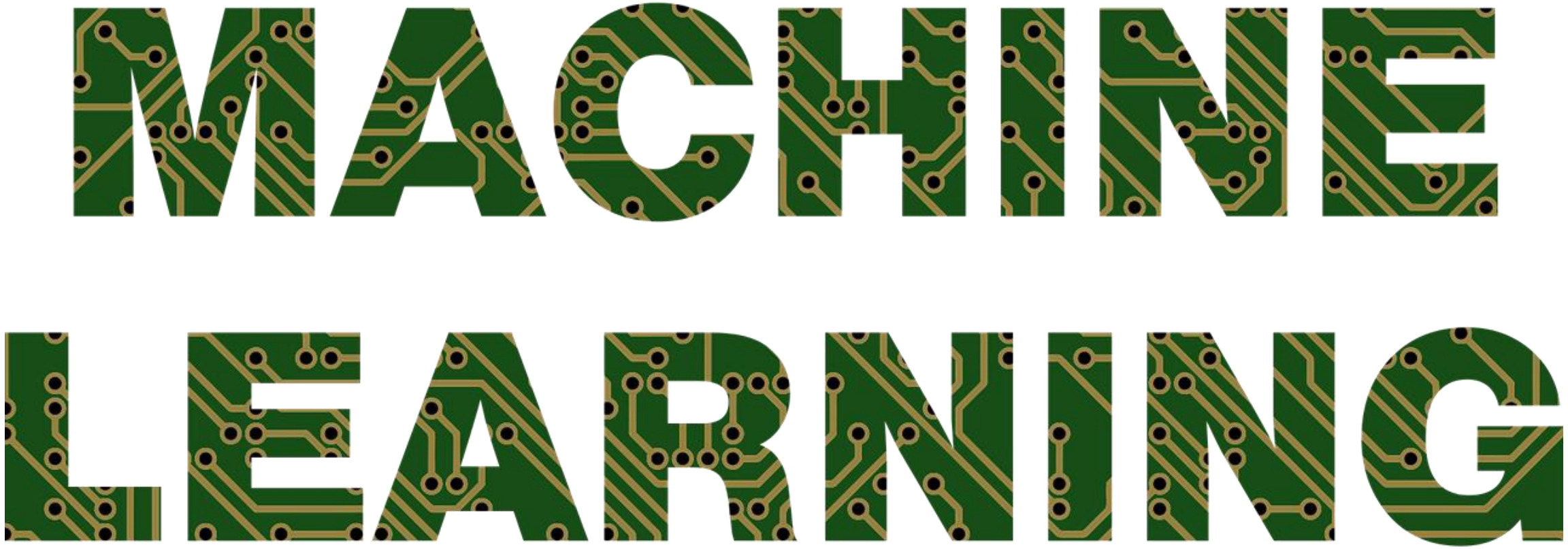

MACHINE
LEARNING

Crazy stuff done with deep learning

AI completes Beethoven's unfinished symphony nearly 200 years later:
https://blogs.nvidia.com/blog/2021/11/01/ai-beethovens-unfinished-symphony/

Deep reinforcement learning controls nuclear fusion:
https://www.nature.com/articles/s41586-021-04301-9

Deep learning restores ancient Greek texts:
https://www.nature.com/articles/s41586-022-04448-z
https://www.deepmind.com/blog/predicting-the-past-with-ithaca

Deep learning drug discovery model turns evil:
https://www.nature.com/articles/s42256-022-00465-9.pdf?utm_source=pocket_mylist

Deep learning finds answers to questions and provides citations:
https://www.deepmind.com/publications/gophercite-teaching-language-models-to-support-answers-with-verified-quotes

