Deep Learning

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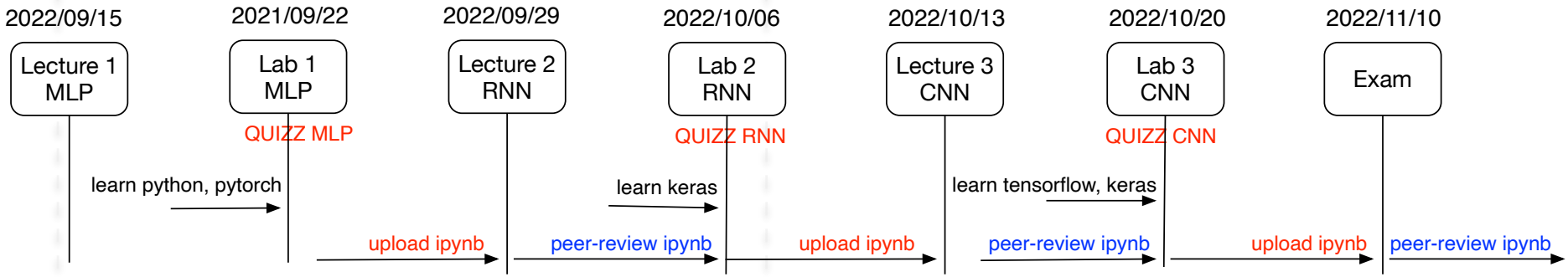
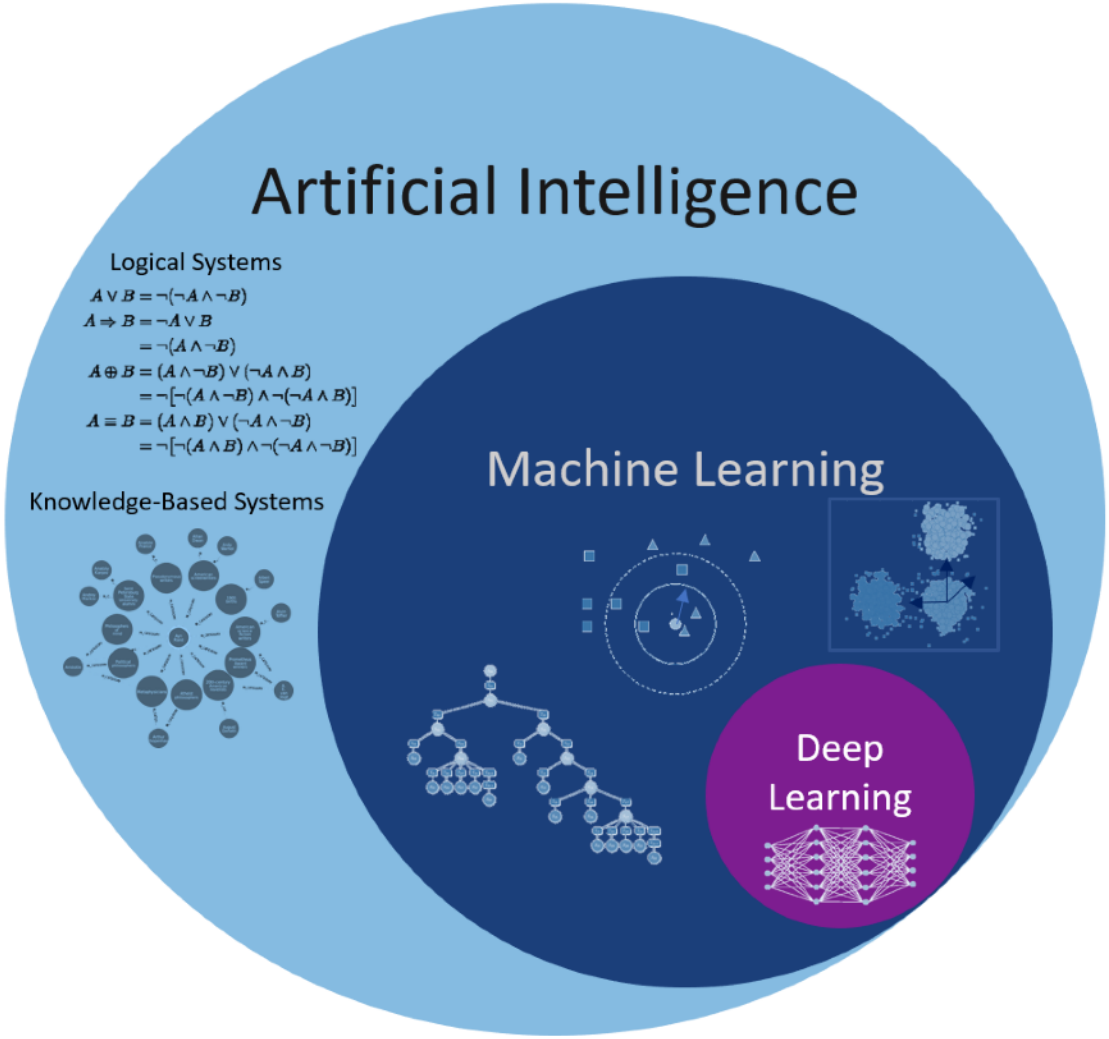
Timetable/ Organisation

