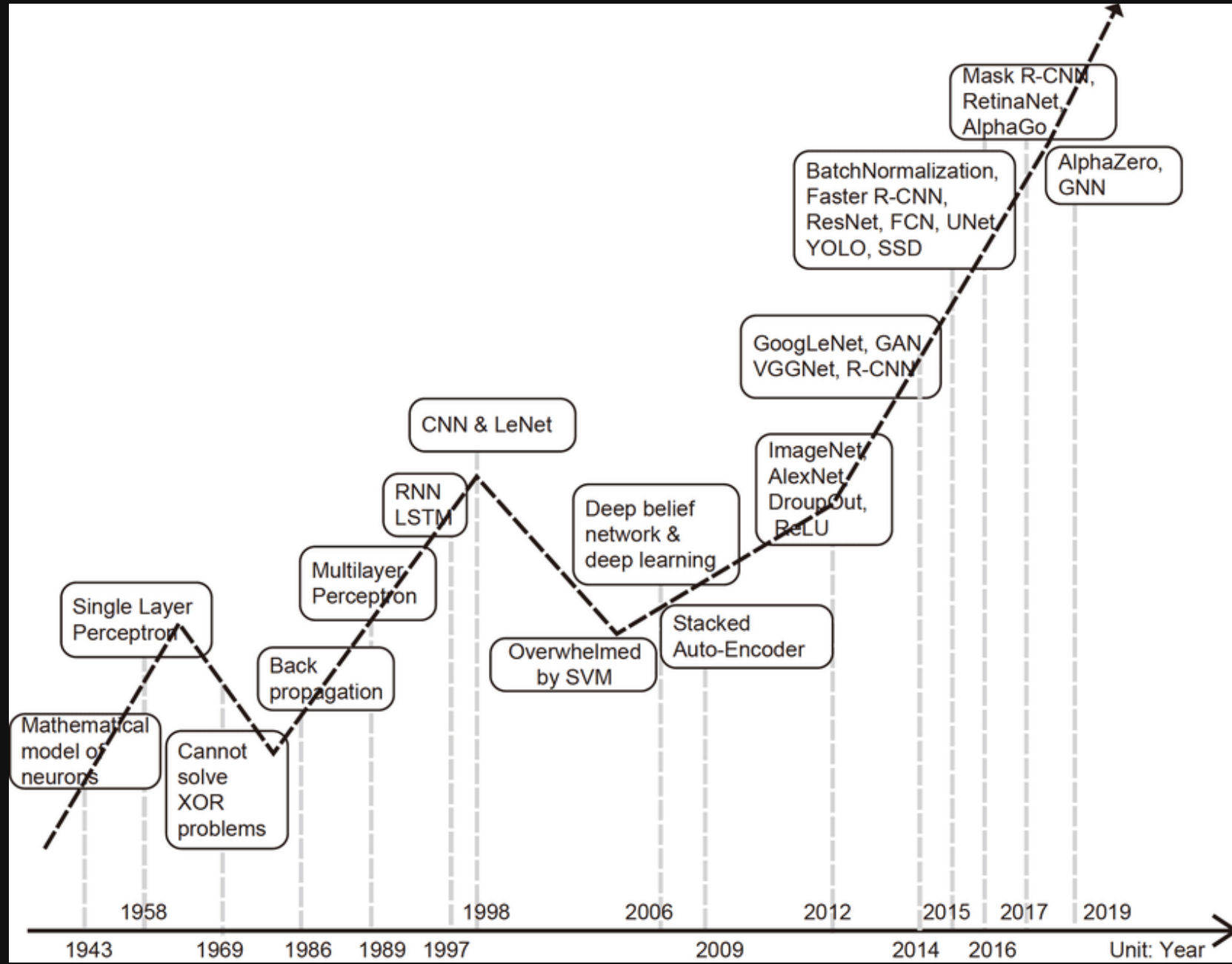
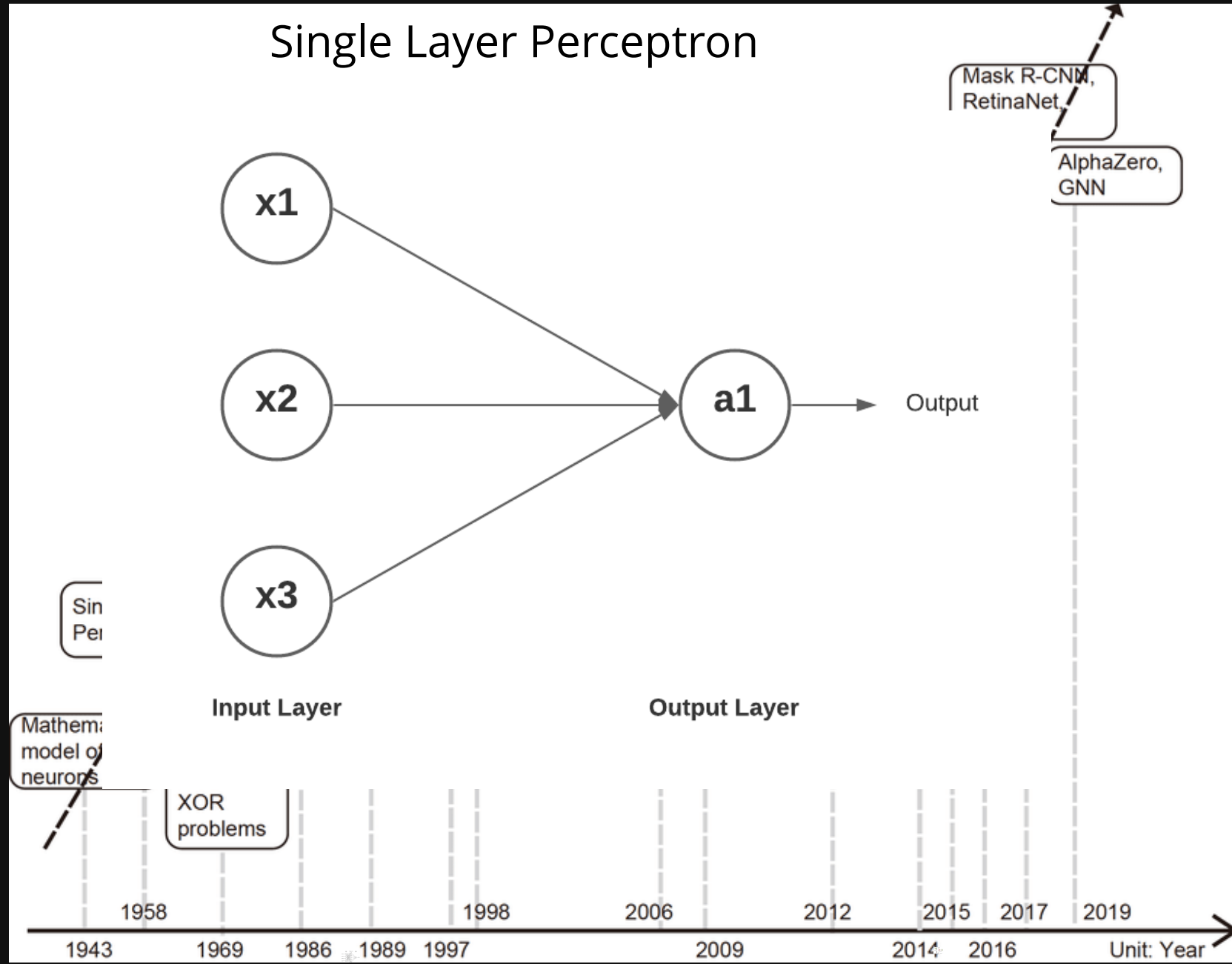


Deep Learning Geschichte

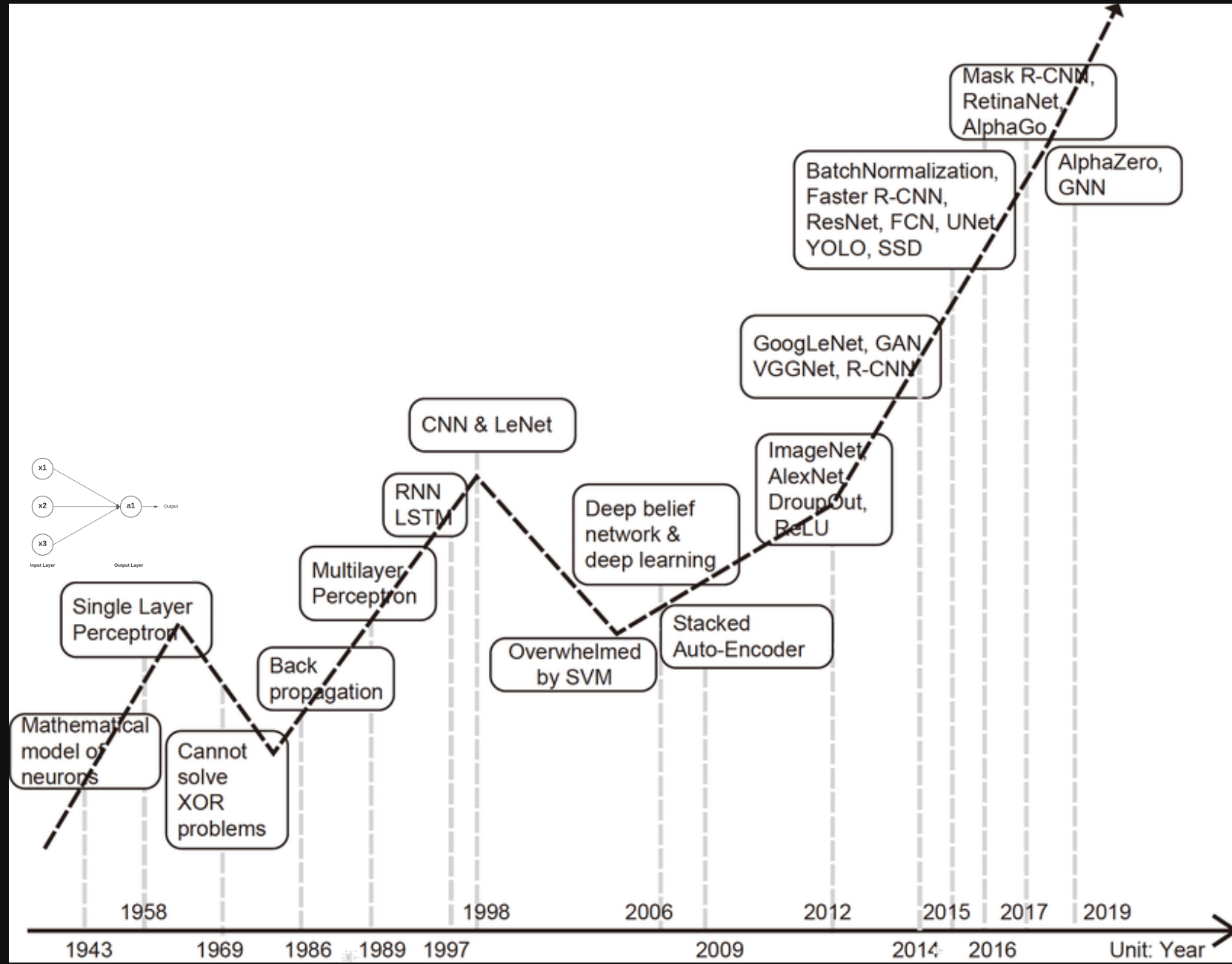
Deep Learning Geschichte



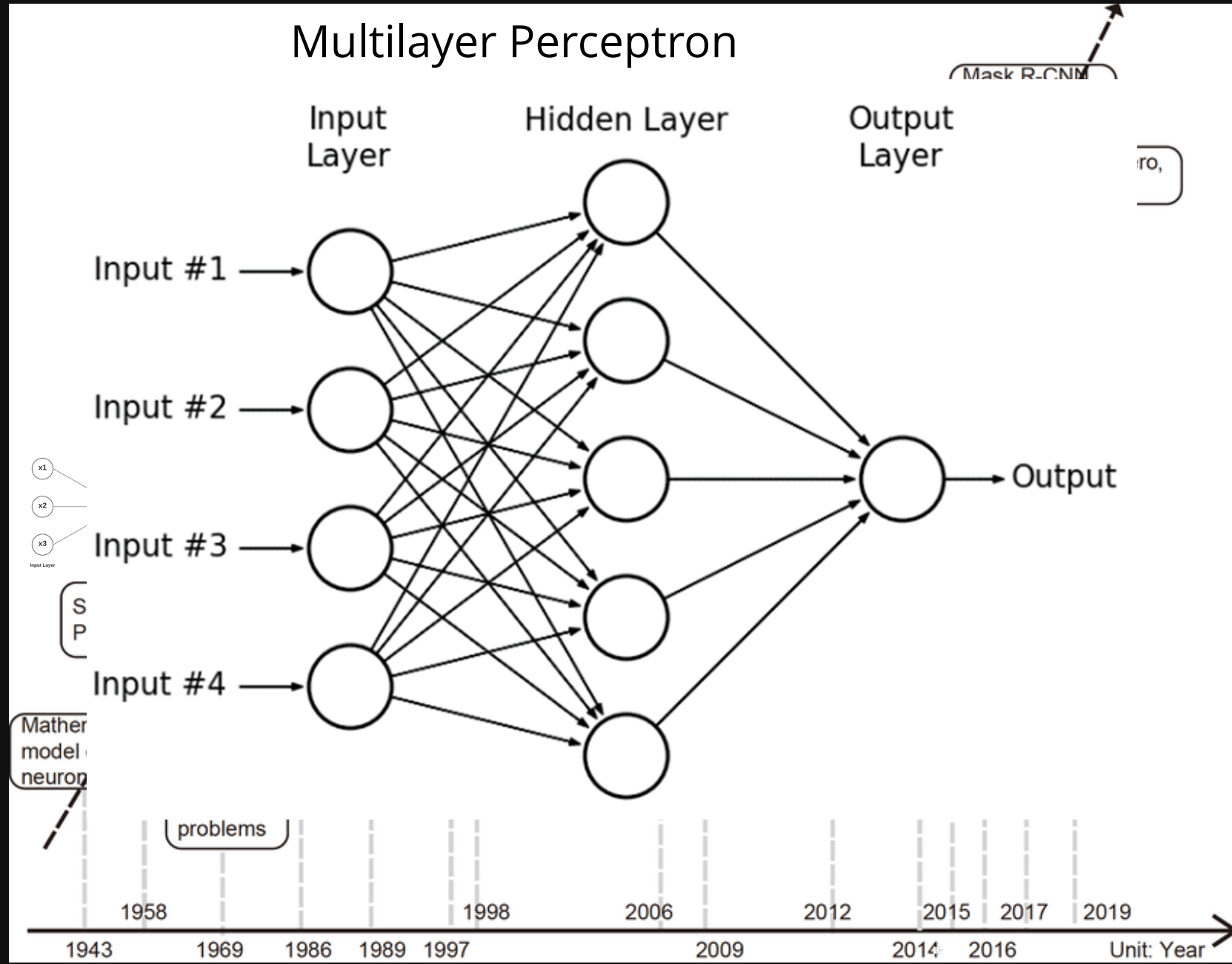
Deep Learning Geschichte



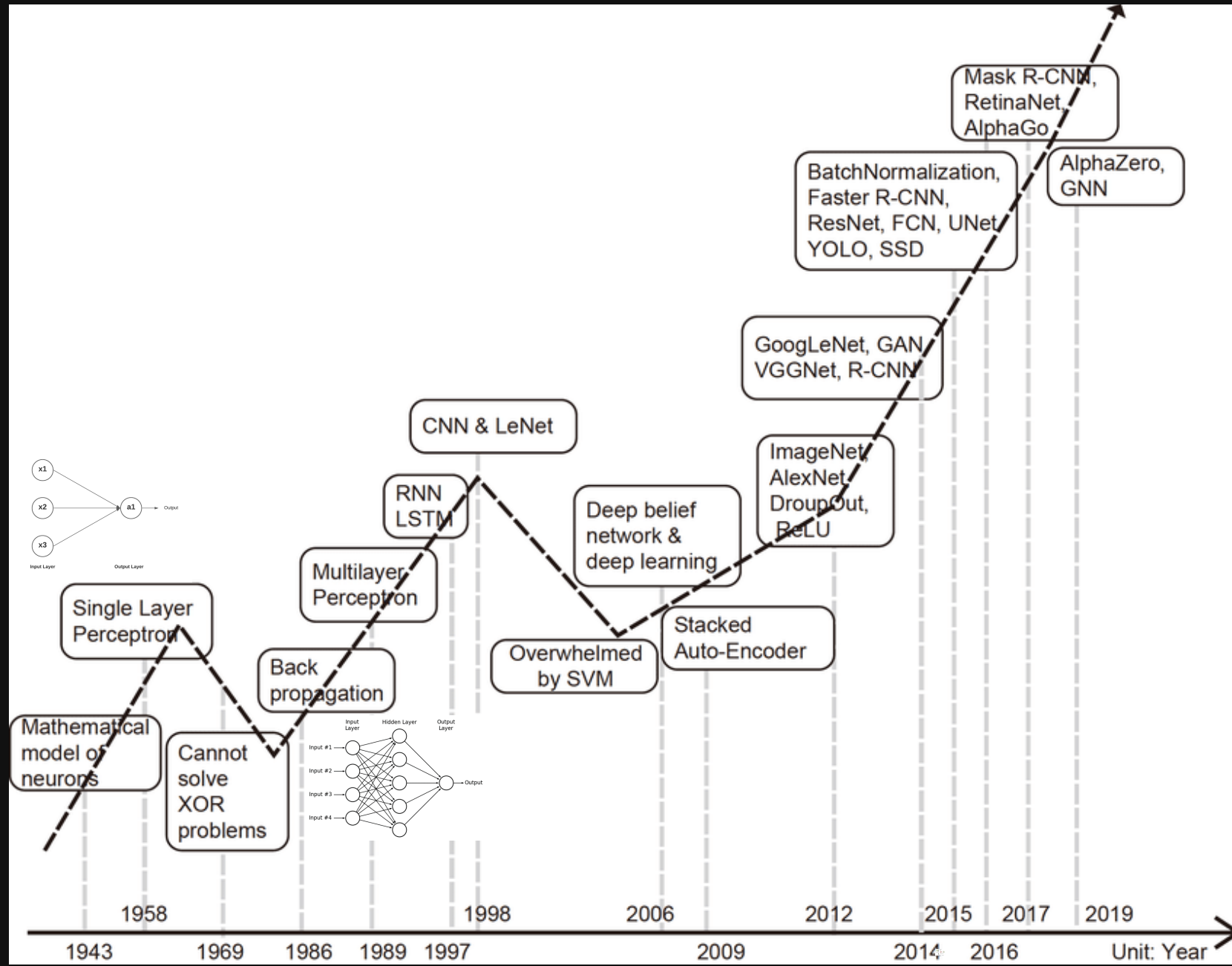
Deep Learning Geschichte



Deep Learning Geschichte

