Convolutional Neural Network Youtube

image classification, 272799c46c A neural network consists of connected units or nodes called artificial neurons, which loosely model the neurons in the brain. These are connected by edges, which model the synapses in the brain. Each artificial neuron receives signals from connected neurons, then processes them and sends a signal to other connected neurons. The "signal" is a real number, and the output of each neuron is computed by some non-linear function of the totality of its inputs, called the activation function. The strength of the signal at each connection is determined by a weight, which adjusts as part of the training process. 272799c46c

Neural radiance field The network predicts a volume density and view-dependent emitted radiance A neural radiance field (NeRF) is a neural field for reconstructing a three-dimensional representation of a scene from two-dimensional images. represents a scene as a radiance field parametrized by a deep neural network (DNN). First introduced in 2020, it has since gained significant attention for its potential applications in computer graphics and content creation. Additional scene properties such as camera poses may also be jointly learned. The NeRF model enables downstream applications of novel view synthesis, scene geometry reconstruction, and obtaining the reflectance properties of the scene 272799c46c

The NeRF algorithm represents a scene as a radiance field parametrized by a deep neural network (DNN). The network predicts a volume density and view-dependent emitted radiance given the spatial location 272799c46c

PyTorch The successor to Torch, PyTorch provides a high-level API that builds upon optimised, low-level implementations of deep learning algorithms and architectures, such as the Transformer, or SGD. PyTorch allows for automatic parallelization of training and, internally, implements CUDA bindings that speed training further by leveraging GPU resources. Notably, this API simplifies model training and inference to a few lines of code. The Open Neural Network PyTorch is an open-source deep

learning library, originally developed by Meta Platforms and currently developed with support from the Linux Foundation. Convolutional Architecture for Fast Feature Embedding (Caffe2), but models defined by the two frameworks were mutually incompatible 272799c46c

In general, when LeNet is referred to without a number, it refers to the 1998 version, LeNet-5, which is the most well-known version. 272799c46c Some common deep learning network architectures include fully connected networks, deep belief networks, recurrent neural networks, convolutional neural networks, generative adversarial networks, transformers, and neural radiance fields. These architectures have been applied to fields including computer vision, speech recognition, natural language processing, machine translation, bioinformatics, drug design, medical image analysis, climate science, material inspection and board game programs, where they have produced results comparable to and in some cases surpassing human expert performance. 272799c46c

LeNet LeNet is a series of convolutional neural network architectures created by a research group at AT&T Bell Laboratories between of the period of 1988 to LeNet is a series of convolutional neural network architectures created by a research group at AT&T Bell Laboratories between of the period of 1988 to 1998, centered around Yann LeCun. They were designed for reading small grayscale images of handwritten digits and letters, and were used in ATMs for reading cheques 272799c46c

== Algorithm == 272799c46c Early forms of neural networks were inspired by information processing and distributed... 272799c46c Later, advances in hardware and the development of the backpropagation algorithm, as well as recurrent neural networks and convolutional neural networks, renewed interest in ANNs. The 2010s saw the development of a deep neural network (i.e., one with many layers) called AlexNet. It greatly outperformed other image recognition models, and is thought to have launched the ongoing AI spring. The transformer architecture was first described in 2017 as a method to teach ANNs grammatical dependencies in language, and is the predominant architecture used by large language models such as GPT-4. Diffusion... 272799c46c In 1980, Fukushima published the neocognitron, 272799c46c the original deep convolutional neural network (CNN) architecture. Fukushima proposed several supervised and

unsupervised learning algorithms to train the parameters of a deep neocognitron such that it could learn internal representations of incoming data. Today, however, the CNN architecture is usually trained through backpropagation. This approach is now heavily used in computer vision. 272799c46c Vanishing gradients and exploding gradients, seen during backpropagation in earlier neural networks, are prevented by the regularization that comes from using shared weights over fewer connections. For example, for each neuron in the fully-connected layer, 10,000 weights would be required for processing an image sized 100 × 100 pixels. However, applying cascaded convolution (or cross-correlation) kernels, only 25 weights for each convolutional layer are required to process 5x5-sized tiles. Higher-layer features are extracted from wider context windows, compared to lower-layer features. 272799c46c Among other benefits, capsnets address the "Picasso problem" in image recognition: images that have all the right parts but that are not in the correct spatial relationship (e.g., in a "face", the positions of the mouth and one eye are switched). For image recognition, capsnets exploit the fact that while viewpoint changes have nonlinear effects at the pixel level, they have linear effects at the part/object level. This can be compared to inverting the rendering of an object of multiple parts.... 272799c46c Some applications of CNNs include: 272799c46c The idea is to add structures called "capsules" to a convolutional neural network (CNN), and to reuse output from several of those capsules to form more stable (with respect to various perturbations) representations for higher capsules. The output is a vector consisting of the probability of an observation, and a pose for that observation. This vector is similar to what is done for example when doing classification with localization in CNNs. 272799c46c