ML NEWS by Yannic Kilcher: https://www.youtube.com/c/YannicKilcher

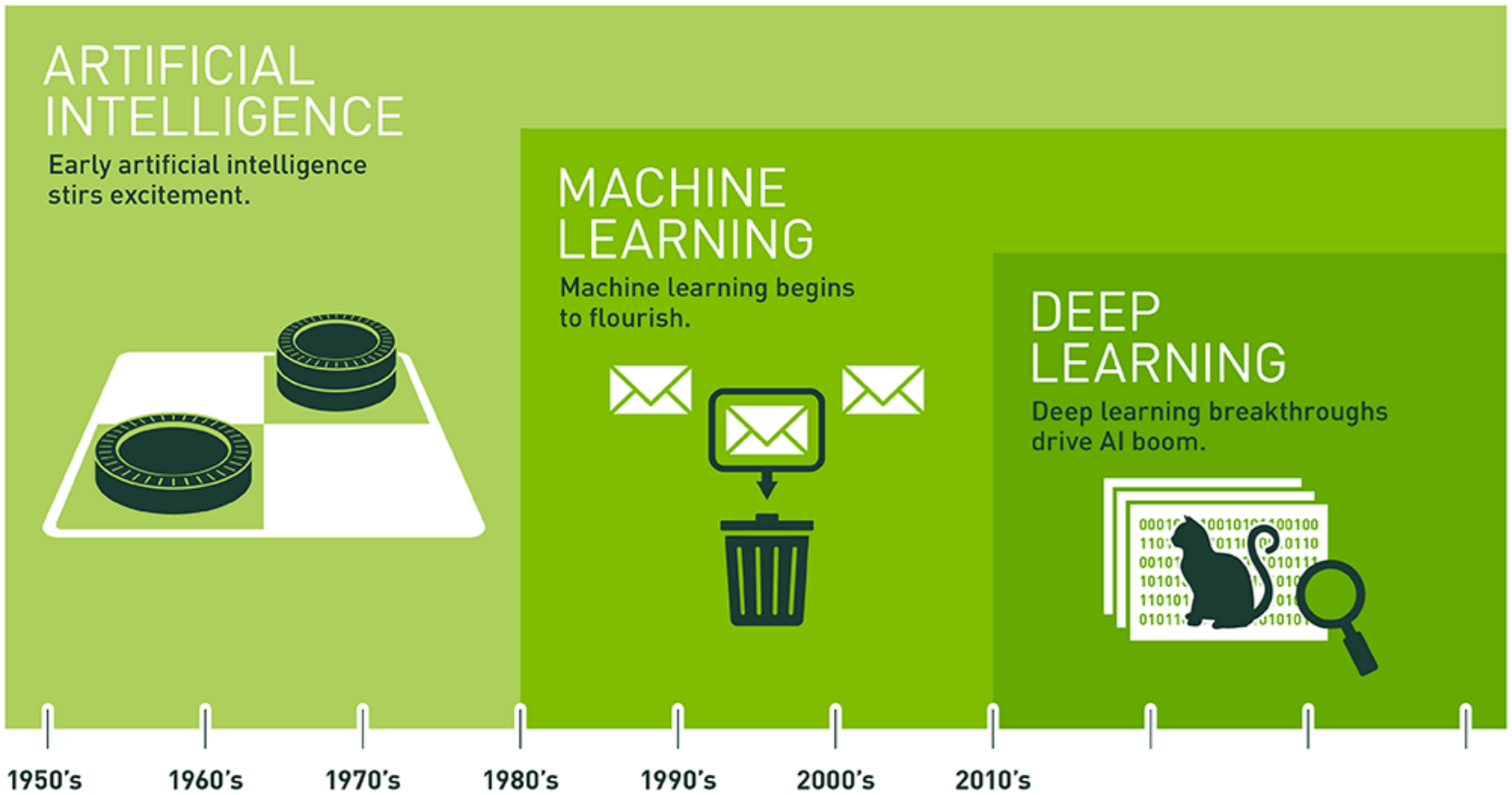
Machine learning and deep learning

Machine learning	Deep learning
Faster to train	Takes more time to train
Software is typically easier to install	Software can be more challenging to install
Can achieve good performance with less data	Requires more data for good performance
Depends on preprocessing to model more than very simple relationships	Can model highly complex relationships