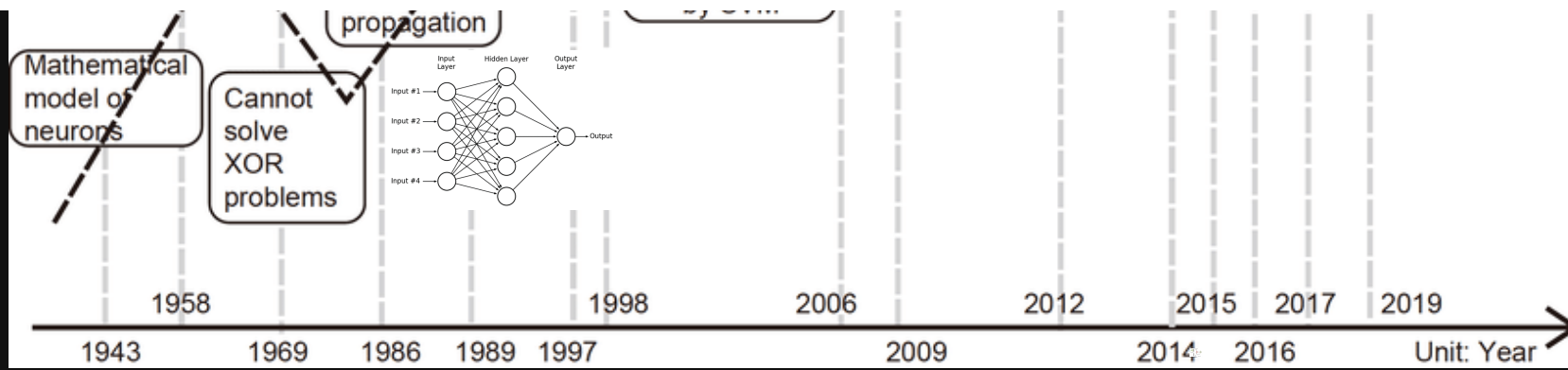
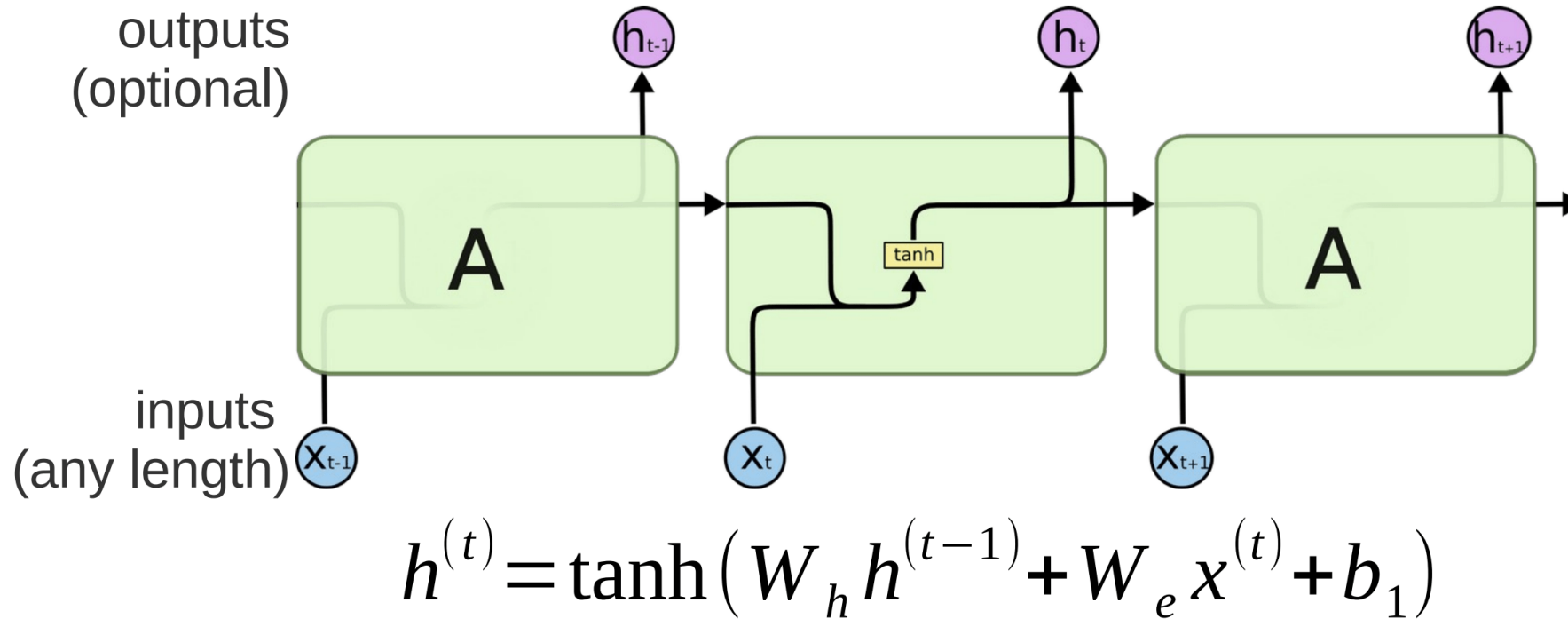


Deep Learning Geschichte

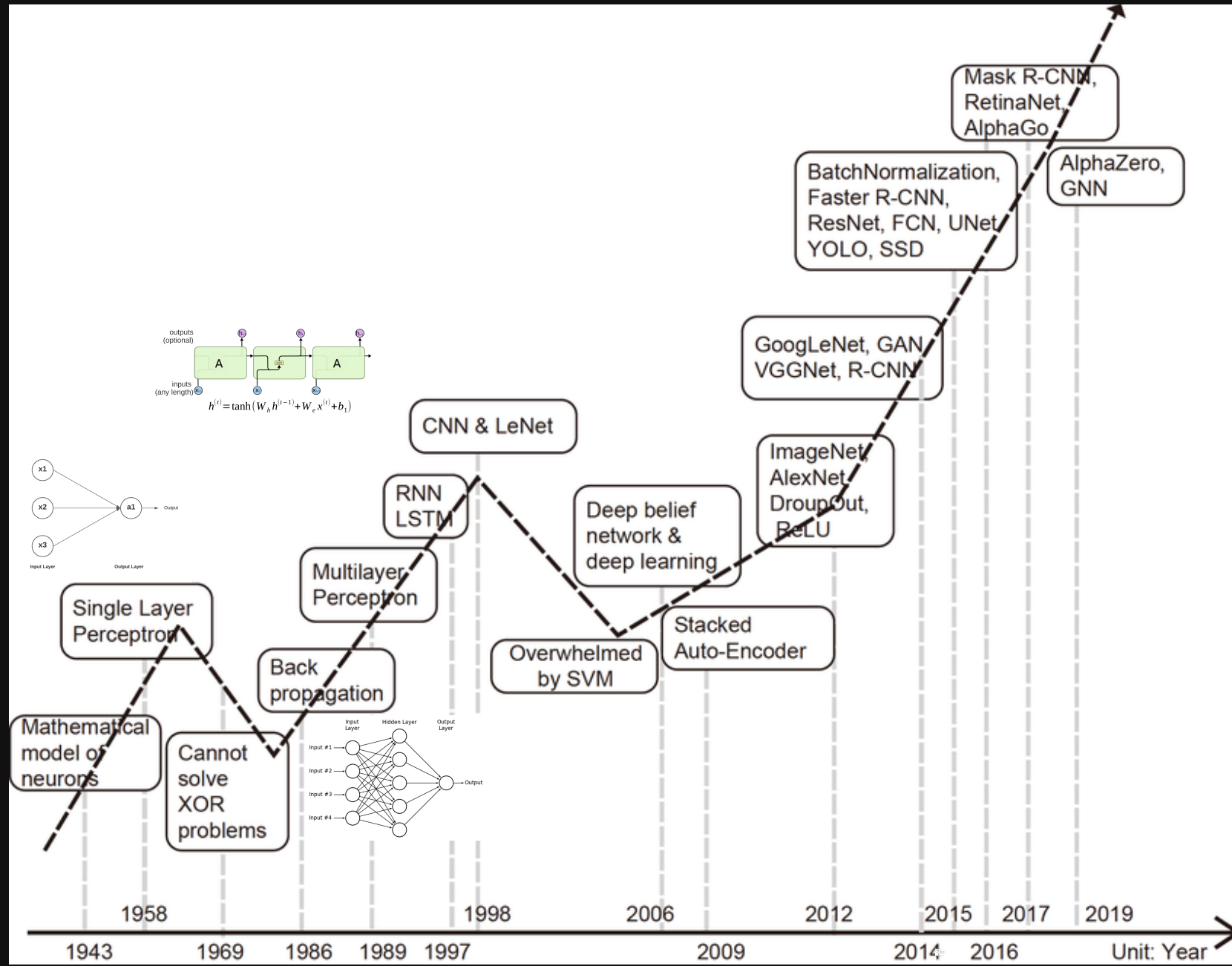


Deep Learning Geschichte

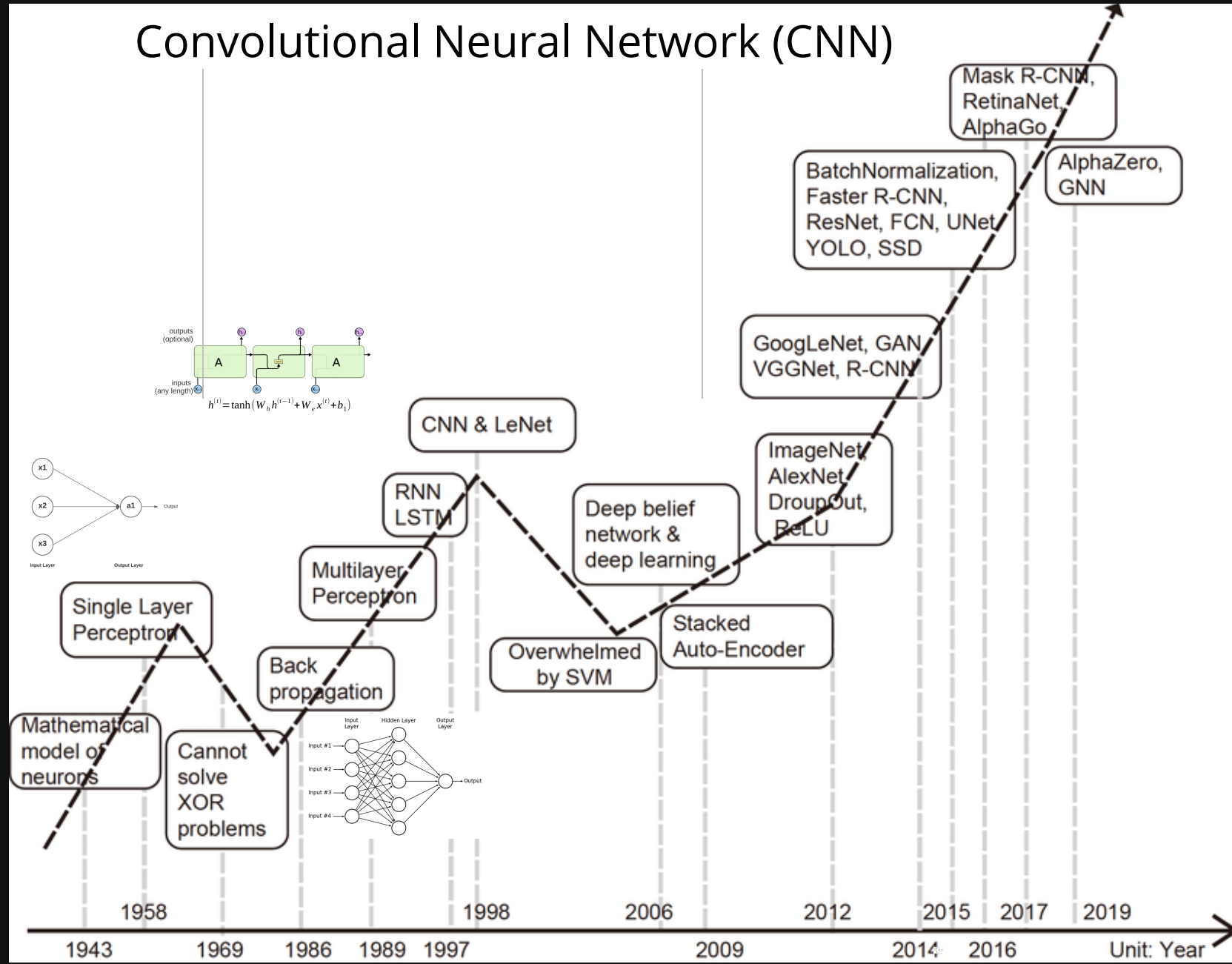
Recurrent Neural Network (RNN)