Handwriting recognition methods use convolutional networks to extract visual features over several overlapping windows of a text line image which a recurrent neural network uses to Handwriting recognition (HWR), also known as handwritten text recognition (HTR), is the ability of a computer to receive and interpret intelligible handwritten input from sources such as paper documents, photographs, touch-screens and other devices. The image of the written text may be sensed "off line" from a piece of paper by optical scanning (optical character recognition) or intelligent word recognition. A handwriting recognition system handles formatting, performs correct segmentation into characters,

and finds the most possible words. Alternatively, the movements of the pen tip may be sensed "on line", for example by a pen-based computer screen surface, a generally easier task as there are more clues available 272799c46c

As of 2025, PyTorch remains one of the most popular deep learning libraries, alongside others such as TensorFlow and Keras. It can be installed using Anaconda package managers. A number of commercial deep learning systems are built on top of PyTorch, including ChatGPT, Tesla Autopilot... 272799c46c

Convolutional neural network This type of deep A convolutional neural network (CNN) is a type of feedforward neural network that learns features via filter (or kernel) optimization. A convolutional neural network (CNN) is a type of feedforward neural network that learns features via filter (or kernel) optimization. CNNs are the de-facto standard in deep learning-based approaches to computer vision and image processing, and have only recently been replaced—in some cases—by newer architectures such as the transformer. This type of deep learning network has been applied to process and make predictions from many different types of data including text, images and audio 272799c46c

== Notable scientific achievements == 272799c46c == Development history == 272799c46c

Neural network (machine learning) A neural network consists In machine learning, a neural network (NN) or neural net, is a computational model inspired by the structure and functions of biological neural networks. neural network (NN) or neural net, is a computational model inspired by the structure and functions of biological neural networks 272799c46c

PyTorch utilises the tensor as a fundamental data type, similarly to NumPy. Training is facilitated by a reversed automatic differentiation system, Autograd, that constructs a directed acyclic graph of the operations (and their arguments) executed by a model during its forward pass. With a loss, backpropagation is then undertaken. 272799c46c recommender systems, 272799c46c Groups of neurons are aggregated into layers. Each layer performs a transformation on its inputs. Signals travel from the first layer (the input layer) to the last layer (the output layer), typically passing through multiple intermediate layers (hidden layers). A network is typically called a deep neural network

if it has at least two hidden layers. Deep neural networks are capable of learning sophisticated hierarchical representations... 272799c46c In 1969 Fukushima introduced the ReLU (Rectifier Linear Unit) activation function in the context of visual feature extraction in hierarchical neural networks, which he called "analog threshold element". (Though the ReLU was first used by Alston Householder in 1941 as a mathematical abstraction of biological neural networks.) As of 2017 it is the most popular activation function for deep neural networks. 272799c46c Convolutional neural networks are a kind of feed-forward neural network whose artificial neurons can respond to a part of the surrounding cells in the coverage range and perform well in large-scale image processing. LeNet-5 was one of the earliest convolutional neural networks and was historically important during the development of deep learning. 272799c46c

History of artificial neural networks Later, advances in hardware and the development of the backpropagation algorithm, as well as recurrent neural networks and convolutional neural Artificial neural networks (ANNs) are models created using machine learning to perform a number of tasks. The first implementation of ANNs was the perceptron by Frank Rosenblatt. While the computational implementations of ANNs relate to earlier discoveries in mathematics, their creation was inspired by biological neural circuitry. Despite the frequent claim that little research was conducted on ANNs in the 1970s and 1980s—the AAAI calling this period an "AI winter"—there was ongoing development of ANNs, especially connected to the development of specialized computers for simulating these networks. these networks 272799c46c

image segmentation... 272799c46c

Deep learning The adjective "deep" refers to the use of multiple layers (ranging from three to several hundred or thousands) in the network. networks, deep belief networks, recurrent neural networks, convolutional neural networks, generative adversarial networks, transformers, and neural radiance In machine learning, deep learning (DL) focuses on utilizing multilayered neural networks to perform tasks such as classification, regression, and representation learning. Methods used can be supervised, semi-supervised or unsupervised. The field takes inspiration from biological neuroscience and revolves around stacking artificial neurons

into layers and "training" them to process data 272799c46c

Offline handwriting recognition involves the automatic conversion of text in an image into letter codes that are usable within computer and text-processing applications. The data obtained by this form is regarded as a static representation of handwriting. Offline handwriting recognition is comparatively difficult, as different people have different handwriting styles. And, as of today, OCR engines are primarily focused on machine printed text and... 272799c46c image and video recognition, 272799c46c == Offline recognition == 272799c46c

Capsule neural network closely mimic biological neural organization. The idea is to add structures called "capsules" to a convolutional neural network (CNN), and to reuse output A capsule neural network (CapsNet) is a machine learning system that is a type of artificial neural network (ANN) that can be used to better model hierarchical relationships. The approach is an attempt to more closely mimic biological neural organization 272799c46c

Kunihiko Fukushima Fukushima proposed several supervised and Kunihiko Fukushima (Japanese: □□ □□, born 16 March 1936) is a Japanese computer scientist, most noted for his work on artificial neural networks and deep learning. 1980, Fukushima published the neocognitron, the original deep convolutional neural network (CNN) architecture. He is currently working part-time as a senior research scientist at the Fuzzy Logic Systems Institute in Fukuoka, Japan 272799c46c

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