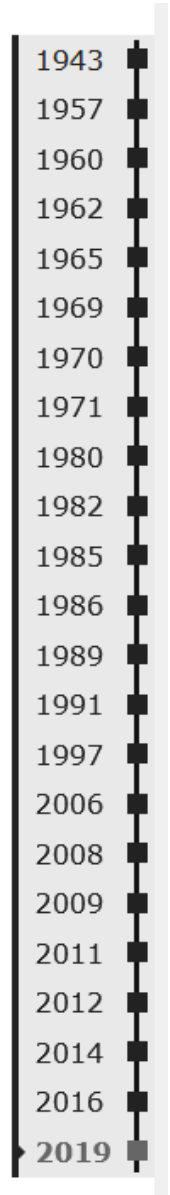
https://smltar.com/dloverview.html

A brief history of deep learning

https://machinelearningknowledge.ai/brief-history-of-deep-learning

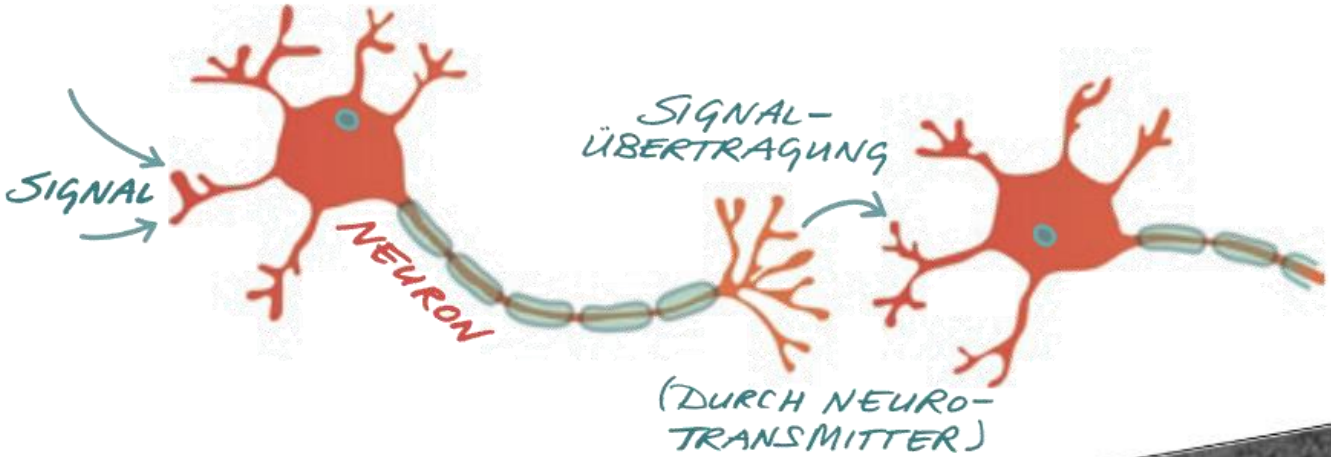


Since an early flush of optimism in the 1950s, smaller subsets of artificial intelligence – first machine learning, then deep learning, a subset of machine learning – have created ever larger disruptions.



https://melaniemitchell.me/aibook
https://towardsdatascience.com/introducing-deep-learning-and-neural-networks-deep-learning-for-rookies-1-bd68f9cf5883