Date	Type	Content	Teacher(s)
September 15, 2022 / 14:00 - 18:00	Lesson	MLP	G. Peeters
September 22, 2022 / 14:00 - 18:00	Lab	MLP	G. Peeters, A. Newson + others
September 29, 2022 / 14:00 - 18:00	Lesson	RNN	G. Peeters
October 06, 2022 / 14:00 - 18:00	Lab	RNN	G. Peeters, A. Newson + others
October 13, 2022 / 14:00 - 18:00	Lesson	CNN	A. Newson
October 20, 2022 / 14:00 - 18:00	Lab	CNN	A. Newson, G. Peeters + others
November 10, 2022	Exam		



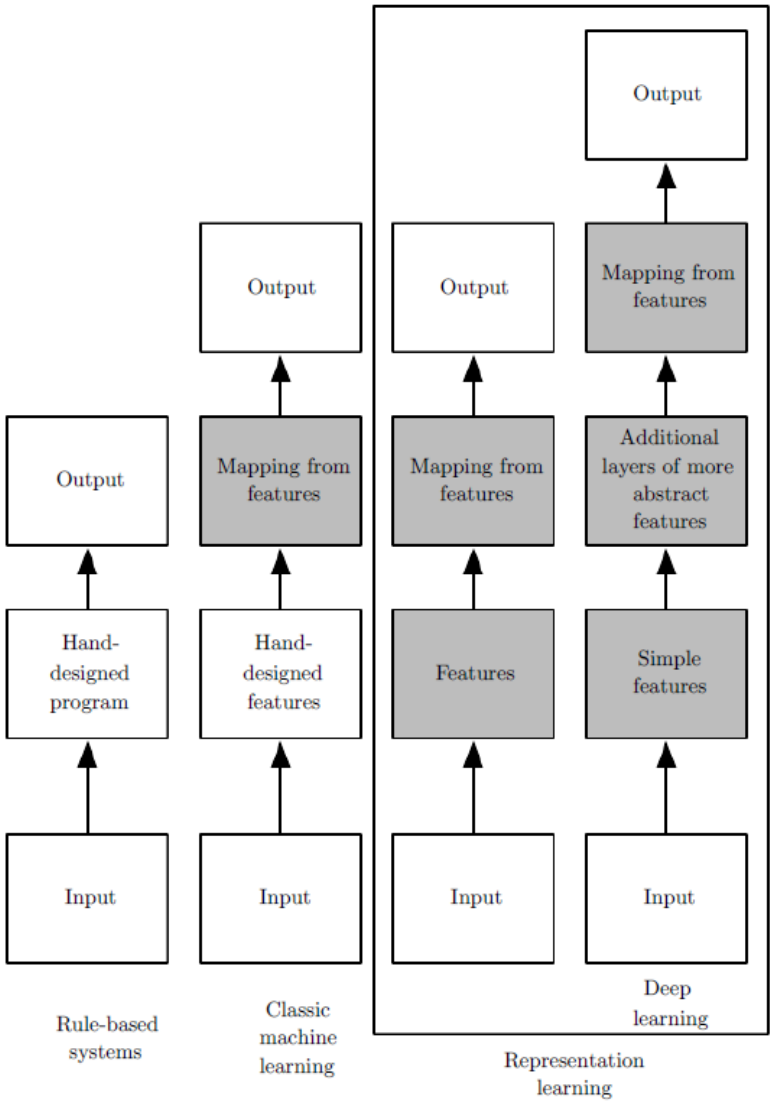
Deep Learning and Neural Networks : History

Deep learning (a subset of machine learning)



