**Convolution:**

2D Convolution:

Zero Padding:

テキスト

自動的に生成された説明

Step 1: Matrix inversion

Step 2: Slide the kernel over the image and perform MAC operation at each instant

• 2-D discrete convolutions (N = 2),

• square inputs (i1 = i2 = i),

• square kernel size (k1 = k2 = k),

• same strides along both axes (s1 = s2 = s),

• same zero padding along both axes (p1 = p2 = p)

時計と文字の加工写真

低い精度で自動的に生成された説明

2D convolution using a kernel size of 3, stride of 1 and padding

図形

自動的に生成された説明

2D convolution with no padding, stride of 2 and kernel of 3

黒い背景と白い文字のロゴ

低い精度で自動的に生成された説明

A (half) padded convolution will keep the spatial output dimensions equal to the input.

The needed parameters for such a layer can be calculated by I\*O\*K

**Transposed convolution:**

Transposed 2D convolution with no padding, stride of 2 and kernel of 3

図形 が含まれている画像

自動的に生成された説明

The need for transposed convolutions generally arises from the desire to use a transformation going in the opposite direction of a normal convolution, i.e., from something that has the shape of the output of some convolution to something that has the shape of its input while maintaining a connectivity pattern that is compatible with said convolution.

テキスト, 手紙

自動的に生成された説明

**Up Sampling:**

The Upsampling layer is a simple layer with no weights that will double the dimensions of input and can be used in a generative model when followed by a traditional convolutional layer.

テーブル が含まれている画像

自動的に生成された説明

**Dilated Convolution (a.k.a. atrous convolutions):**

2D convolution using a 3 kernel with a dilation rate of 2 and no padding

黒い背景と白い文字のロゴ

低い精度で自動的に生成された説明

Dilated convolutions “inflate” the kernel by inserting spaces between the kernel elements. The dilation “rate” is controlled by an additional hyperparameter

d. Implementations may vary, but there are usually d−1 spaces inserted between

kernel elements such that d = 1 corresponds to a regular convolution.

Dilated convolutions are used to cheaply increase the receptive field of output units without increasing the kernel size, which is especially effective when multiple dilated convolutions are stacked one after another.

A kernel of size k dilated by a factor d has an effective size k’ = k + (k − 1)(d − 1).

テーブル

中程度の精度で自動的に生成された説明

**1D Convolution:**

Conv1D is widely applied on sensory data, and accelerometer data is one of it.

テーブル

自動的に生成された説明

**3D Convolution:**

In Conv3D, the kernel slides in 3 dimensions,

ダイアグラム

自動的に生成された説明

Conv3D is mostly used with 3D image data. Such as Magnetic Resonance Imaging (MRI) data. MRI data is widely used for examining the brain, spinal cords, internal organs and many more. A Computerized Tomography (CT) Scan is also an example of 3D data, which is created by combining a series of X-rays image taken from different angles around the body. We can use Conv3D to classify this medical data or extract features from it.

**Graph Convolution Network:**

The major difference between CNNs and GNNs is that CNNs are specially built to operate on regular (Euclidean) structured data, while GNNs are the generalized version of CNNs where the numbers of nodes connections vary and the nodes are unordered (irregular on non-Euclidean structured data).

GCNs themselves can be categorized into 2 major algorithms, **Spatial Graph Convolutional Networks** and **Spectral Graph Convolutional Network**s.

Review: <https://arxiv.org/pdf/1901.00596.pdf>

Temporal 3D Convnets:

Review: <https://arxiv.org/pdf/1711.08200.pdf>

Object Detection:

Yolo:

Faster RCNN:

PAFNet

[PAFNet: An Efficient Anchor-Free Object Detector Guidance](https://paperswithcode.com/paper/pafnet-an-efficient-anchor-free-object)

Semantic Segmentation:

Mask RCNN, DeepLabv3

Generative Adversarial Network (GAN)

Auto-encoder

RNN, LSTM, GRU

Few Shot Learning (FSL)

Triplet Loss

Multi Instance Learning (MIL)

Deep Affinity Network (DAN)

Deep Belief Network (DBN)

FlowNet2.0:

OpenPose:

Action Recognition:

I3D CNN:

ダイアグラム

自動的に生成された説明

SlowFast: