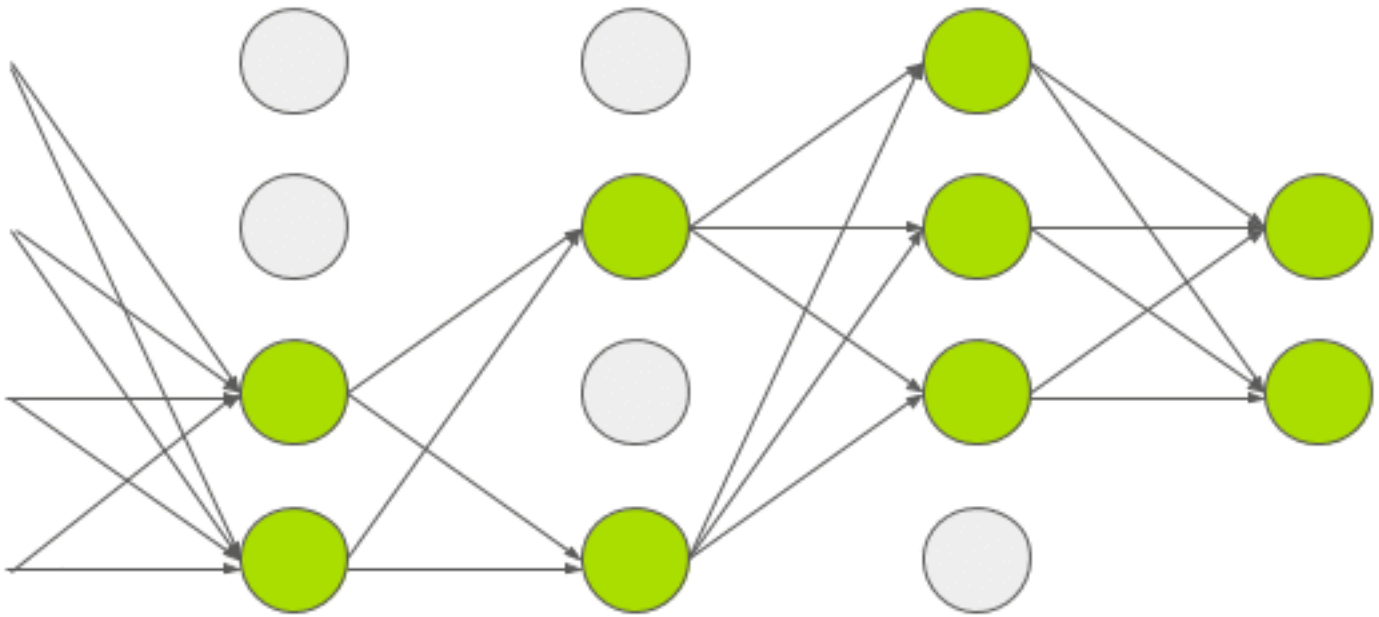
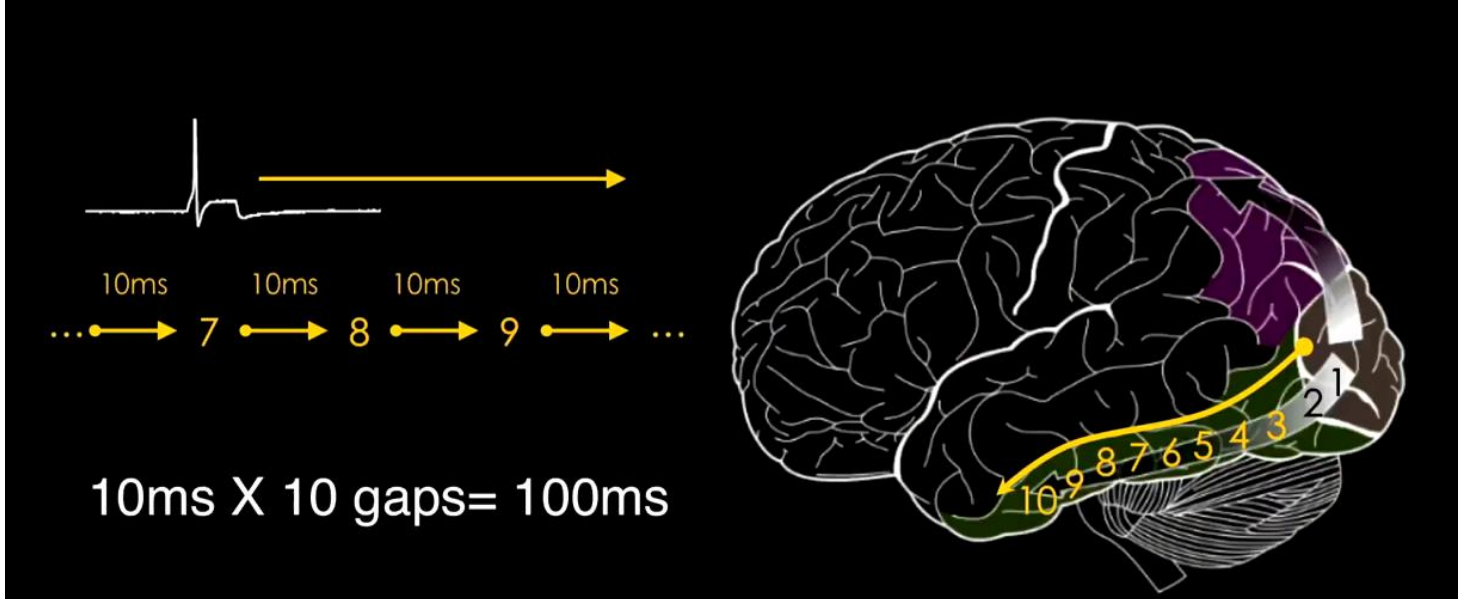


