

tf.nn.pool

```
pool(
    input,
    window_shape,
    pooling_type,
    padding,
    dilation_rate=None,
    strides=None,
    name=None,
    data_format=None
)
```

Defined in [tensorflow/python/ops/nn_ops.py](#).

See the guide: [Neural Network > Pooling](#)

Performs an N-D pooling operation.

In the case that **data_format** does not start with "NC", computes for $0 \leq b < \text{batch_size}$, $0 \leq x[i] < \text{output_spatial_shape}[i]$, $0 \leq c < \text{num_channels}$:

```
output[b, x[0], ..., x[N-1], c] =
    REDUCE_{z[0], ..., z[N-1]}
    input[b,
        x[0] * strides[0] - pad_before[0] + dilation_rate[0]*z[0],
        ...
        x[N-1]*strides[N-1] - pad_before[N-1] + dilation_rate[N-1]*z[N-1],
        c],
```

where the reduction function REDUCE depends on the value of **pooling_type**, and **pad_before** is defined based on the value of **padding** as described in the [comment here](#). The reduction never includes out-of-bounds positions.

In the case that **data_format** starts with "NC", the **input** and output are simply transposed as follows:

```
pool(input, data_format, **kwargs) =
    tf.transpose(pool(tf.transpose(input, [0] + range(2,N+2) + [1]),
        **kwargs),
        [0, N+1] + range(1, N+1))
```

Args:

- input**: Tensor of rank N+2, of shape **[batch_size] + input_spatial_shape + [num_channels]** if **data_format** does not start with "NC" (default), or **[batch_size, num_channels] + input_spatial_shape** if **data_format** starts with "NC". Pooling happens over the spatial dimensions only.
- window_shape**: Sequence of N ints ≥ 1 .
- pooling_type**: Specifies pooling operation, must be "AVG" or "MAX".
- padding**: The padding algorithm, must be "SAME" or "VALID". See the [comment here](#)
- dilation_rate**: Optional. Dilation rate. List of N ints ≥ 1 . Defaults to $[1]*N$. If any value of **dilation_rate** is > 1 , then all values of **strides** must be 1.
- strides**: Optional. Sequence of N ints ≥ 1 . Defaults to $[1]*N$. If any value of **strides** is > 1 , then all values of

dilation_rate must be 1.

- **name** : Optional. Name of the op.
- **data_format** : A string or None. Specifies whether the channel dimension of the **input** and output is the last dimension (default, or if **data_format** does not start with "NC"), or the second dimension (if **data_format** starts with "NC"). For N=1, the valid values are "NWC" (default) and "NCW". For N=2, the valid values are "NHWC" (default) and "NCHW". For N=3, the valid values are "NDHWC" (default) and "NCDHW".

Returns:

Tensor of rank N+2, of shape [batch_size] + output_spatial_shape + [num_channels]

if data_format is None or does not start with "NC", or

[batch_size, num_channels] + output_spatial_shape

if data_format starts with "NC", where **output_spatial_shape** depends on the value of padding:

If padding = "SAME": $\text{output_spatial_shape}[i] = \text{ceil}(\text{input_spatial_shape}[i] / \text{strides}[i])$

If padding = "VALID": $\text{output_spatial_shape}[i] = \text{ceil}((\text{input_spatial_shape}[i] - (\text{window_shape}[i] - 1) * \text{dilation_rate}[i]) / \text{strides}[i])$.

Raises:

- **ValueError** : if arguments are invalid.

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