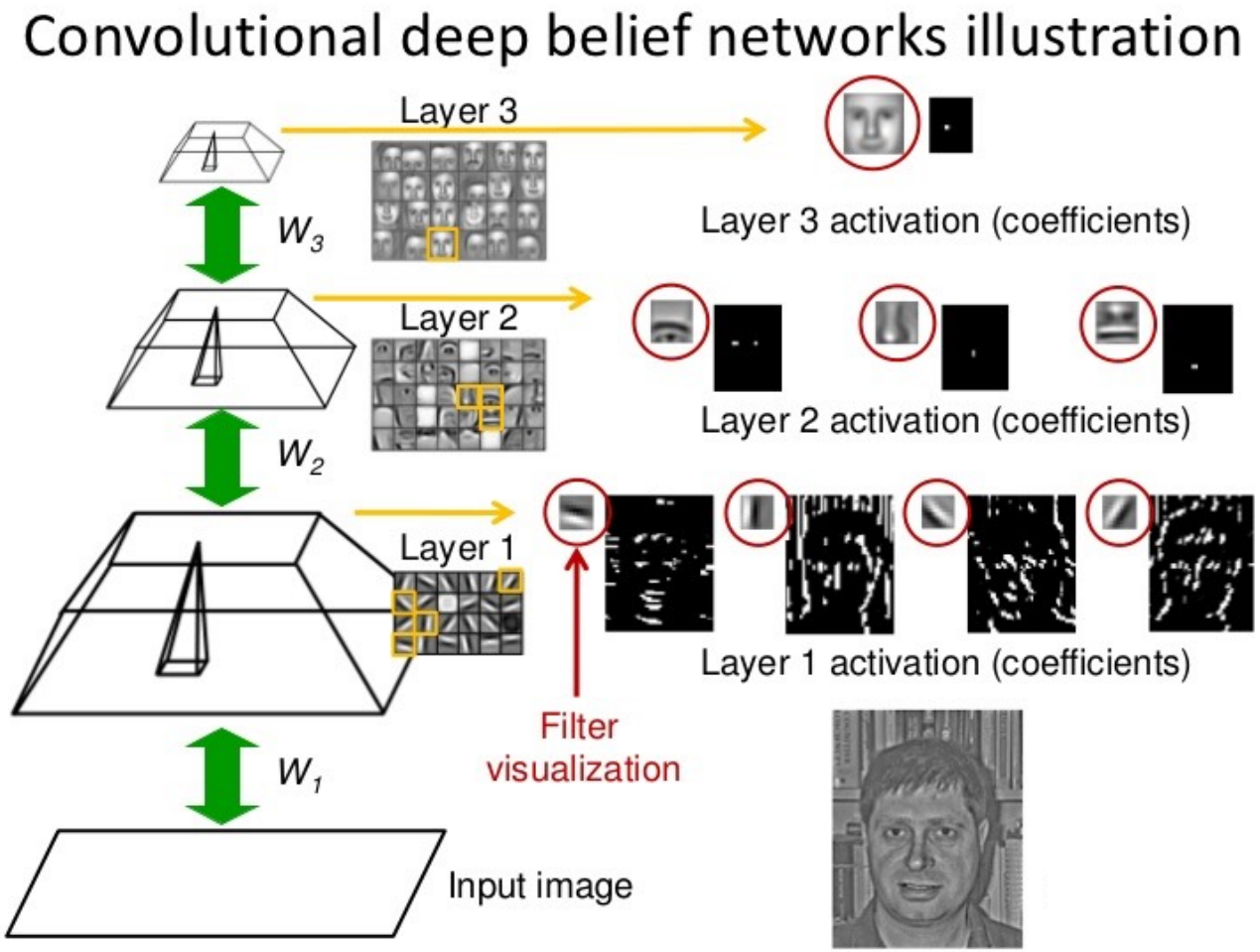
From http://canvart.club/atmose-11_21_13.html