https://www.learnopencv.com/understanding-alexnet/

ANN is NOT a perfect model

https://www.pyimagesearch.com/2015/03/23/sliding-windows-for-object-detection-with-python-and-opencv/



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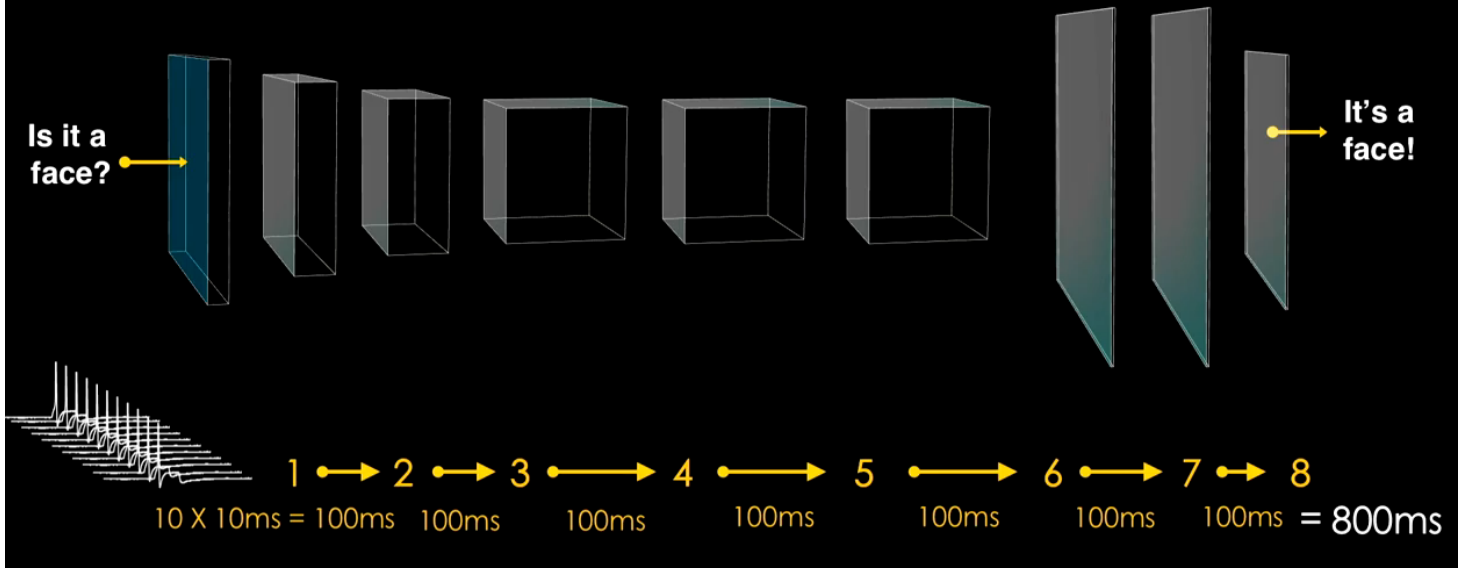