Biological neural networks



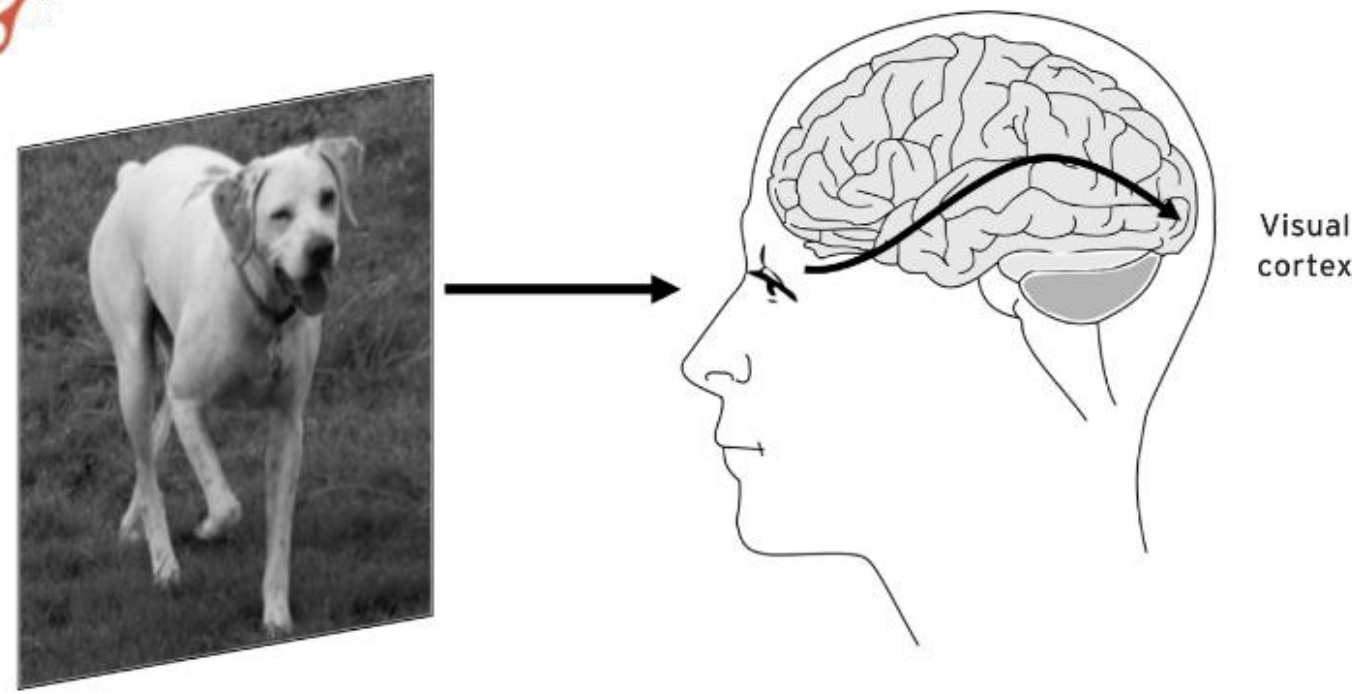
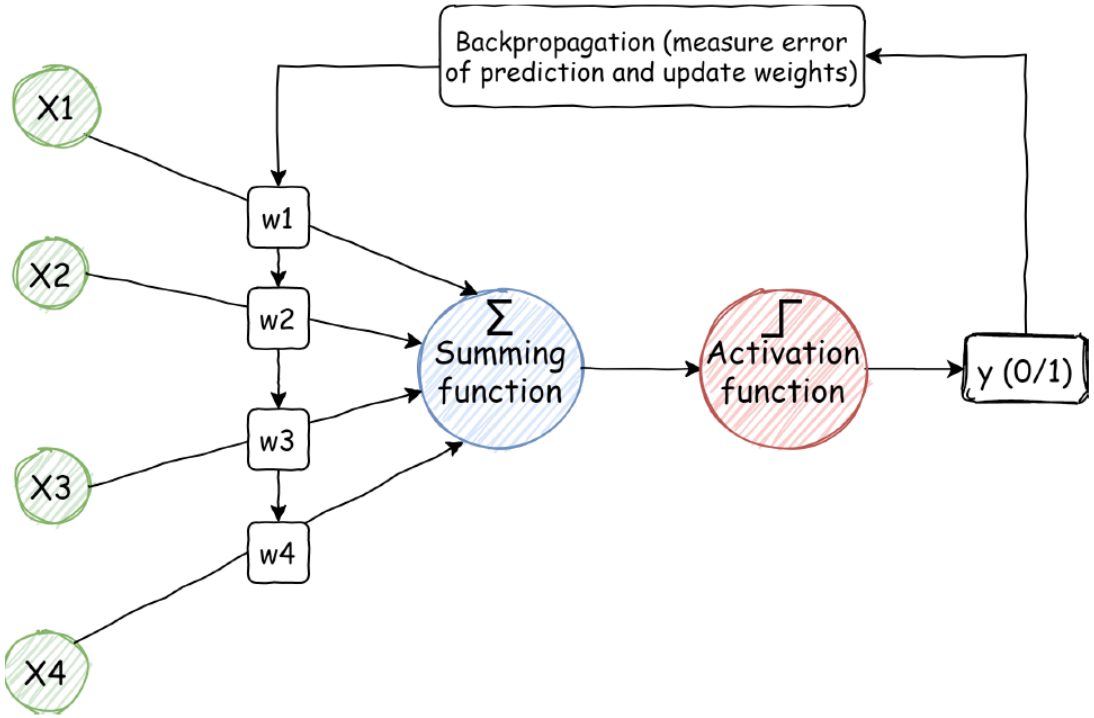
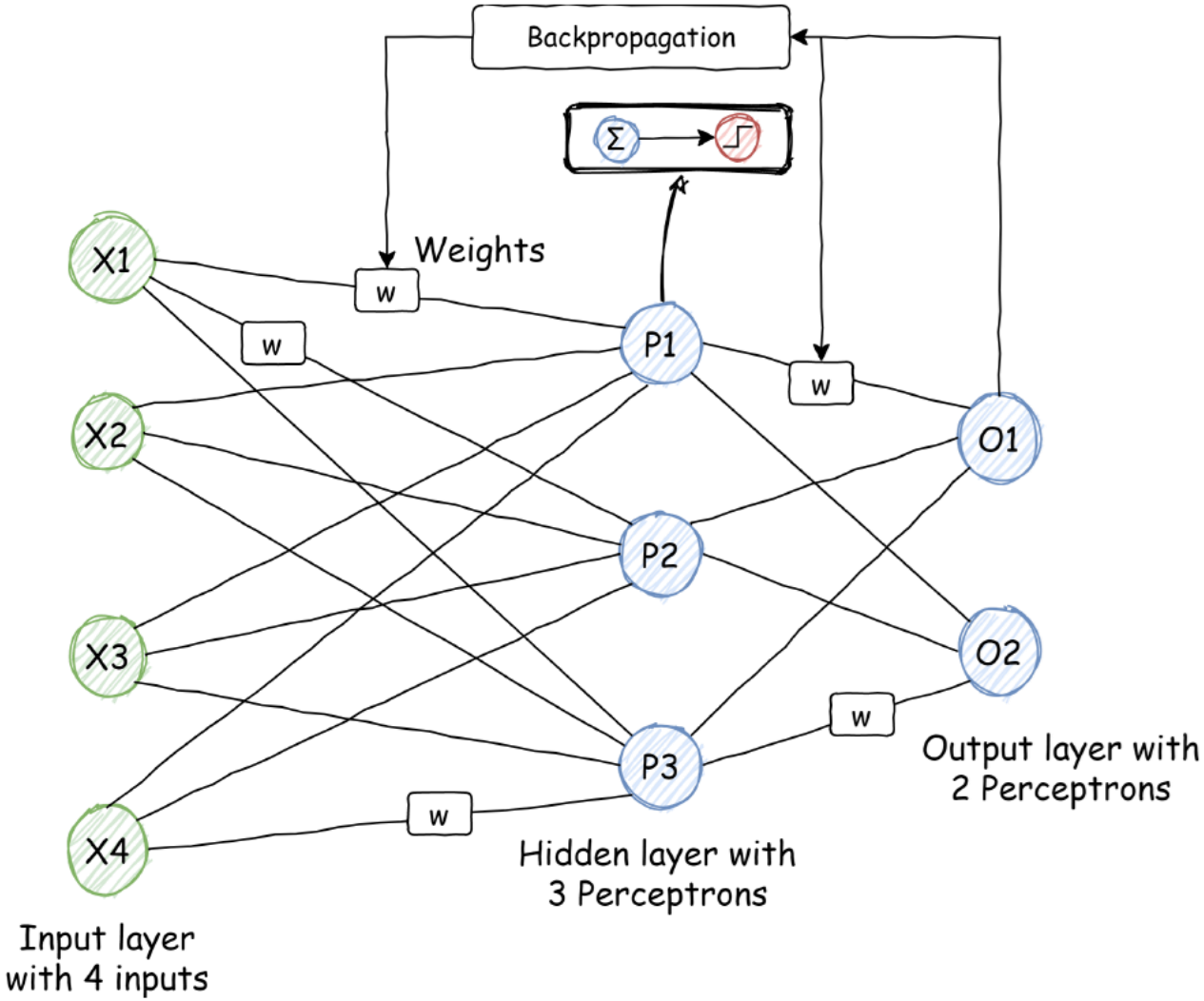