Deep learning : learning hierarchical representations



From Deep Learning by Ian Goodfellow and Yoshua Bengio and Aaron Courville

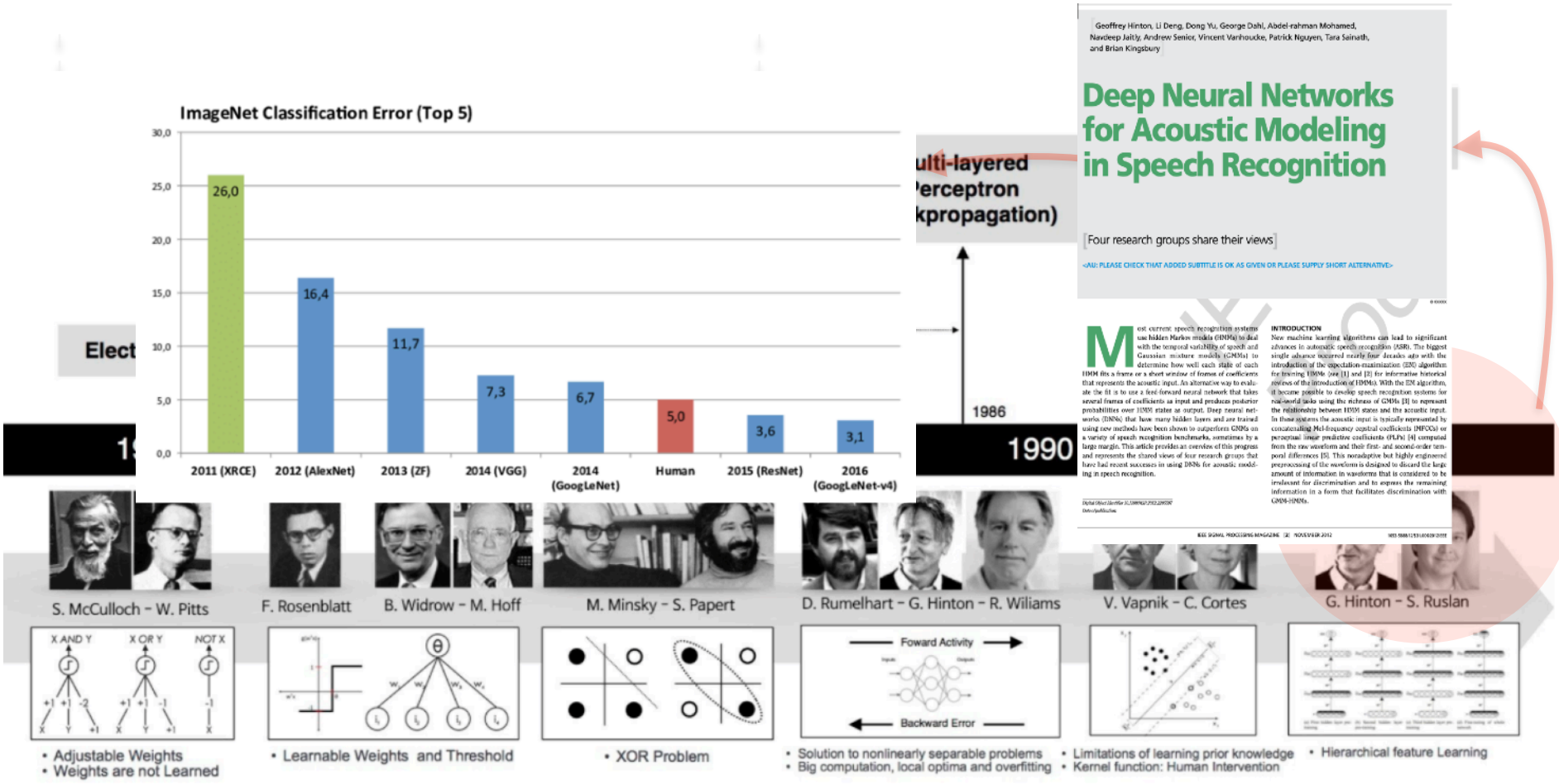
Feature learning examples



from Lee, Grosse, Ranganathn and Ng, "Convolutional Deep Belief Networks", ICML, 2009

