tf.nn.conv2d

```
conv2d(
    input,
    filter,
    strides,
    padding,
    use_cudnn_on_gpu=True,
    data_format='NHWC',
    name=None
)
```

Defined in **`tensorflow/python/ops/gen_nn_ops.py`**.

See the guide: Neural Network > Convolution
(https://www.tensorflow.org/api_guides/python/nn#Convolution)

Computes a 2-D convolution given 4-D **`input`** and **`filter`** tensors.

Given an input tensor of shape **`[batch, in_height, in_width, in_channels]`** and a filter / kernel tensor of shape **`[filter_height, filter_width, in_channels, out_channels]`**, this op performs the following:

1. Flattens the filter to a 2-D matrix with shape **`[filter_height * filter_width * in_channels, output_channels]`**.
2. Extracts image patches from the input tensor to form a *virtual* tensor of shape **`[batch, out_height, out_width, filter_height * filter_width * in_channels]`**.
3. For each patch, right-multiplies the filter matrix and the image patch vector.

In detail, with the default NHWC format,

```
output[b, i, j, k] =
    sum_{di, dj, q} input[b, strides[1] * i + di, strides[2] * j + dj, q] *
                    filter[di, dj, q, k]
```

Must have **`strides[0] = strides[3] = 1`**. For the most common case of the same horizontal and vertices strides, **`strides = [1, stride, stride, 1]`**.

Args:

- **`input`**: A **`Tensor`**. Must be one of the following types: **`half`**, **`float32`**. A 4-D tensor. The dimension order is interpreted according to the value of **`data_format`**, see below for details.
- **`filter`**: A **`Tensor`**. Must have the same type as **`input`**. A 4-D tensor of shape **`[filter_height, filter_width, in_channels, out_channels]`**
- **`strides`**: A list of **`ints`**. 1-D tensor of length 4. The stride of the sliding window for each dimension of **`input`**. The dimension order is determined by the value of **`data_format`**, see below for details.
- **`padding`**: A **`string`** from: **`"SAME", "VALID"`**. The type of padding algorithm to use.
- **`use_cudnn_on_gpu`**: An optional **`bool`**. Defaults to **`True`**.
- **`data_format`**: An optional **`string`** from: **`"NHWC", "NCHW"`**. Defaults to **`"NHWC"`**. Specify the data format of the input and output data. With the default format "NHWC", the data is stored in the order of: [batch, height, width, channels]. Alternatively, the format could be "NCHW", the data storage order of: [batch, channels, height, width].
- **`name`**: A name for the operation (optional).

Returns:

A **`Tensor`**. Has the same type as **`input`**. A 4-D tensor. The dimension order is determined by the value of **`data_format`**, see below for details.

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