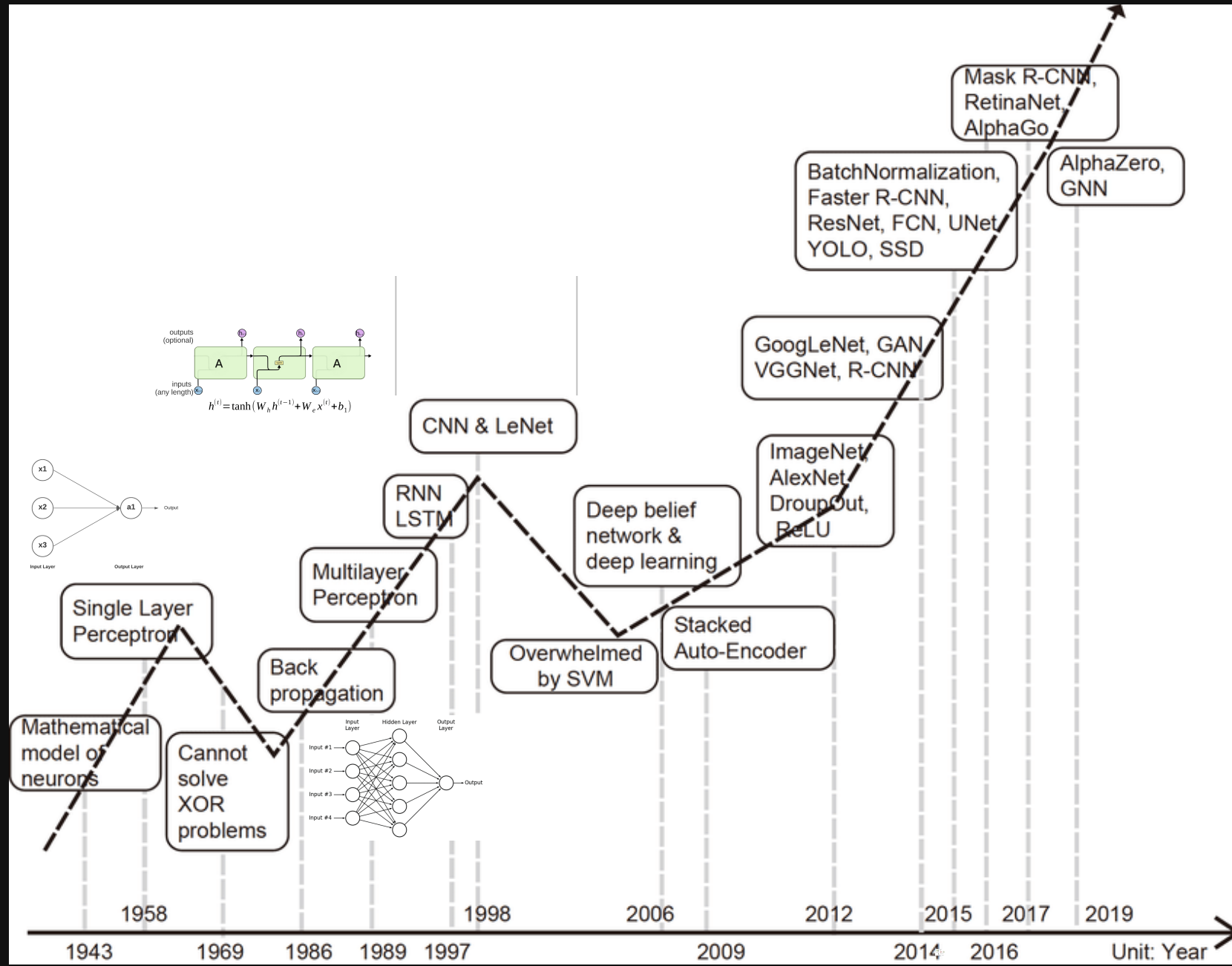
Deep Learning Geschichte



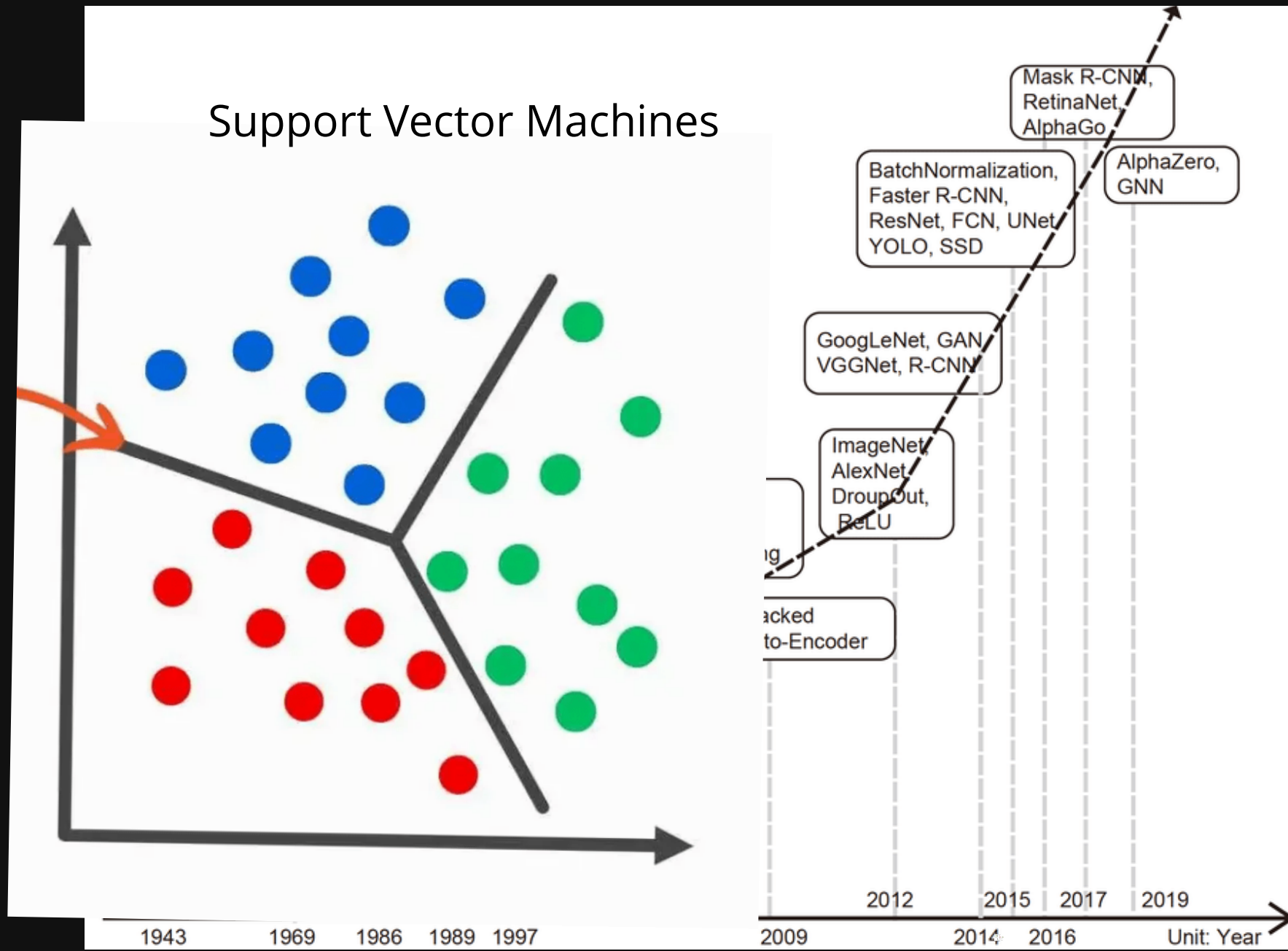
Deep Learning Geschichte



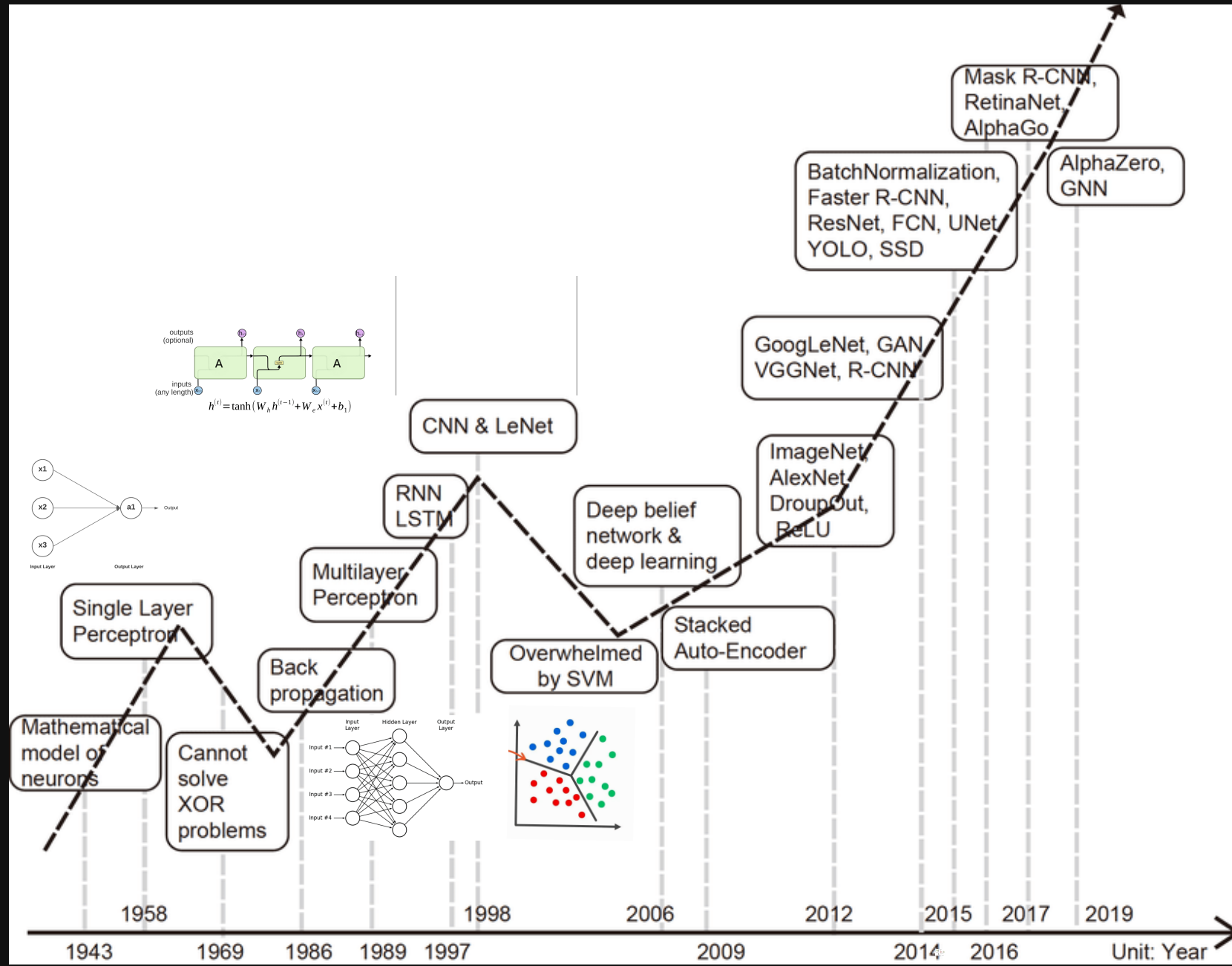
Deep Learning Geschichte



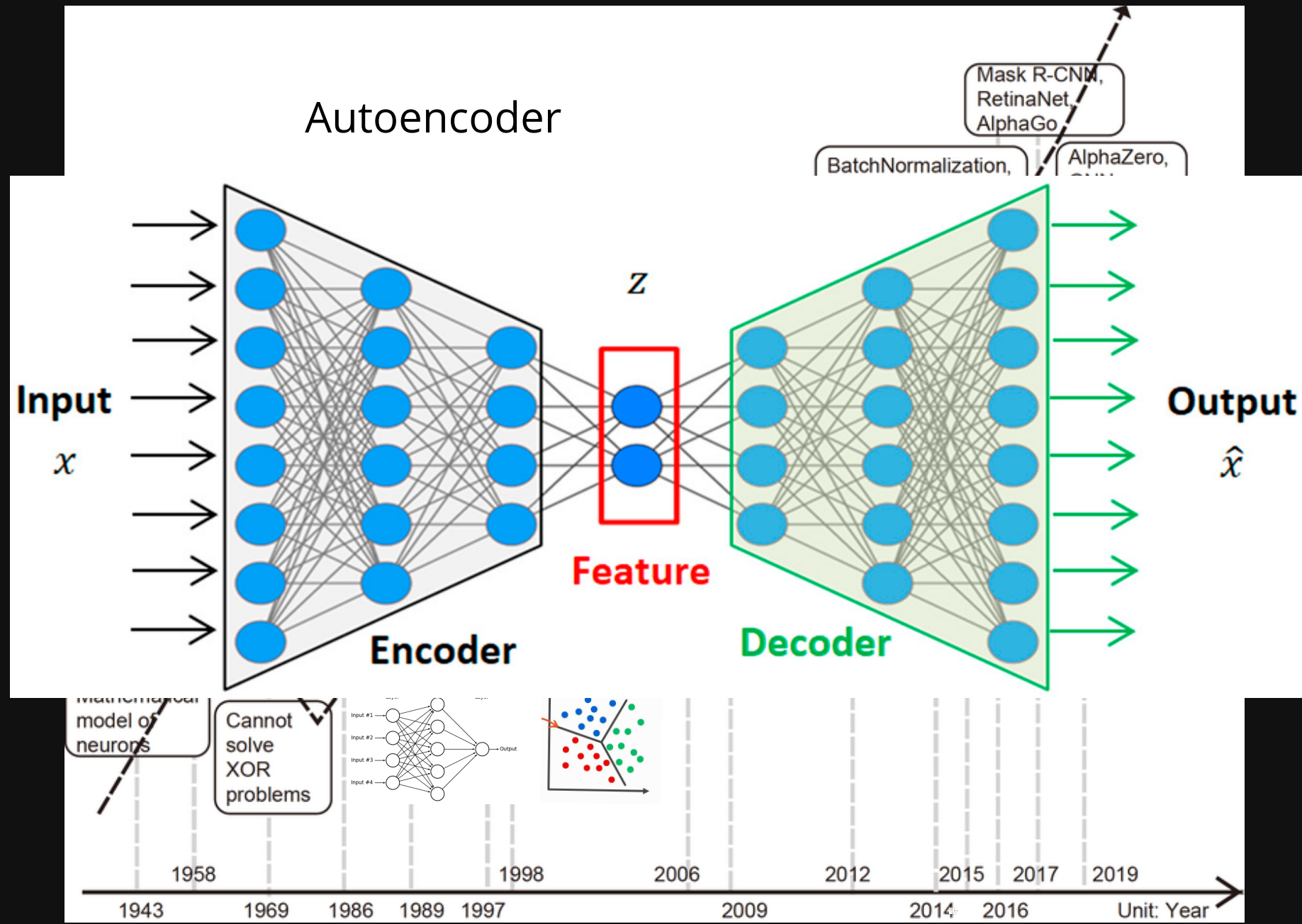
Deep Learning Geschichte



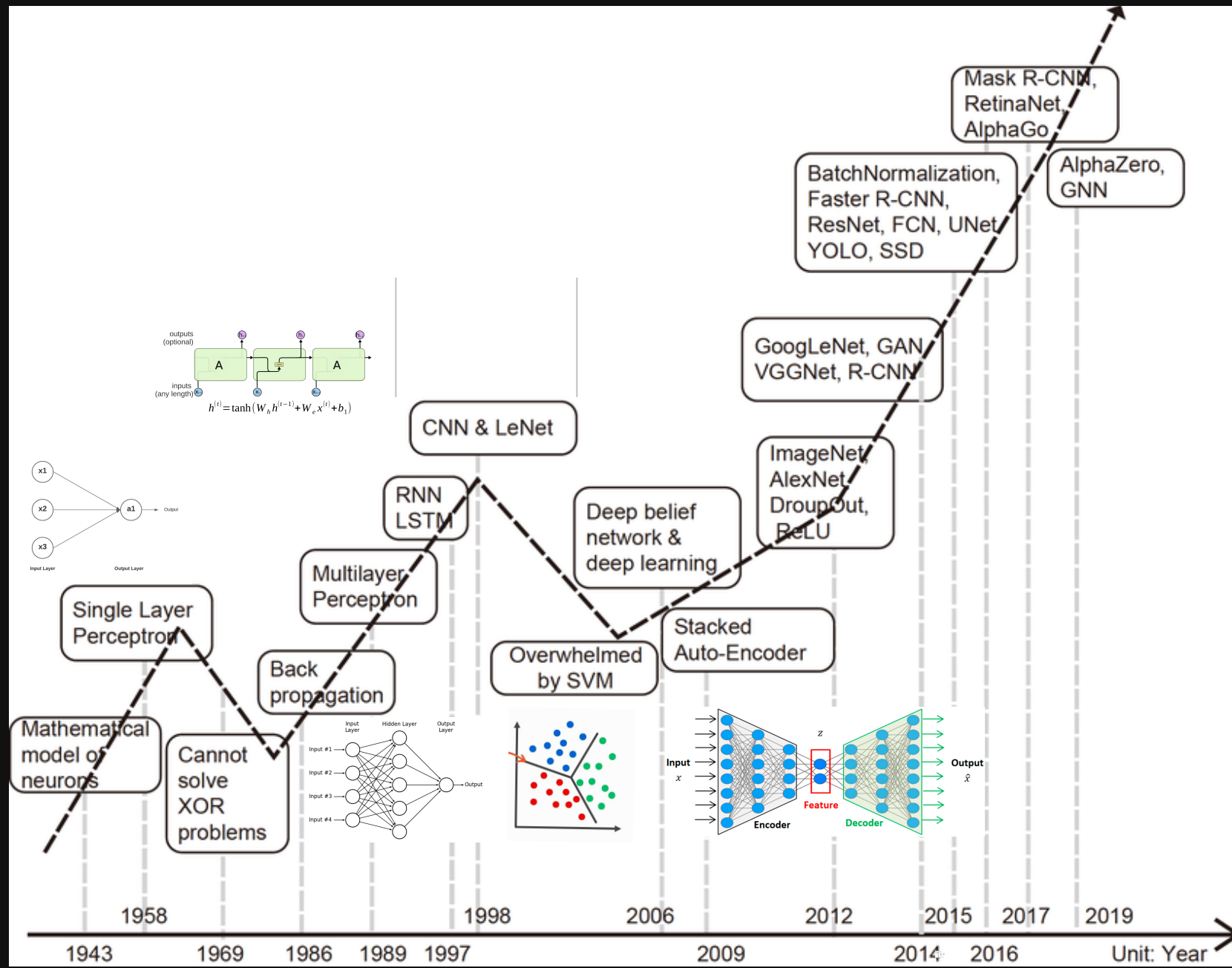
Deep Learning Geschichte



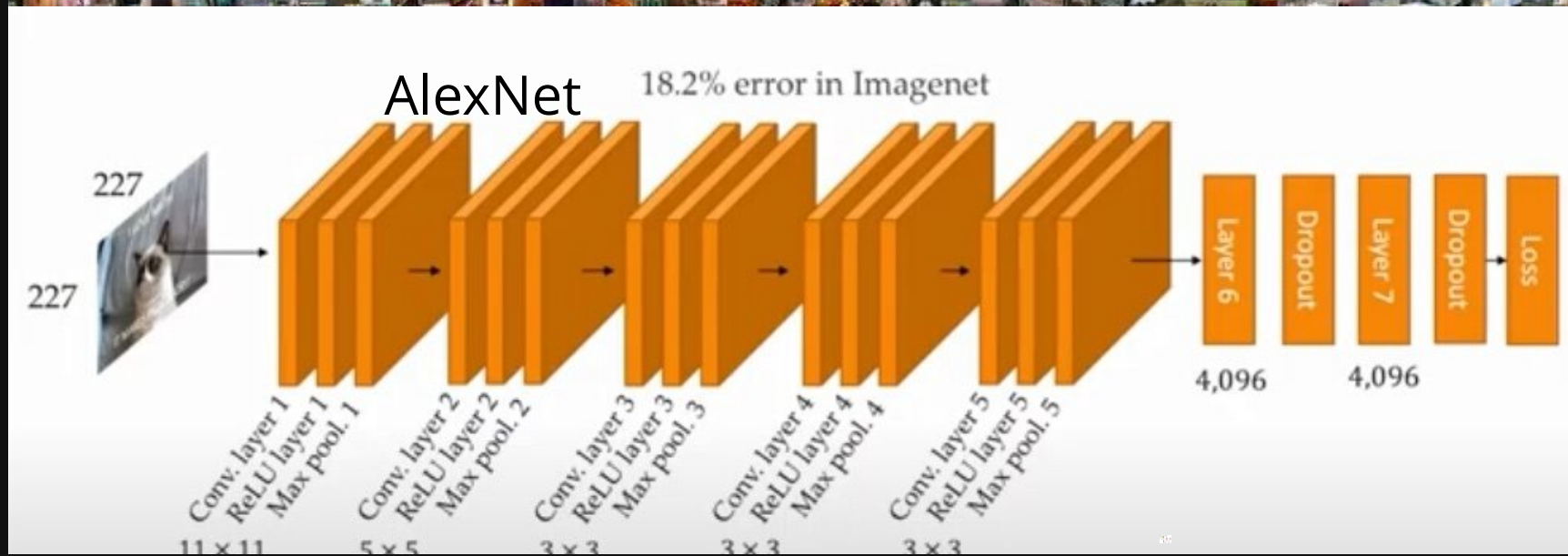
Deep Learning Geschichte



Deep Learning Geschichte



