

## tf.keras.layers.PReLU

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Class **PReLU**Inherits From: [Layer](#)Defined in [tensorflow/python/keras/\\_impl/keras/layers/advanced\\_activations.py](#).

Parametric Rectified Linear Unit.

It follows:  $f(x) = \alpha * x$  for  $x < 0$ ,  $f(x) = x$  for  $x \geq 0$ , where  $\alpha$  is a learned array with the same shape as  $x$ .

Input shape: Arbitrary. Use the keyword argument **input\_shape** (tuple of integers, does not include the samples axis) when using this layer as the first layer in a model.

Output shape: Same shape as the input.

## Arguments:

- alpha\_initializer**: initializer function for the weights.
- alpha\_regularizer**: regularizer for the weights.
- alpha\_constraint**: constraint for the weights.
- shared\_axes**: the axes along which to share learnable parameters for the activation function. For example, if the incoming feature maps are from a 2D convolution with output shape **(batch, height, width, channels)**, and you wish to share parameters across space so that each filter only has one set of parameters, set **shared\_axes=[1, 2]**.

## Properties

**activity\_regularizer**

Optional regularizer function for the output of this layer.

**dtype****graph****input**

Retrieves the input tensor(s) of a layer.

Only applicable if the layer has exactly one input, i.e. if it is connected to one incoming layer.

Returns:

Input tensor or list of input tensors.

Raises:

- `AttributeError` : if the layer is connected to more than one incoming layers.

Raises:

- `RuntimeError` : If called in Eager mode.
- `AttributeError` : If no inbound nodes are found.

## **input\_mask**

Retrieves the input mask tensor(s) of a layer.

Only applicable if the layer has exactly one inbound node, i.e. if it is connected to one incoming layer.

Returns:

Input mask tensor (potentially None) or list of input mask tensors.

Raises:

- `AttributeError` : if the layer is connected to more than one incoming layers.

## **input\_shape**

Retrieves the input shape(s) of a layer.

Only applicable if the layer has exactly one input, i.e. if it is connected to one incoming layer, or if all inputs have the same shape.

Returns:

Input shape, as an integer shape tuple (or list of shape tuples, one tuple per input tensor).

Raises:

- `AttributeError` : if the layer has no defined input\_shape.
- `RuntimeError` : if called in Eager mode.

## **losses**

**name**

## **non\_trainable\_variables**

## **non\_trainable\_weights**

## **output**

Retrieves the output tensor(s) of a layer.

Only applicable if the layer has exactly one output, i.e. if it is connected to one incoming layer.

Returns:

Output tensor or list of output tensors.

Raises:

- `AttributeError` : if the layer is connected to more than one incoming layers.
- `RuntimeError` : if called in Eager mode.

## **output\_mask**

Retrieves the output mask tensor(s) of a layer.

Only applicable if the layer has exactly one inbound node, i.e. if it is connected to one incoming layer.

Returns:

Output mask tensor (potentially None) or list of output mask tensors.

Raises:

- `AttributeError` : if the layer is connected to more than one incoming layers.

## **output\_shape**

Retrieves the output shape(s) of a layer.

Only applicable if the layer has one output, or if all outputs have the same shape.

Returns:

Output shape, as an integer shape tuple (or list of shape tuples, one tuple per output tensor).

Raises:

- `AttributeError` : if the layer has no defined output shape.
- `RuntimeError` : if called in Eager mode.

## **scope\_name**

## **trainable\_variables**

## **trainable\_weights**

## **updates**

## **variables**

Returns the list of all layer variables/weights.

Returns:

A list of variables.

## **weights**

Returns the list of all layer variables/weights.

Returns:

A list of variables.

## Methods

---

### **\_\_init\_\_**

```
__init__(
    alpha_initializer='zeros',
    alpha_regularizer=None,
    alpha_constraint=None,
    shared_axes=None,
    **kwargs
)
```

### **\_\_call\_\_**

```
__call__(
    inputs,
    **kwargs
)
```

Wrapper around self.call(), for handling internal references.

If a Keras tensor is passed: - We call self.\_add\_inbound\_node(). - If necessary, we **build** the layer to match the shape of the input(s). - We update the \_keras\_history of the output tensor(s) with the current layer. This is done as part of \_add\_inbound\_node().

Arguments:

- **inputs** : Can be a tensor or list/tuple of tensors.
- **\*\*kwargs** : Additional keyword arguments to be passed to **call()** .