FIGURE 8: Pathway of visual input from eyes to visual cortex

https://melaniemitchell.me/aibook
https://link.springer.com/book/10.1007/978-3-658-26763-6
https://towardsdatascience.com/deep-learning-versus-biological-neurons-floating-point-numbers-spikes-and-neurotransmitters-6eebfa3390e9

Artificial neural networks

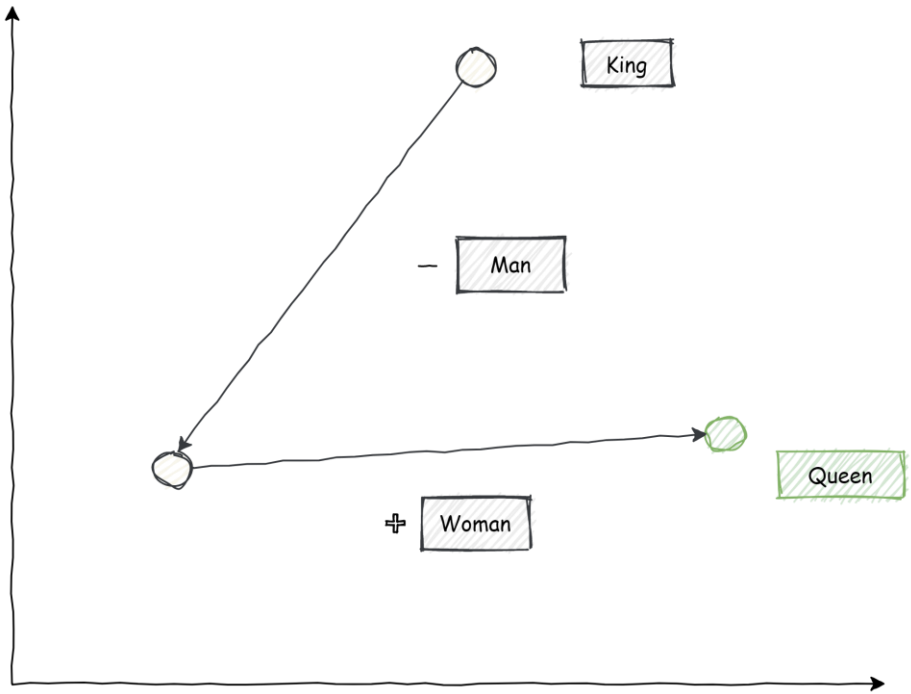




http://playground.tensorflow.org
https://www.youtube.com/watch?v=aircAruvnKk

Automated text analysis with neural networks – word vectors

"*You shall know a word by the company it keeps.*" John Rupert Firth



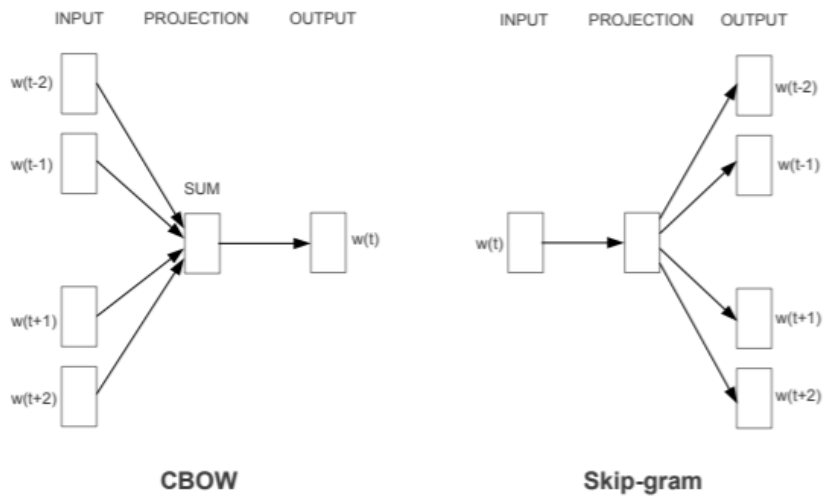
Jane worked as a _.