Deep Learning Geschichte



The diagram illustrates the timeline of Deep Learning from 1943 to 2019. A dashed arrow represents the progression of the field, showing a period of decline followed by a rapid ascent.

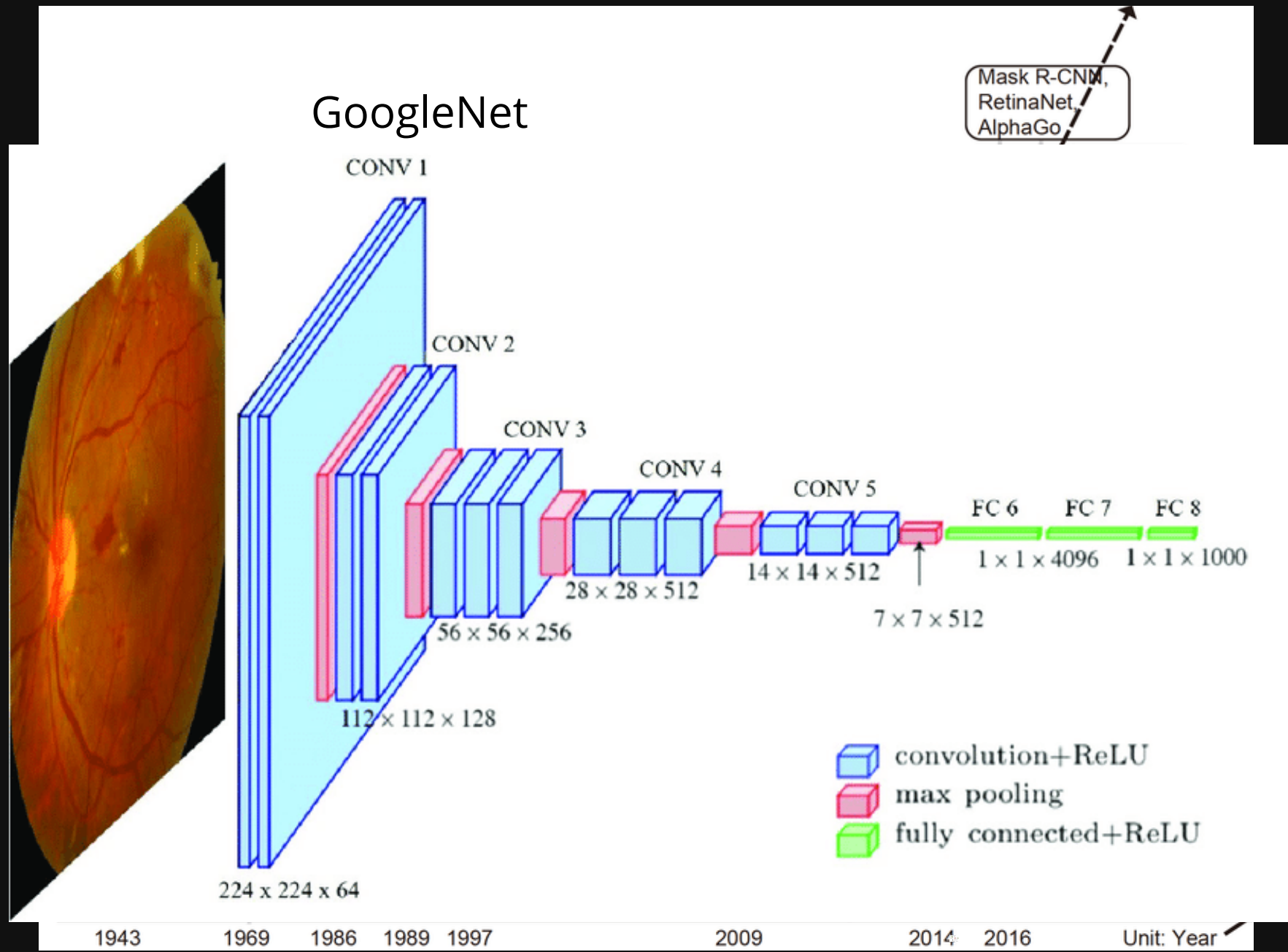
Timeline Milestones:

- 1943:** Mathematical model of neurons
- 1958:** Single Layer Perceptron
- 1969:** Cannot solve XOR problems
- 1986:** Back propagation
- 1989:** Multilayer Perceptron
- 1997:** RNN LSTM
- 1998:** CNN & LeNet
- 2006:** Deep belief network & deep learning
- 2009:** Stacked Auto-Encoder
- 2012:** ImageNet, AlexNet, Dropout, ReLU
- 2014:** GoogLeNet, GAN, VGGNet, R-CNN
- 2015:** BatchNormalization, Faster R-CNN, ResNet, FCN, UNet, YOLO, SSD
- 2017:** Mask R-CNN, RetinaNet, AlphaGo
- 2019:** AlphaZero, GNN

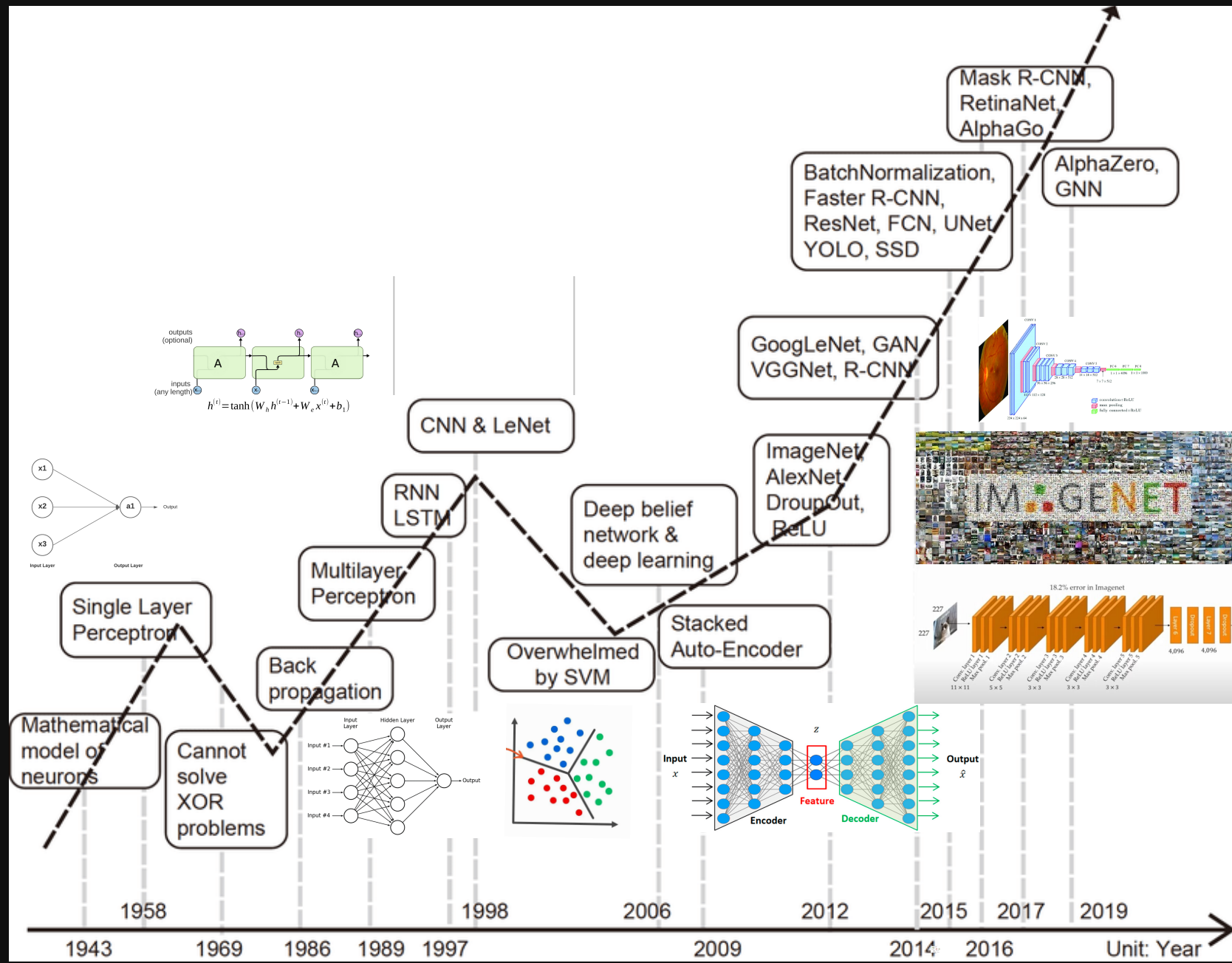
Key Diagrams and Concepts:

