The Fourth Week Report

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Contents

[1] The source of package "pythonhighlight":https://github.com/chenfeng123/latex-highlighting

1 Some Questions Remained

1.1 What is Forward and Back propagation

In short, forward propagation is a way we used to count the value of compound functions. And back propagation is used to count the derivative of compound functions. We needn't complicate them.

1.2 How can we express the derivative of $\sigma(z)$

By taking the derivative of $\sigma(z)$, we can easily get the result:$\sigma'(z) = \sigma(z)(1-\sigma)$. Further, we can gain the consequence:

$$dz = \frac{\partial L}{\partial z} = \frac{\partial L}{\partial a} \cdot \frac{\partial a}{\partial z} \tag{1}$$

$$= (-\frac{y}{a} + \frac{1-y}{1-1} \cdot a(1-a) \tag{2}$$

$$= a - y \tag{3}$$

$$dw = \frac{\partial L(w,b)}{\partial w} = \frac{\partial L}{\partial z} \cdot \frac{\partial z}{\partial w} \tag{4}$$

$$= dz \cdot x \tag{5}$$

$$= x(a - y) \tag{6}$$

$$db = \frac{\partial L}{\partial b} = \frac{\partial L}{\partial z} \cdot \frac{\partial z}{\partial b} \tag{7}$$

$$= 1 \cdot dz \tag{8}$$

$$= a - y \tag{9}$$

1.3 Some uses of numpy [2]

1. Creat a vector:

```
x = np.array([...])
```

2. Call some frequently-used functions

```
np.exp(x)
np.log(x)
```

[2]The source of package "pythonhighlight":https://github.com/chenfeng123/latex-highlighting

3. Get the shape of matrices

```
x.shape[0] # the number of rows
x.shape[1] # the number of column
```

4. Change the dimension

```
x.reshape((row,col))
```

5. Count the length of each row

```
x_norm = np.linalg.norm(x, axis=1, keepdims =
                        True)
```

6. Matrix-matrix or matrix-vector multiplication

```
# matrix multiplication:
# x1.shape = (a, m), x2.shape = (m, b)
np.dot(x1,x2)
# multiply the elements in corresponding
                          locations
# x1.shape = (a, m), x2.shape = (a, m)
np.multiply(x1, x2)
```

7. Gain random numbers

   - Get one number

```
n = numpy.random.random()
```

- Get a matrix

```
n = numpy.random.random(size=(3, 2))
```

- Generate random numbers between 0 and 1

```
np.random.rand(2,3) # (2,3) show the
                            dimension
```

- Generate the same random numbers

```
'''
Set the same seed every time,
and we can get the same random numbers
'''
numpy.random.seed(num)
numpy.random.rand(the_length_of_the_array)
```