

## tf.train.natural\_exp\_decay

```
natural_exp_decay(  
    learning_rate,  
    global_step,  
    decay_steps,  
    decay_rate,  
    staircase=False,  
    name=None  
)
```

Defined in [tensorflow/python/training/learning\\_rate\\_decay.py](#).

See the guide: [Training > Decaying the learning rate](#)

Applies natural exponential decay to the initial learning rate.

When training a model, it is often recommended to lower the learning rate as the training progresses. This function applies an exponential decay function to a provided initial learning rate. It requires an **global\_step** value to compute the decayed learning rate. You can just pass a TensorFlow variable that you increment at each training step.

The function returns the decayed learning rate. It is computed as:

```
decayed_learning_rate = learning_rate * exp(-decay_rate * global_step)
```

Example: decay exponentially with a base of 0.96:

```
...  
global_step = tf.Variable(0, trainable=False)  
learning_rate = 0.1  
k = 0.5  
learning_rate = tf.train.exponential_time_decay(learning_rate, global_step, k)  
  
# Passing global_step to minimize() will increment it at each step.  
learning_step = (  
    tf.train.GradientDescentOptimizer(learning_rate)  
    .minimize(...my loss..., global_step=global_step)  
)
```

### Args:

- **learning\_rate**: A scalar **float32** or **float64 Tensor** or a Python number. The initial learning rate.
- **global\_step**: A Python number. Global step to use for the decay computation. Must not be negative.
- **decay\_steps**: How often to apply decay.
- **decay\_rate**: A Python number. The decay rate.
- **staircase**: Whether to apply decay in a discrete staircase, as opposed to continuous, fashion.
- **name**: String. Optional name of the operation. Defaults to 'ExponentialTimeDecay'.

### Returns:

A scalar `Tensor` of the same type as `learning_rate`. The decayed learning rate.

Raises:

- `ValueError`: if `global_step` is not supplied.

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