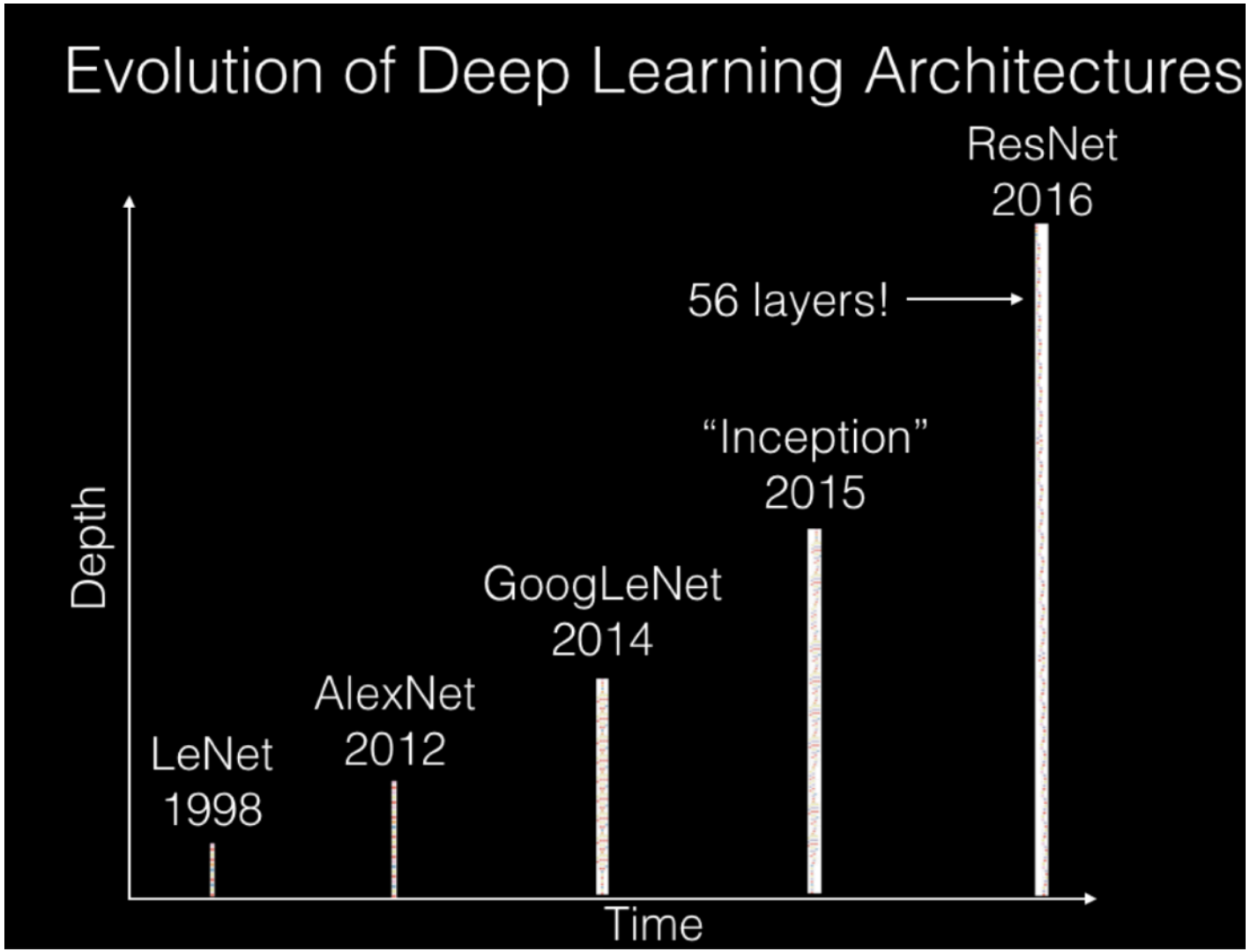
https://github.com/arthurmeyer/Convolutional_Deep_Belief_Network

Deep Learning and Neural Networks : History

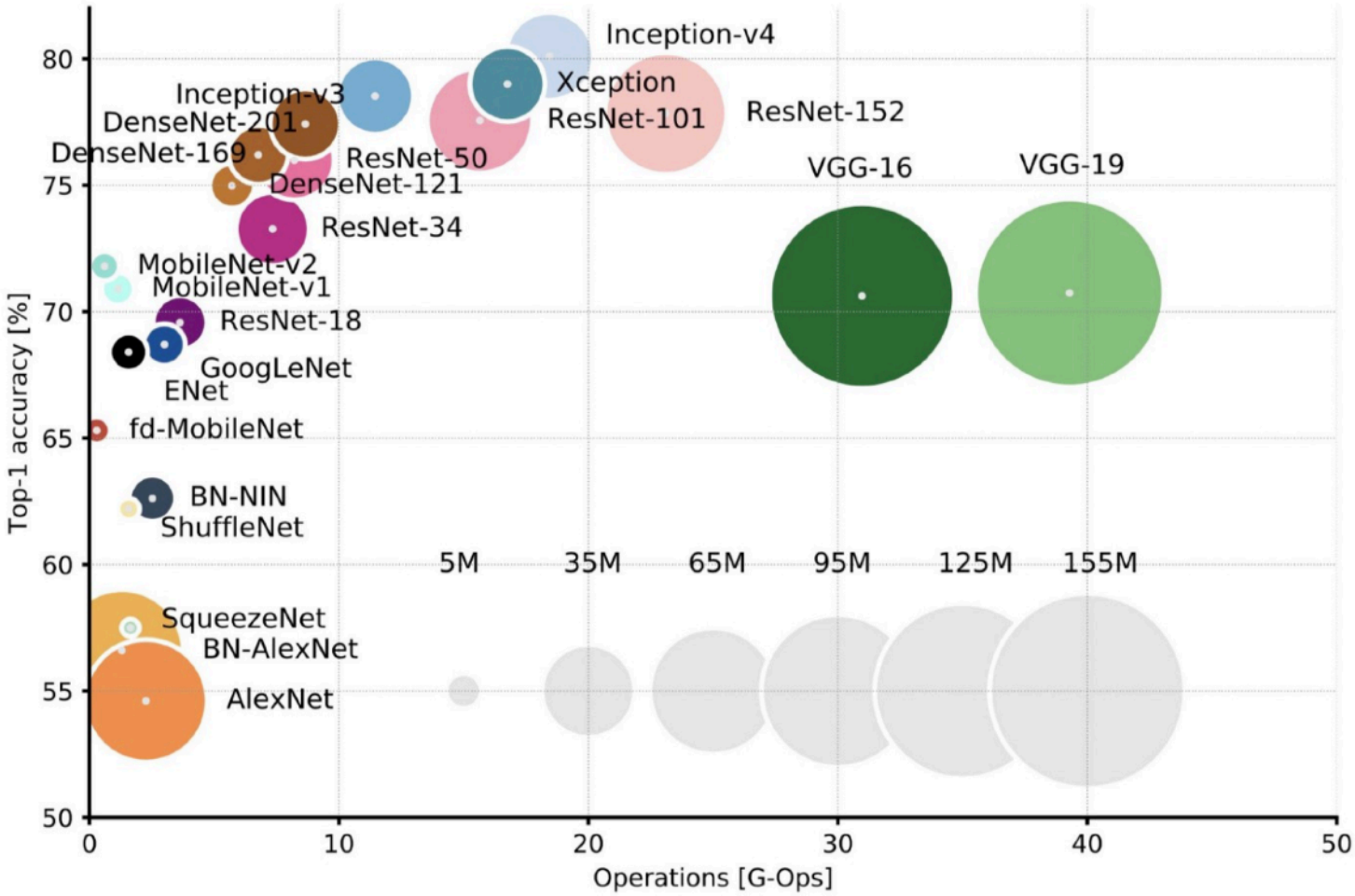


https://stateofther.github.io/post/deep_learning/deep-learning-history.html#2

Deep Learning and Neural Networks : History



Deep Learning and Neural Networks : History

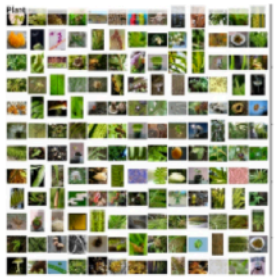


https://towardsdatascience.com/neural-network-architectures-156e5bad51ba

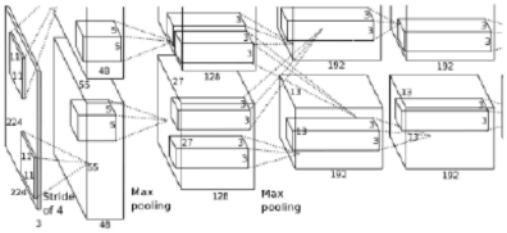
Deep Learning and Neural Networks : History

***Deep Learning* =**
Lots of training data* + *Parallel Computation* + *Scalable, smart algorithms

The Deep Learning "Computer Vision Recipe"


Big Data: ImageNet

+



Deep Convolutional Neural Network

+

Backprop on GPU

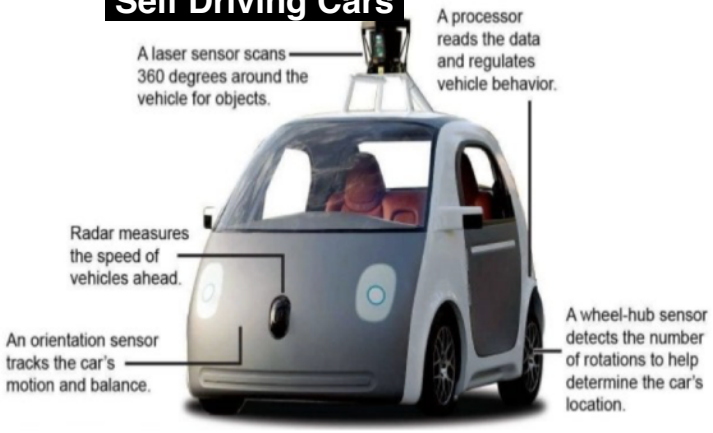
=


Learned Weights

Applications

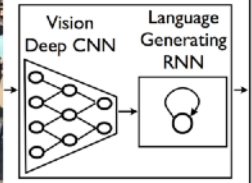
Automatic Speech Recognition

Self Driving Cars



DALL-E

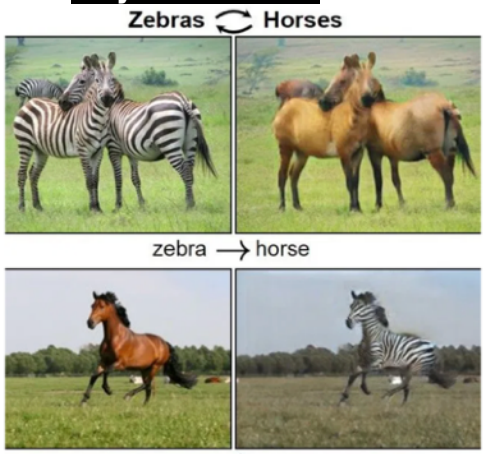
Automatic picture captioning



A group shopping at an outdoor market.

