model_calculation

September 12, 2024

[ ]:
```
import numpy as np
```

[ ]:
```
np.random.seed(52)
```

[ ]:
```
def relu(x):
    return (x > 0) * x


def relu2deriv(output):
    return output > 0
```

[ ]:
```
input1 = np.array([[1], [1]])

output1 = np.array([[1]]).T

alpha = 1
input1.shape
```

[ ]:
```
(2, 1)
```

[ ]:
```
weights_0_1 = np.array([[0.2, 0.3], [0, 0.1], [0, 0.1]])
print("weights_0_1.shape: ", weights_0_1.shape)

weights_1_2 = np.array([[0.2, 0.1, 0], [0, 0.1, 0.2]])
print("weights_1_2.shape: ", weights_1_2.shape)

weights_2_3 = np.array([[0.2, 0], [0, 0.1]])
print("weights_2_3.shape: ", weights_2_3.shape)

weights_3_4 = np.array([[0.1, 0.1]])
print("weights_3_4.shape: ", weights_3_4.shape)
```

```
weights_0_1.shape:  (3, 2)
weights_1_2.shape:  (2, 3)
weights_2_3.shape:  (2, 2)
weights_3_4.shape:  (1, 2)
```

[ ]:
```
for iteration in range(1):
    output_error = 0

    layer_0 = input1.T

    layer_1 = relu(np.dot(layer_0,weights_0_1.T))
    layer_2 = relu(np.dot(layer_1,weights_1_2.T))
    layer_3 = relu(np.dot(layer_2,weights_2_3.T))

    output = np.dot(layer_3,weights_3_4.T)

    # Half of mse loss
    output_error += np.sum((output - output1) ** 2) / 2
    print("Output Error: ", output_error)

    output_delta = (output - output1)
    print("Delta output: ",output_delta)

    layer_3_delta = output_delta.dot(weights_3_4)*relu2deriv(layer_3)
    layer_2_delta = layer_3_delta.dot(weights_2_3)*relu2deriv(layer_2)
    layer_1_delta = layer_2_delta.dot(weights_1_2)*relu2deriv(layer_1)

    weights_3_4 = weights_3_4.T - alpha * layer_3.T.dot(output_delta)
    weights_2_3 = weights_2_3.T - alpha * layer_2.T.dot(layer_3_delta)
    weights_1_2 = weights_1_2.T - alpha * layer_1.T.dot(layer_2_delta)
    weights_0_1 = weights_0_1.T - alpha * layer_0.T.dot(layer_1_delta)

print(weights_0_1, weights_1_2, weights_2_3, weights_3_4)
```

```
Output Error:  0.49750312500000005
Delta output:  [[-0.9975]]
[[0.20399   0.0029925 0.001995 ]
 [0.30399   0.1029925 0.101995 ]] [[0.209975  0.0049875]
 [0.101995  0.1009975]
 [0.001995  0.2009975]] [[0.2109725 0.0109725]
 [0.0029925 0.1029925]] [[0.121945 ]
 [0.1029925]]
```