12주차 과제

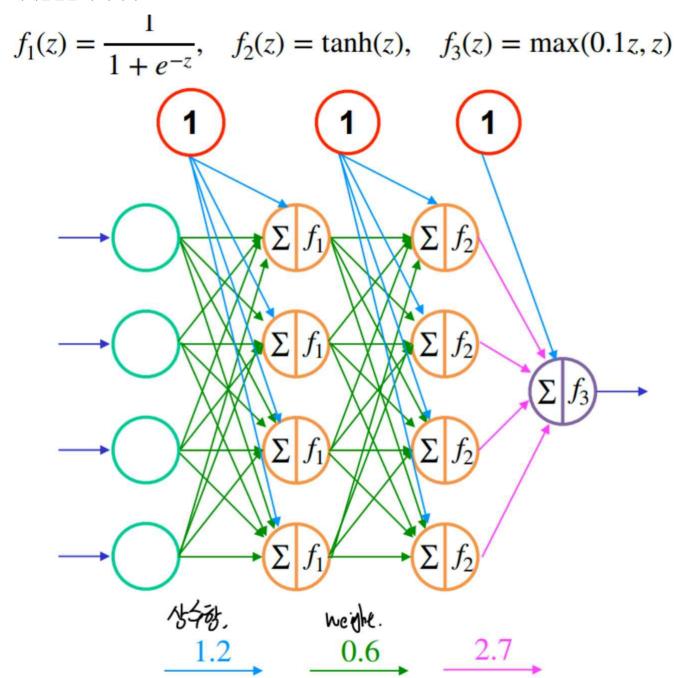|	
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X1 = 1.2 X2 = 5.9 X3 = 2.3 X4 = 0.2 Y = 13

각 입출력 데이터는 다음과 같으며, Hidden Node 1, 2, Output Node 1의 Activation Function은 각 Sigmoid, Hyperbolic Tangent, Leaky RELU이다.

오차제곱합을 구하여라.

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

<코드>

```r
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) %>% `colnames<-`("Loss") %>%   print
}
c(1.2, 5.9, 2.3, 0.2) %>% matrix(., nrow = 4) %>% forward_exer1
```

<출력결과>

```
> forward_exer1 ← function(x)
Warning message:
package 'ragg' is not available; using default graphics backend instead
+ {
+   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) %>% `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
```