- Single Layer Perceptron:** A diagram showing inputs x_1, x_2, x_3 feeding into a single neuron a_1 to produce an output.
- Cannot solve XOR problems:** A diagram showing a simple perceptron's inability to solve the XOR problem.
- Back propagation:** A diagram illustrating the flow of error gradients through a neural network.
- Multilayer Perceptron:** A diagram showing a network with multiple layers of neurons.
- CNN & LeNet:** A diagram showing a convolutional neural network architecture.
- RNN LSTM:** A diagram showing a recurrent neural network with Long Short-Term Memory (LSTM) units.
- Deep belief network & deep learning:** A diagram showing a deep belief network architecture.
- Overwhelmed by SVM:** A diagram showing a scatter plot with a linear decision boundary, indicating the limitations of Support Vector Machines (SVM) for complex data.
- Stacked Auto-Encoder:** A diagram showing an auto-encoder architecture with an encoder, a bottleneck feature, and a decoder.
- ImageNet:** A diagram showing a large dataset of images used for training and testing deep learning models.
- GoogLeNet, GAN, VGGNet, R-CNN:** A diagram showing a generative adversarial network (GAN) architecture.
- BatchNormalization, Faster R-CNN, ResNet, FCN, UNet, YOLO, SSD:** A diagram showing a deep convolutional neural network (CNN) architecture.
- Mask R-CNN, RetinaNet, AlphaGo:** A diagram showing a deep reinforcement learning architecture.
- AlphaZero, GNN:** A diagram showing a deep generative neural network (GNN) architecture.

Deep Learning Geschichte

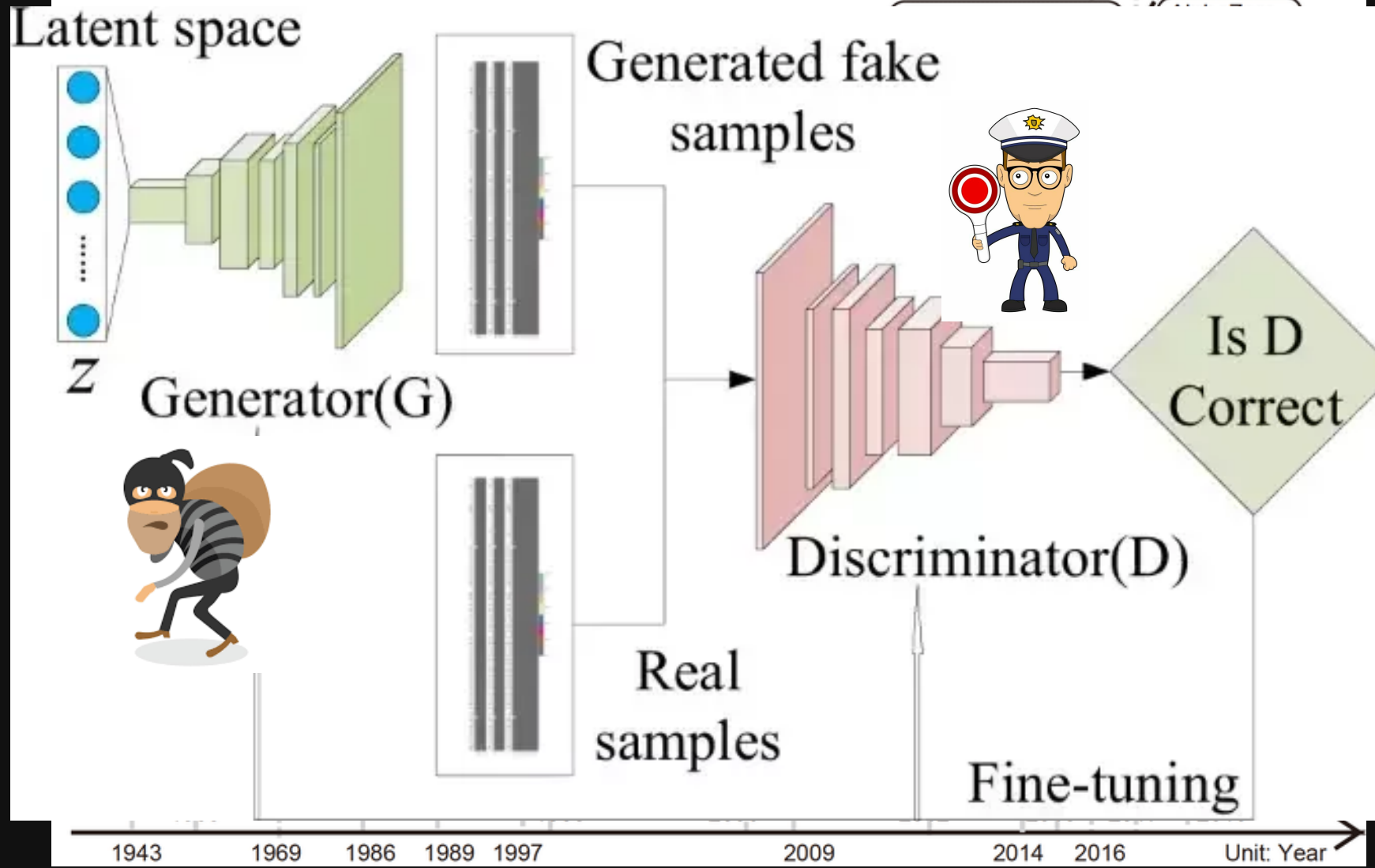


Deep Learning Geschichte

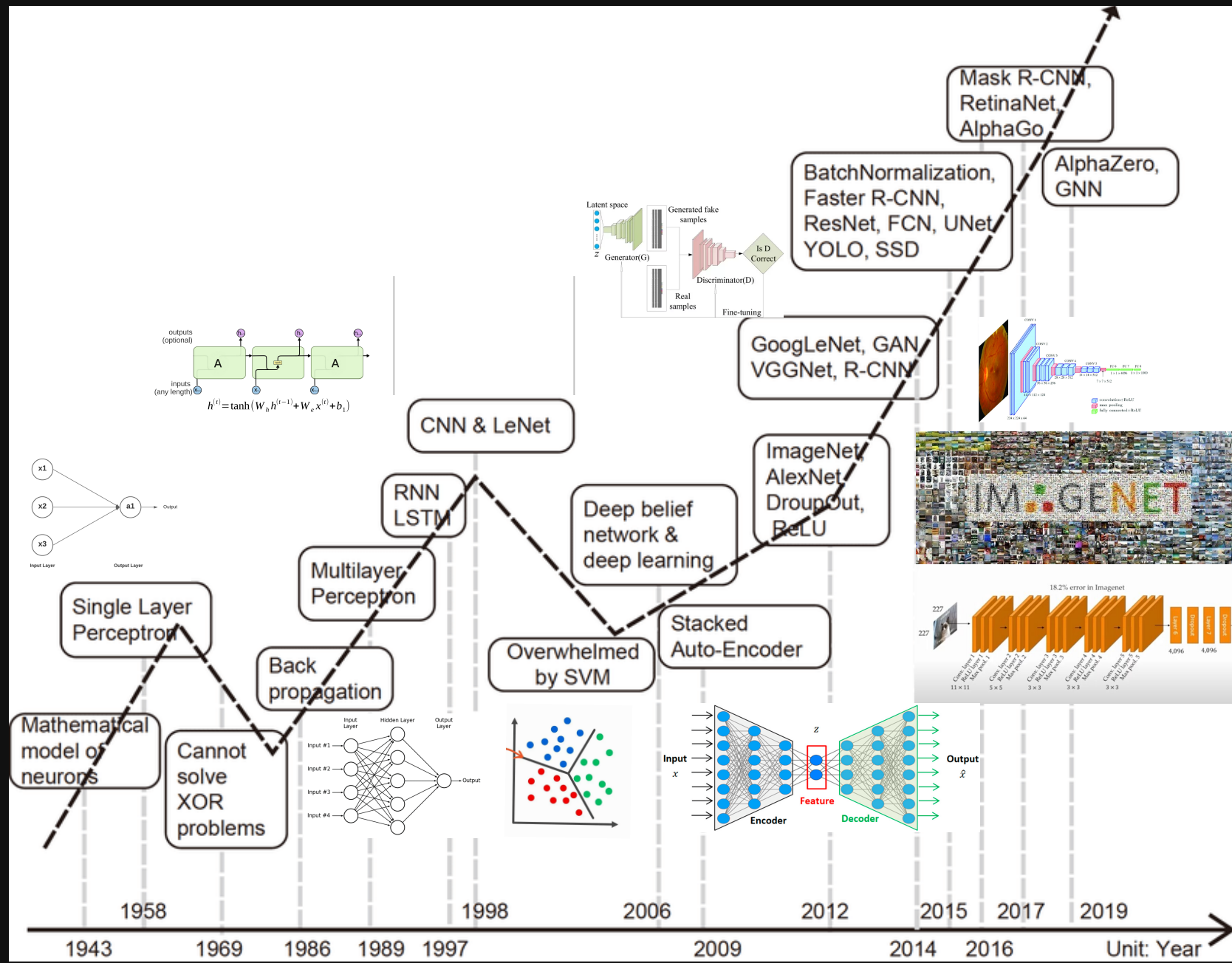


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Generative Adversarial Network (GAN)