Jim worked as a _.

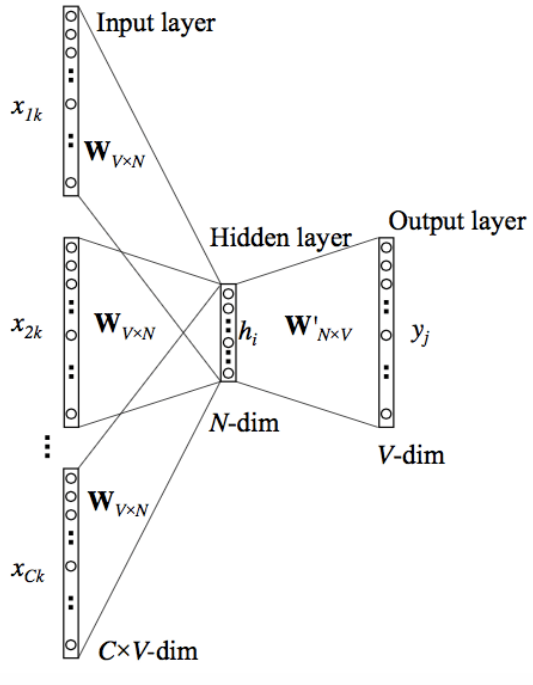
https://pair.withgoogle.com/explorables/fill-in-the-blank/
https://projector.tensorflow.org/
https://storage.googleapis.com/bert-wsd-vis/demo/index.html?#word=lie

Automated text analysis with neural networks – word vectors

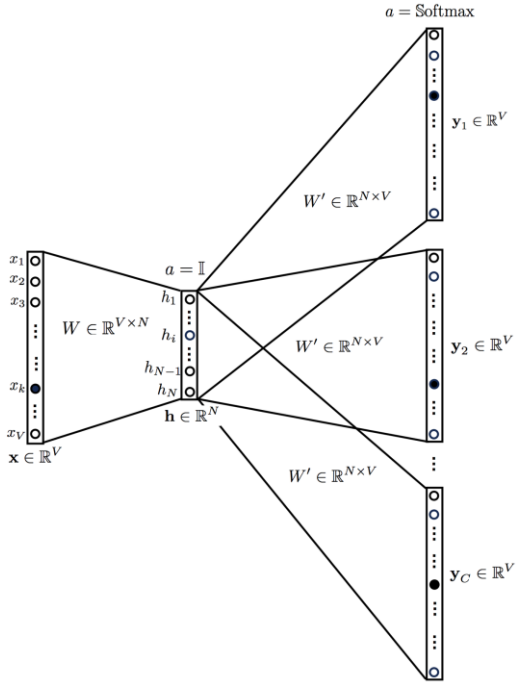
Source Text	Training Samples generated from source text			
I will have orange juice and eggs for breakfast	(will, I)	(will, have)	(will, orange)	
I will have orange juice and eggs for breakfast	(have, I)	(have, will)	(have, orange)	(have, juice)
I will have orange juice and eggs for breakfast	(orange, will)	(orange, have)	(orange, juice)	(orange, and)
I will have orange juice and eggs for breakfast	(juice, have)	(juice, orange)	(juice, and)	(juice, eggs)
I will have orange juice and eggs for breakfast	(and, orange)	(and, juice)	(and, eggs)	(and, for)
I will have orange juice and eggs for breakfast	(eggs, juice)	(eggs, and)	(eggs, for)	(eggs, breakfast)
I will have orange juice and eggs for breakfast	(for, and)	(for, eggs)	(for, breakfast)	



