

03_Activation_Function_v1

October 11, 2020

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[1]: import numpy as np
import matplotlib.pyplot as plt
```

0.0.1 Sigmoid

$$\begin{aligned}\text{sigmoid}(x) &= \frac{1}{1 + e^{-x}} \\ &= \frac{1}{1 + \exp(-x)}\end{aligned}$$

```
[2]: def my_sigmoid(x):
return 1 / (1+np.exp(-x))
```

0.0.2 Hyperbolic Tangent (tanh)

$$\tanh(x) = \frac{1 - e^{-x}}{1 + e^{-x}} = \frac{2}{1 + e^{-2x}} - 1 = 2 \times \text{sigmoid}(2x) - 1$$

```
[3]: def my_tanh(x):
return 2* my_sigmoid(2 *x) -1
```

0.0.3 Step function

```
[4]: def my_step(x):
return np.array(x>0, dtype=np.int)
```

0.0.4 ReLU

```
[5]: def my_relu(x):
return np.maximum(0, x)
```

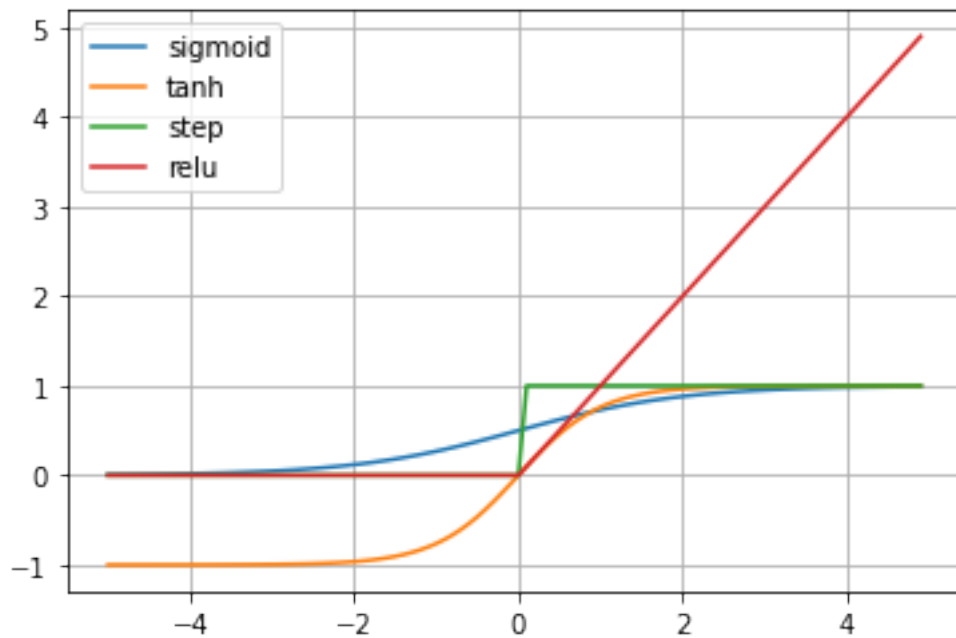
```
[6]: # https://stackoverflow.com/a/47936476
def my_relu2(x):
return x * (x > 0)
```

0.0.5 Test

```
[7]: x = np.arange(-5,5, 0.1)
```

```
[8]: y1 = my_sigmoid(x)  
y2 = my_tanh(x)  
y3 = my_step(x)  
y4 = my_relu2(x)
```

```
[9]: plt.plot(x, y1)  
plt.plot(x, y2)  
plt.plot(x, y3)  
plt.plot(x, y4)  
plt.legend(['sigmoid', 'tanh', 'step', 'relu'])  
plt.grid()
```



```
[9]:
```