Returns:

Output of the layer's `call` method.

Raises:

- `ValueError` : in case the layer is missing shape information for its `build` call.

## `__deepcopy__`

```
__deepcopy__(memo)
```

## `add_loss`

```
add_loss(  
    losses,  
    inputs=None  
)
```

Add loss tensor(s), potentially dependent on layer inputs.

Some losses (for instance, activity regularization losses) may be dependent on the inputs passed when calling a layer. Hence, when reusing a same layer on different inputs `a` and `b`, some entries in `layer.losses` may be dependent on `a` and some on `b`. This method automatically keeps track of dependencies.

The `get_losses_for` method allows to retrieve the losses relevant to a specific set of inputs.

Arguments:

- `losses` : Loss tensor, or list/tuple of tensors.
- `inputs` : Optional input tensor(s) that the loss(es) depend on. Must match the `inputs` argument passed to the `__call__` method at the time the losses are created. If `None` is passed, the losses are assumed to be unconditional, and will apply across all dataflows of the layer (e.g. weight regularization losses).

Raises:

- `RuntimeError` : If called in Eager mode.

## `add_update`

```
add_update(  
    updates,  
    inputs=None  
)
```

Add update op(s), potentially dependent on layer inputs.

Weight updates (for instance, the updates of the moving mean and variance in a BatchNormalization layer) may be dependent on the inputs passed when calling a layer. Hence, when reusing a same layer on different inputs `a` and `b`, some entries in `layer.updates` may be dependent on `a` and some on `b`. This method automatically keeps track of dependencies.

The `get_updates_for` method allows to retrieve the updates relevant to a specific set of inputs.

This call is ignored in Eager mode.

## Arguments:

- `updates` : Update op, or list/tuple of update ops.
- `inputs` : Optional input tensor(s) that the update(s) depend on. Must match the `inputs` argument passed to the `__call__` method at the time the updates are created. If `None` is passed, the updates are assumed to be unconditional, and will apply across all dataflows of the layer.

## add\_variable

```
add_variable(  
    name,  
    shape,  
    dtype=None,  
    initializer=None,  
    regularizer=None,  
    trainable=True,  
    constraint=None  
)
```

Adds a new variable to the layer, or gets an existing one; returns it.

## Arguments:

- `name` : variable name.
- `shape` : variable shape.
- `dtype` : The type of the variable. Defaults to `self.dtype` or `float32`.
- `initializer` : initializer instance (callable).
- `regularizer` : regularizer instance (callable).
- `trainable` : whether the variable should be part of the layer's "trainable\_variables" (e.g. variables, biases) or "non\_trainable\_variables" (e.g. BatchNorm mean, stddev).
- `constraint` : constraint instance (callable).

## Returns:

The created variable.

## Raises:

- `RuntimeError` : If called in Eager mode with regularizers.

## add\_weight

```
add_weight(  
    name,  
    shape,  
    dtype=None,  
    initializer=None,  
    regularizer=None,  
    trainable=True,  
    constraint=None  
)
```

Adds a weight variable to the layer.

### Arguments:

- `name` : String, the name for the weight variable.
- `shape` : The shape tuple of the weight.
- `dtype` : The dtype of the weight.
- `initializer` : An Initializer instance (callable).
- `regularizer` : An optional Regularizer instance.
- `trainable` : A boolean, whether the weight should be trained via backprop or not (assuming that the layer itself is also trainable).
- `constraint` : An optional Constraint instance.

### Returns:

The created weight variable.

## apply

```
apply(  
    inputs,  
    *args,  
    **kwargs  
)
```

Apply the layer on a input.

This simply wraps `self.__call__`.

### Arguments:

- `inputs` : Input tensor(s).
- `*args` : additional positional arguments to be passed to `self.call`.
- `**kwargs` : additional keyword arguments to be passed to `self.call`.

### Returns:

Output tensor(s).

## build

```
build(input_shape)
```

## call

```
call(  
    inputs,  
    mask=None  
)
```

## compute\_mask

```
compute_mask(  
    inputs,  
    mask=None  
)
```

Computes an output mask tensor.

### Arguments:

- `inputs`: Tensor or list of tensors.
- `mask`: Tensor or list of tensors.

### Returns:

None or a tensor (or list of tensors, one per output tensor of the layer).

## count\_params

```
count_params()
```

Count the total number of scalars composing the weights.