CBOW

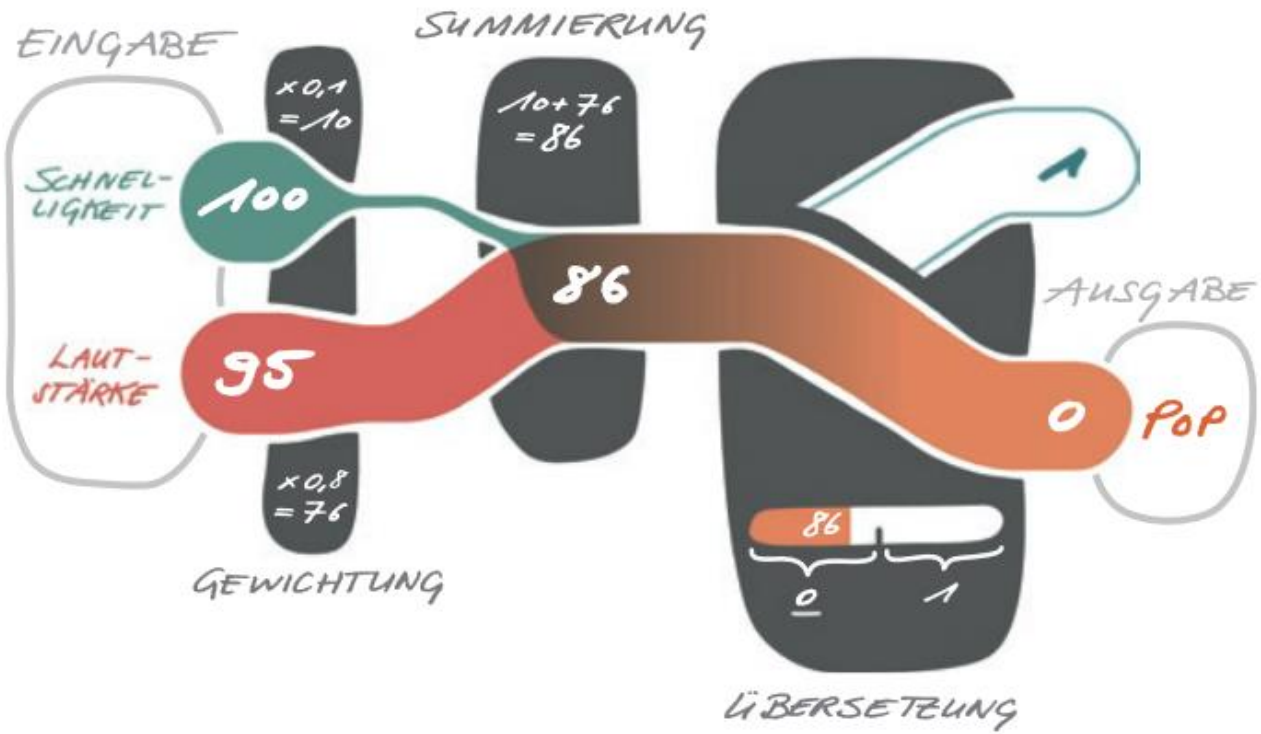


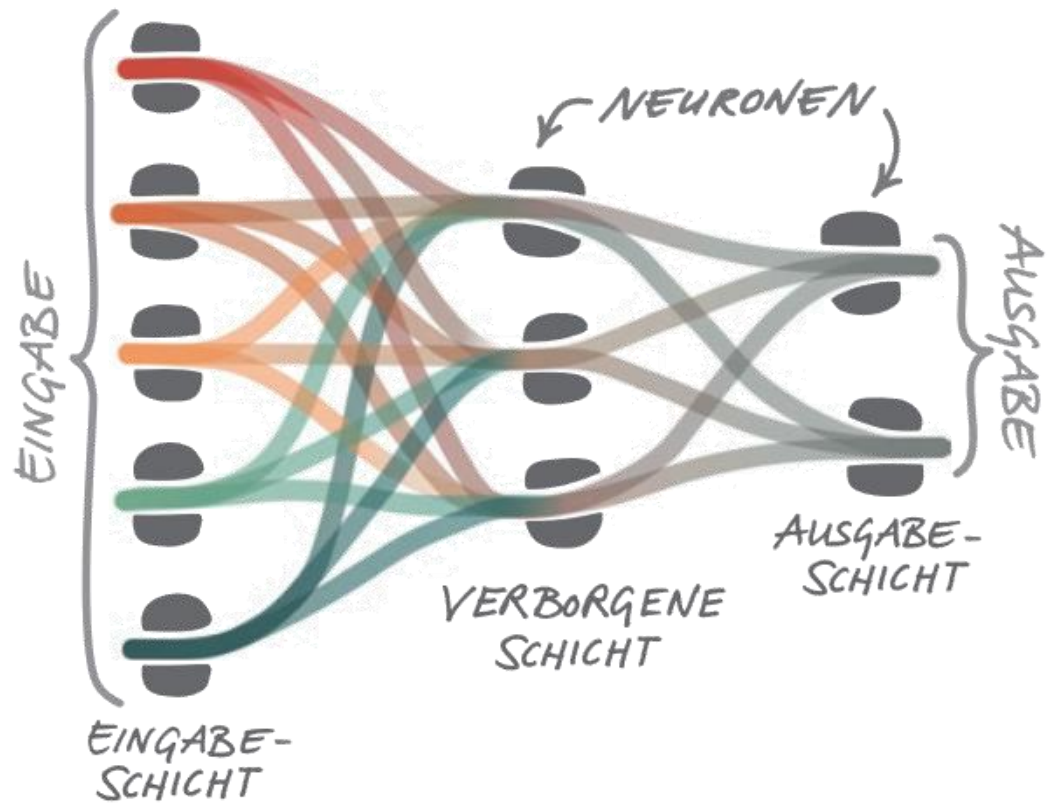
Skip-gram



https://arxiv.org/pdf/1309.4168v1.pdf
https://towardsdatascience.com/nlp-101-word2vec-skip-gram-and-cbow-93512ee24314
http://mccormickml.com/2016/04/19/word2vec-tutorial-the-skip-gram-model/