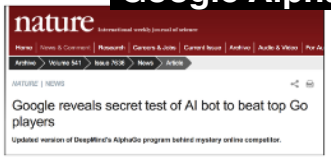
There are many vegetables at the fruit stand.

Style Transfer

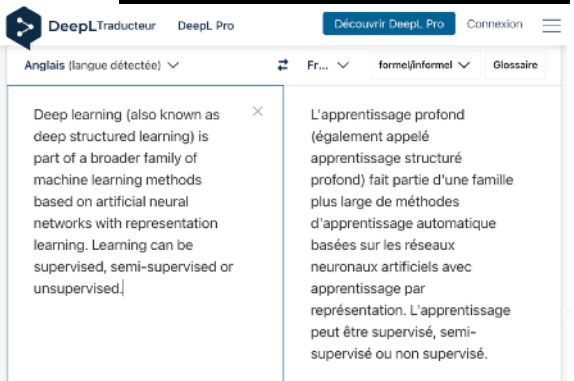


Google Alpha Go

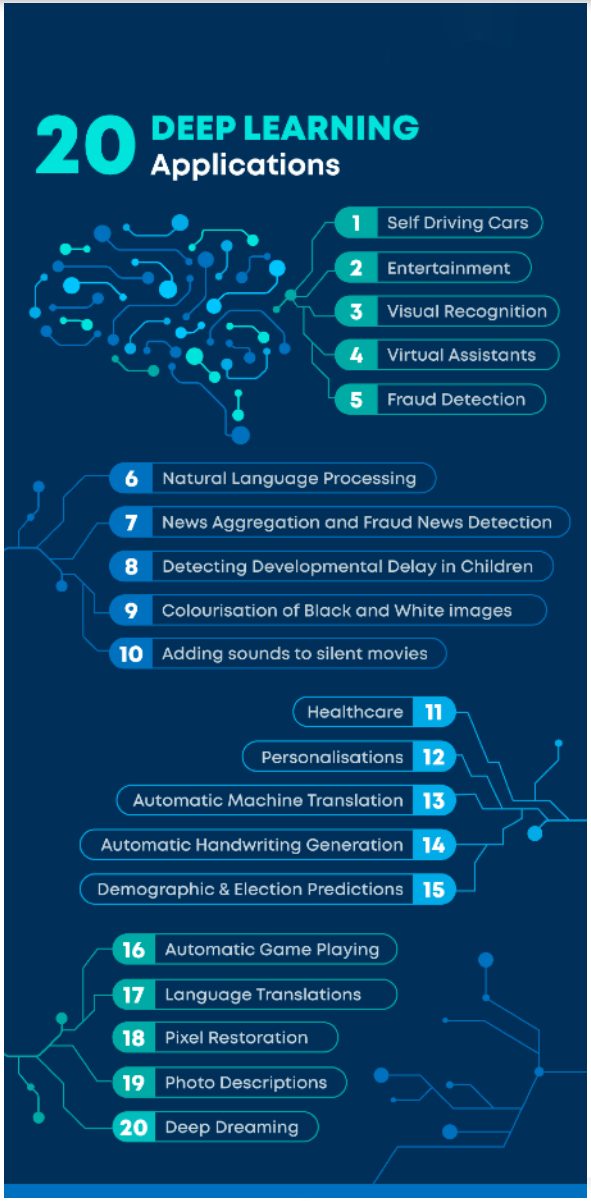
DEEP LEARNING HAS MASTERED GO



Neural Machine Translation



Applications



Deep learning: famous people

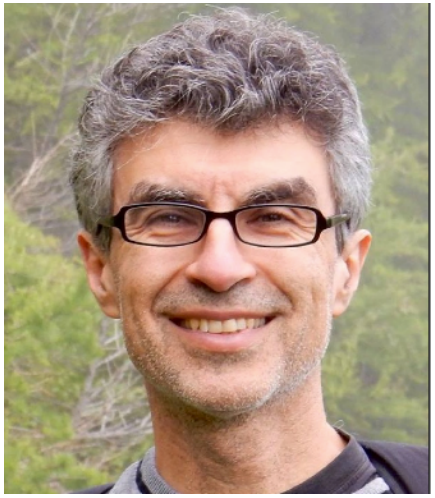
- **Turing price (ACM Turing Award), 2018**