### Returns:

An integer count.

### Raises:

- `ValueError`: if the layer isn't yet built (in which case its weights aren't yet defined).

## from\_config

```
from_config(  
    cls,  
    config  
)
```

Creates a layer from its config.

This method is the reverse of `get_config`, capable of instantiating the same layer from the config dictionary. It does not handle layer connectivity (handled by `Container`), nor weights (handled by `set_weights`).

### Arguments:

- `config`: A Python dictionary, typically the output of `get_config`.

### Returns:

A layer instance.



## get\_config

```
get_config()
```

## get\_input\_at

```
get_input_at(node_index)
```

Retrieves the input tensor(s) of a layer at a given node.

Arguments:

- `node_index` : Integer, index of the node from which to retrieve the attribute. E.g. `node_index=0` will correspond to the first time the layer was called.

Returns:

A tensor (or list of tensors if the layer has multiple inputs).

Raises:

- `RuntimeError` : If called in Eager mode.

## get\_input\_mask\_at

```
get_input_mask_at(node_index)
```

Retrieves the input mask tensor(s) of a layer at a given node.

Arguments:

- `node_index` : Integer, index of the node from which to retrieve the attribute. E.g. `node_index=0` will correspond to the first time the layer was called.

Returns:

A mask tensor (or list of tensors if the layer has multiple inputs).

## get\_input\_shape\_at

```
get_input_shape_at(node_index)
```

Retrieves the input shape(s) of a layer at a given node.

Arguments:

- `node_index` : Integer, index of the node from which to retrieve the attribute. E.g. `node_index=0` will correspond to the first time the layer was called.

Returns:

A shape tuple (or list of shape tuples if the layer has multiple inputs).

Raises:

- `RuntimeError` : If called in Eager mode.

## **get\_losses\_for**

```
get_losses_for(inputs)
```

Retrieves losses relevant to a specific set of inputs.

Arguments:

- `inputs` : Input tensor or list/tuple of input tensors. Must match the `inputs` argument passed to the `__call__` method at the time the losses were created. If you pass `inputs=None`, unconditional losses are returned, such as weight regularization losses.

Returns:

List of loss tensors of the layer that depend on `inputs`.

Raises:

- `RuntimeError` : If called in Eager mode.

## **get\_output\_at**

```
get_output_at(node_index)
```

Retrieves the output tensor(s) of a layer at a given node.

Arguments:

- `node_index` : Integer, index of the node from which to retrieve the attribute. E.g. `node_index=0` will correspond to the first time the layer was called.

Returns:

A tensor (or list of tensors if the layer has multiple outputs).

Raises:

- `RuntimeError` : If called in Eager mode.

## **get\_output\_mask\_at**

```
get_output_mask_at(node_index)
```

Retrieves the output mask tensor(s) of a layer at a given node.

Arguments:

- `node_index` : Integer, index of the node from which to retrieve the attribute. E.g. `node_index=0` will correspond to the first time the layer was called.

Returns:

A mask tensor (or list of tensors if the layer has multiple outputs).

## **get\_output\_shape\_at**

```
get_output_shape_at(node_index)
```

Retrieves the output shape(s) of a layer at a given node.

Arguments:

- `node_index` : Integer, index of the node from which to retrieve the attribute. E.g. `node_index=0` will correspond to the first time the layer was called.

Returns:

A shape tuple (or list of shape tuples if the layer has multiple outputs).

Raises:

- `RuntimeError` : If called in Eager mode.

## **get\_updates\_for**

```
get_updates_for(inputs)
```

Retrieves updates relevant to a specific set of inputs.

Arguments:

- `inputs` : Input tensor or list/tuple of input tensors. Must match the `inputs` argument passed to the `__call__` method at the time the updates were created. If you pass `inputs=None`, unconditional updates are returned.

Returns:

List of update ops of the layer that depend on `inputs`.

Raises:

- `RuntimeError` : If called in Eager mode.

## **get\_weights**

```
get_weights()
```

Returns the current weights of the layer.

Returns:

Weights values as a list of numpy arrays.

## set\_weights

```
set_weights(weights)
```

Sets the weights of the layer, from Numpy arrays.

Arguments:

- **weights** : a list of Numpy arrays. The number of arrays and their shape must match number of the dimensions of the weights of the layer (i.e. it should match the output of **get\_weights** ).

Raises:

- **ValueError** : If the provided weights list does not match the layer's specifications.

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