https://towardsdatascience.com/introduction-to-word-embedding-and-word2vec-652d0c2060fa
https://aclanthology.org/P14-2050/

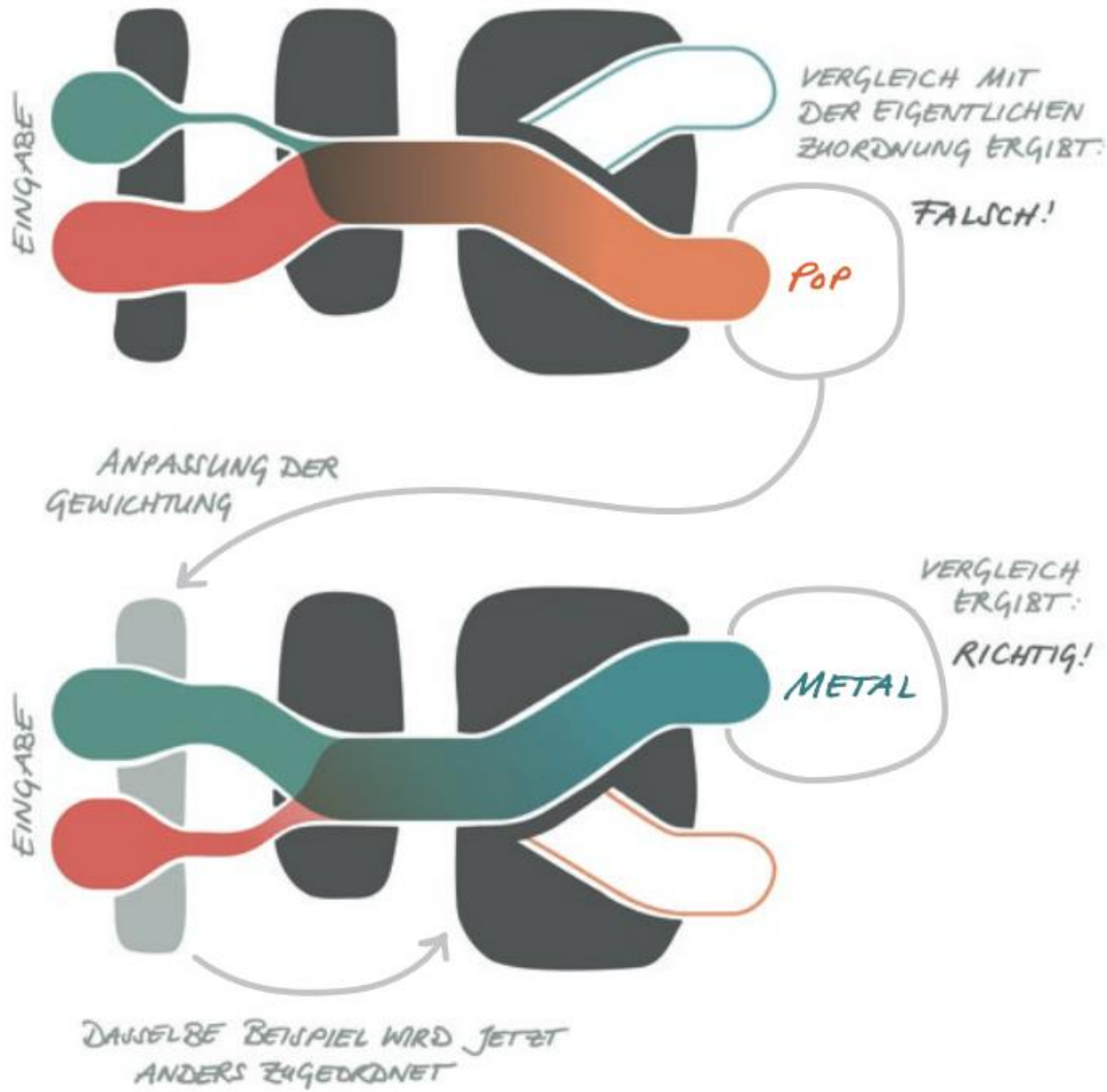
Artificial neural networks





https://link.springer.com/book/10.1007/978-3-658-26763-6

Artificial neural networks - backpropagation



https://link.springer.com/book/10.1007/978-3-658-26763-6