Geoffrey Hinton (1947, canadian)

Google Brain
University of Toronto

Yann LeCun (1960, french)

Facebook AI Research (Paris)
University of New-York



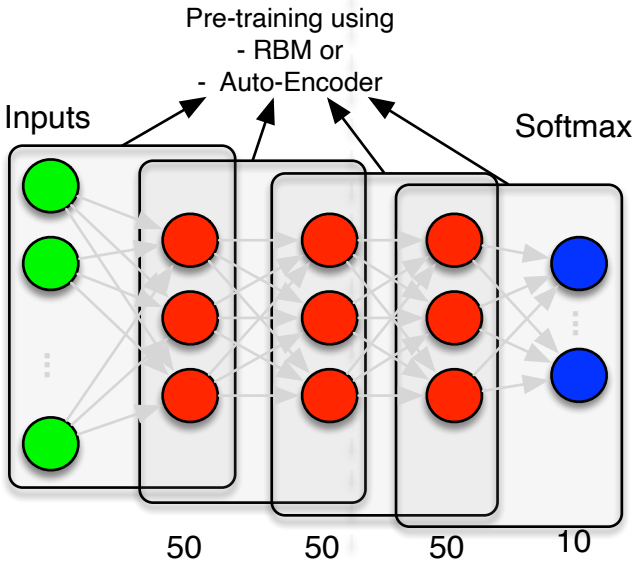
Yoshua Bengio (1964, canadian)

MILA (University of Montreal)

Three main types of Nets

Multi Layers Perceptron (MLP), Fully-Connected (FC), Feed-Forward

Multi Layers Perceptron (Fully Connected)

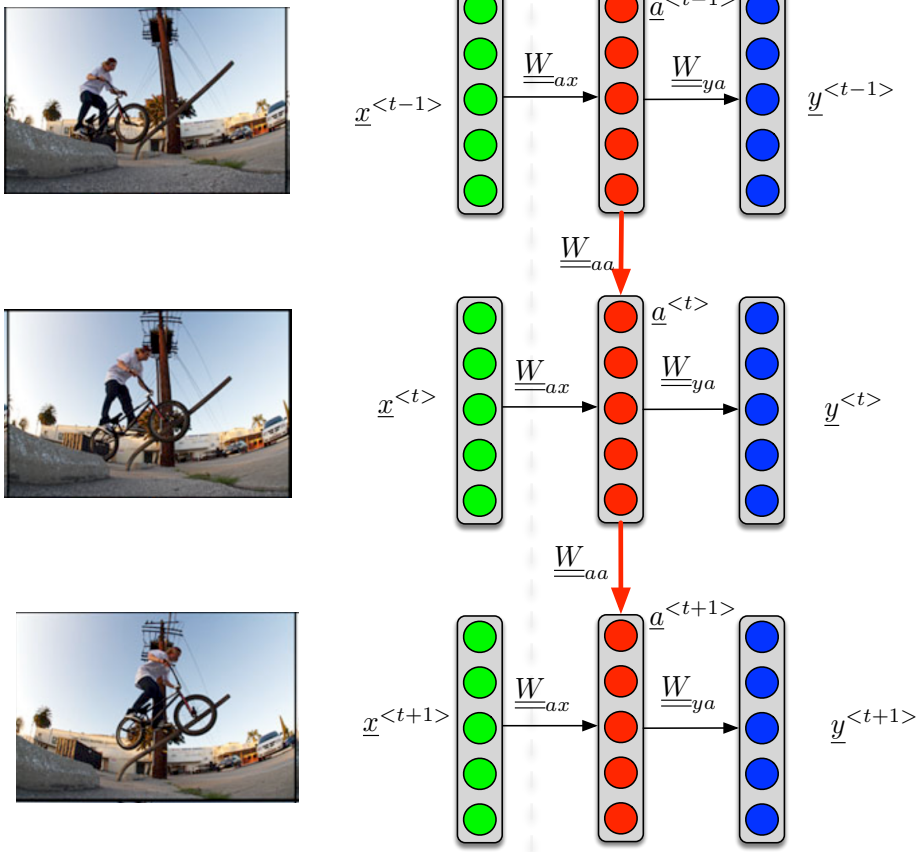


$$\underline{z}^{[l]} = \underline{\underline{W}}^{[l]} \underline{a}^{[l-1]} + \underline{b}^{[l]}$$

$$\underline{a}^{[l]} = g^{[l]}(\underline{z}^{[l]})$$

Recurrent Neural Networks (RNN)

Recurrent Neural Network



Three main types of Nets

Convolutional Neural Networks (CNN)