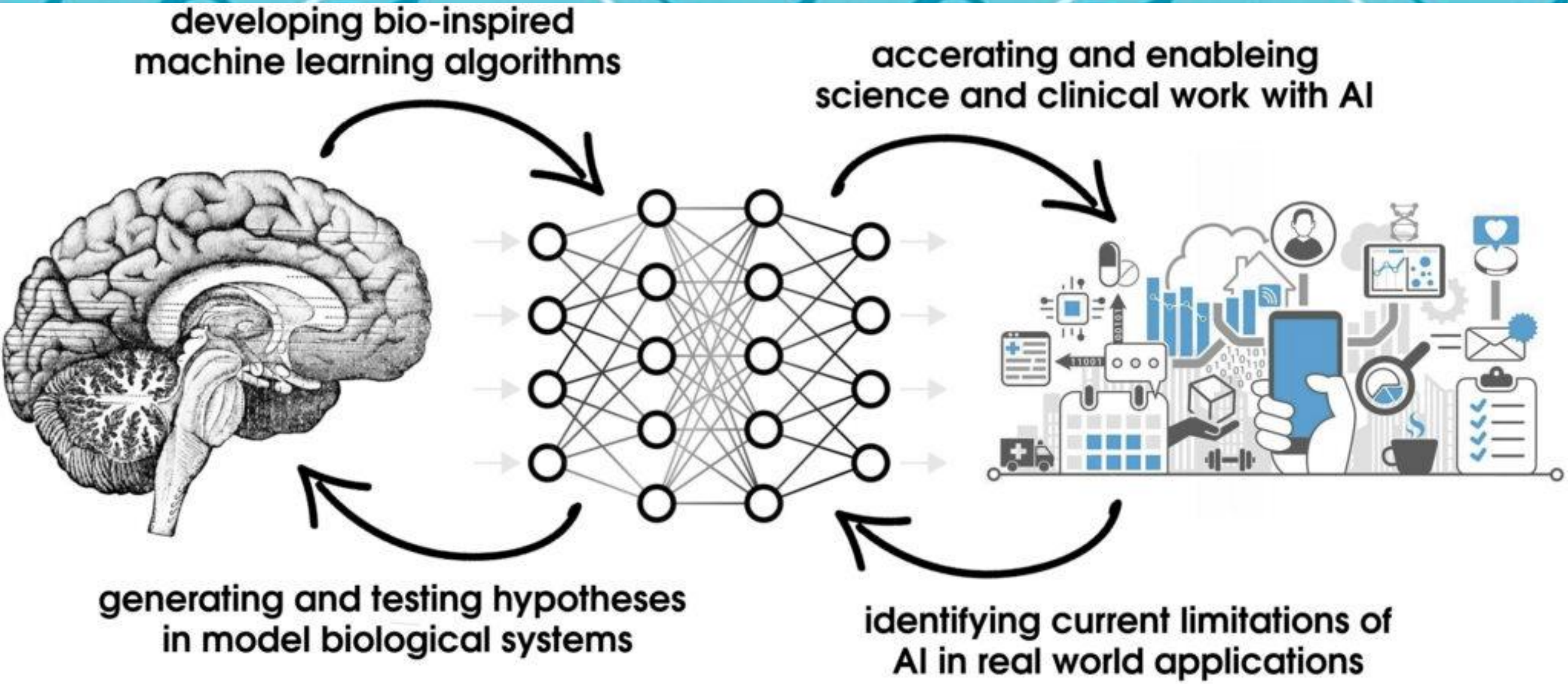


Bigger than the sum of their parts



http://www.uvm.edu/neurobotics/wp-content/uploads/brain_model_application-1024x447.jpg

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