머신러닝을이용한재난설계 제출일 2022. 06. 03

201720970_권대한

X1 = 1.2 X2 = 5.9 X3 = 2.3 X4 = 0.2 Y = 13

각 입출력 데이터는 다음과 같으며, Hidden Node 1, 2, Output Node 1 의 Activation Function 이 각 Sigmoid, Hyperbolic Tangent, Leaky RELU 이다.

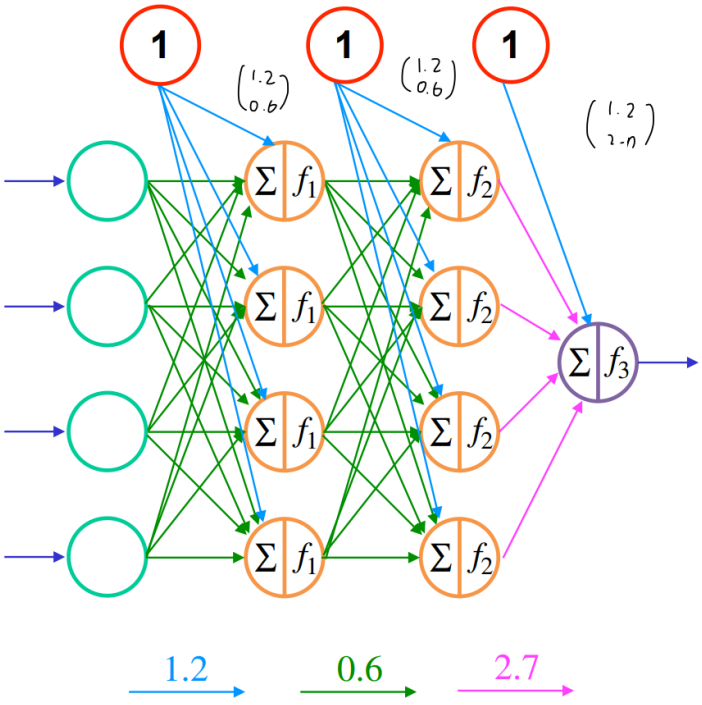
Feed Forward NN 의 Loss 값을 구하여라. (입력 데이터가 1 개이므로 y - y.hat 이 되겠다.)

	X_1	X_2	X_3	X_4	Y
⋮	⋮	⋮	⋮	⋮	⋮
k	1.2	5.9	2.3	0.2	13
⋮	⋮	⋮	⋮	⋮	⋮

sse

$$\text{Loss}(y_k, \hat{y}_k) = ?$$

$$f_1(z) = \frac{1}{1+e^{-z}}, \quad f_2(z) = \tanh(z), \quad f_3(z) = \max(0.1z, z)$$



<코드>

```
forward_exer1 <- function(x)
{
 f.1 <- function(z)
 {
   1 / (1 + exp(-z))
 }
 f.2 <- function(z)
 {
   tanh(z)
 }
 f.3 <- function(z)
 {
   pmax(0.1 * z, z)
 }
 a.0 <- x
 b.1 <- c(rep(1.2, 4)) %>% matrix(., nrow = 4)
 b.2 <- b.1
 b.3 <- 1.2
 w.1 <- c(rep(0.6, 16)) %>% matrix(., ncol = 4)
 w.2 <- w.1
 w.3 <- c(rep(2.7, 4)) %>% matrix(., ncol = 4)
 a.1 <- (b.1 + w.1 %*% a.0) %>% f.1 %>% `colnames<-`("a.1") %>% print(.)
 a.2 <- (b.2 + w.2 %*% a.1) %>% f.2 %>% `colnames<-`("a.2") %>% print(.)
 a.3 <- (b.3 + w.3 %*% a.2) %>% f.3 %>% `colnames<-`("a.3") %>% print(.)
 ((13 - a.3) / 1) %>% `colnames<-`("Loss") %>% print(.)
}
c(1.2, 5.9, 2.3, 0.2) %>% matrix(., nrow = 4) %>% forward_exer1
```

<출력 결과>

```
> forward_exer1 ← function(x)
+ {
+  f.1 ← function(z)
+  {
+    1 / (1 + exp(-z))
+  }
+  f.2 ← function(z)
+  {
+    tanh(z)
+  }
+  f.3 ← function(z)
+  {
+    pmax(0.1 * z, z)
+  }
+
+  a.0 ← x
+
+  b.1 ← c(rep(1.2, 4)) %>% matrix(., nrow = 4)
+  b.2 ← b.1
+  b.3 ← 1.2
+
+  w.1 ← c(rep(0.6, 16)) %>% matrix(., ncol = 4)
+  w.2 ← w.1
+  w.3 ← c(rep(2.7, 4)) %>% matrix(., ncol = 4)
+
+  a.1 ← (b.1 + w.1 %*% a.0) %>% f.1 %>% `colnames←`("a.1") %>% print(.)
+  a.2 ← (b.2 + w.2 %*% a.1) %>% f.2 %>% `colnames←`("a.2") %>% print(.)
+  a.3 ← (b.3 + w.3 %*% a.2) %>% f.3 %>% `colnames←`("a.3") %>% print(.)
+
+  ((13 - a.3) / 1) %>% `colnames←`("Loss") %>% print(.)
+
+ }
>
> c(1.2, 5.9, 2.3, 0.2) %>% matrix(., nrow = 4) %>% forward_exer1
           a.1
[1,] 0.9990518
[2,] 0.9990518
[3,] 0.9990518
[4,] 0.9990518
           a.2
[1,] 0.9985011
[2,] 0.9985011
[3,] 0.9985011
[4,] 0.9985011
          a.3
[1,] 11.98381
         Loss
[1,] 1.016188
```