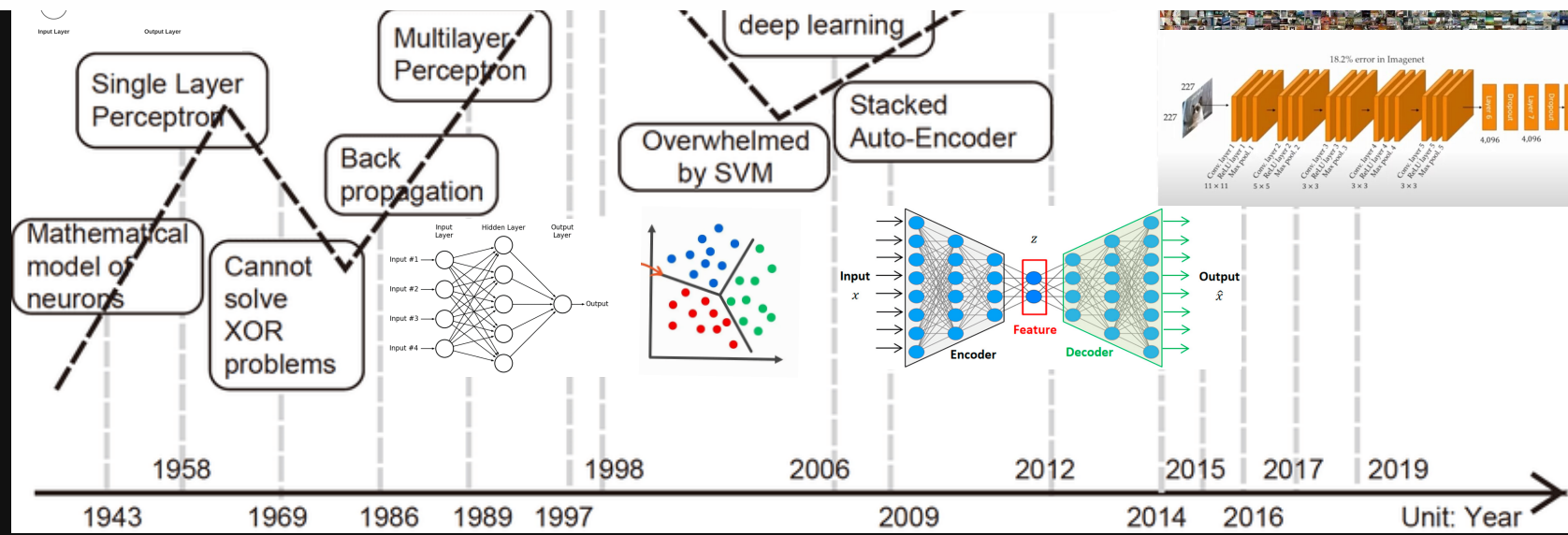
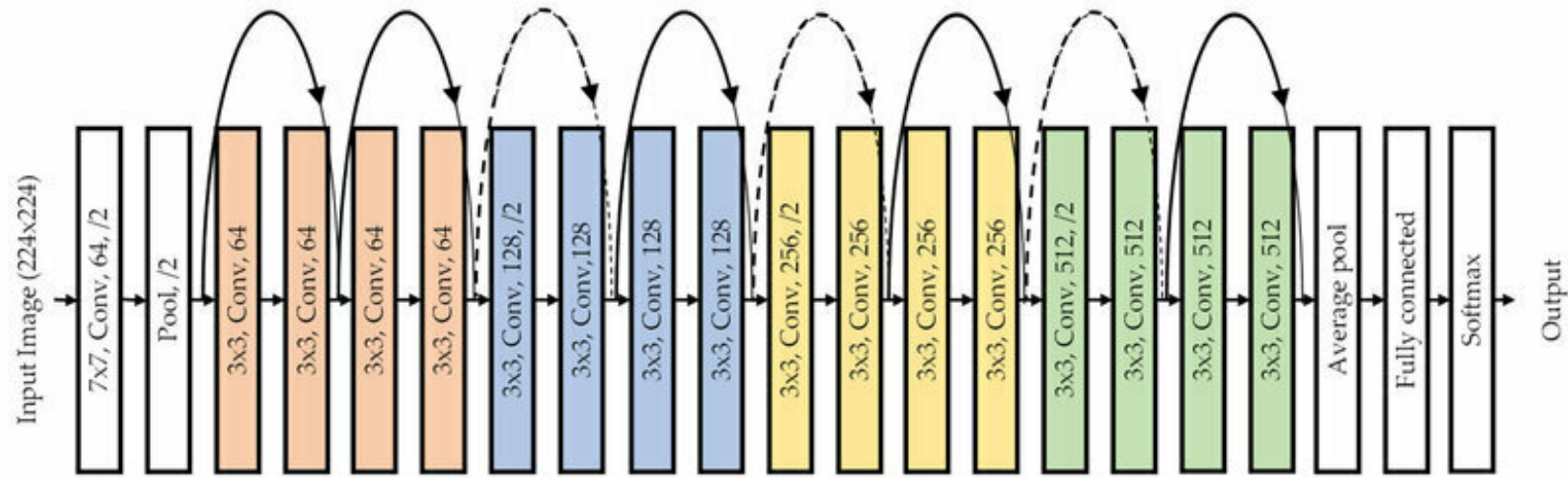


Deep Learning Geschichte

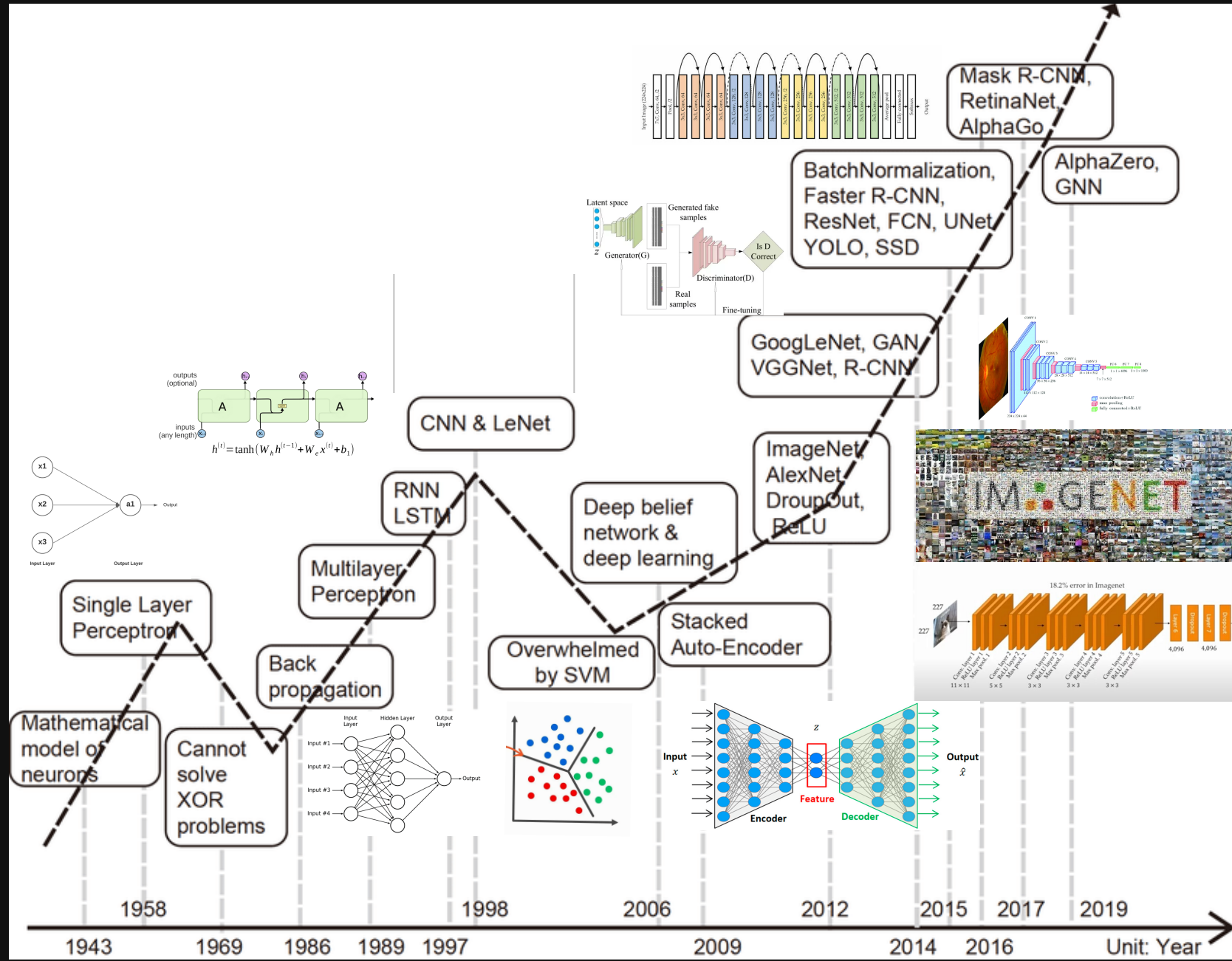


Deep Learning Geschichte

ResNet-18



Deep Learning Geschichte



Nochmal von Vorne...

Hands-On: Cifar-100 Classification

Starten Sie mit [diesem Notebook](#)

- Erstellen, trainieren und evaluieren Sie einen Classifier für den Cifar-100 Datensatz

Aufs wichtige beschränken

Hands-On: Audio Noise Reduction

Starten Sie mit [diesem Notebook](#)

- Optimieren Sie die Audio Entrauschung so, dass der Output weniger Rauschen zeigt als der Input, die Sprache aber trotzdem zu hören ist.

Squeeze the Juice ...

Hands-On: Pytorch MNIST Anomaly Detection

Betrachten Sie [dieses Notebook](#)

- Versuchen Sie, die Performance eines der Outputs zu verbessern
 - Classifier
 - Generator (Variational Autoencoder)
 - Anomaly Detection
- Vergleichen Sie die Ergebnisse der verschiedenen Anomaly Detection methoden:
 - Isolation Forest
 - Mahalanobis Distanz
 - VAE reconstruction error