

# Data

```
library(magrittr)
library(knitr)
library(pander)
library(ggplot2)
library(extrafont)
```

```
## Registering fonts with R
```

```
data(Titanic)
Titanic %>% str
```

```
## 'table' num [1:4, 1:2, 1:2, 1:2] 0 0 35 0 0 0 17 0 118 154 ...
## - attr(*, "dimnames")=List of 4
## ..$ Class : chr [1:4] "1st" "2nd" "3rd" "Crew"
## ..$ Sex : chr [1:2] "Male" "Female"
## ..$ Age : chr [1:2] "Child" "Adult"
## ..$ Survived: chr [1:2] "No" "Yes"
```

## Array

```
Titanic %>% ftable %>% as.matrix %>% kable(align = "c")
```

	No	Yes
1st_Male_Child	0	5
1st_Male_Adult	118	57
1st_Female_Child	0	1
1st_Female_Adult	4	140
2nd_Male_Child	0	11
2nd_Male_Adult	154	14
2nd_Female_Child	0	13
2nd_Female_Adult	13	80
3rd_Male_Child	35	13
3rd_Male_Adult	387	75
3rd_Female_Child	17	14
3rd_Female_Adult	89	76
Crew_Male_Child	0	0
Crew_Male_Adult	670	192
Crew_Female_Child	0	0

	No	Yes
Crew_Female_Adult	3	20

```
Titanic %>% apply(MARGIN = 1, FUN = sum) %>% as.matrix %>% t %>% kable(align = "c")
```

1st	2nd	3rd	Crew
325	285	706	885

```
Titanic %>% apply(MARGIN = 2, FUN = sum) %>% as.matrix %>% t %>% kable(align = "c")
```

Male	Female
1731	470

```
Titanic %>% apply(MARGIN = 3, FUN = sum) %>% as.matrix %>% t %>% kable(align = "c")
```

Child	Adult
109	2092

```
Titanic %>% apply(MARGIN = 4, FUN = sum) %>% as.matrix %>% t %>% kable(align = "c")
```

No	Yes
1490	711

```
Titanic %>%  
  apply(MARGIN = 1:2, FUN = sum)
```

##	Sex		
##	Class	Male	Female
##	1st	180	145
##	2nd	179	106
##	3rd	510	196
##	Crew	862	23

```
Titanic %>%  
  apply(MARGIN = 2:1, FUN = sum)
```

##	Class				
##	Sex	1st	2nd	3rd	Crew
##	Male	180	179	510	862
##	Female	145	106	196	23

```
Titanic %>%  
  apply(MARGIN = c(3, 1), FUN = sum)
```

```
##          Class
## Age      1st 2nd 3rd Crew
## Child    6  24  79    0
## Adult  319 261 627  885
```

```
Surv_Class <- Titanic %>%
  apply(MARGIN = c(4, 1), FUN = sum)
```

## Proportions

```
options(digits = 3)
#> Titanic %>%
#>   apply(MARGIN = c(4, 1), FUN = sum) %>%
Surv_Class %>%
  prop.table(margin = 2) %>%
  `*`(100) %>%
  rbind(., "Sum" = colSums(.))
```

```
##          1st   2nd   3rd Crew
## No      37.5  58.6  74.8   76
## Yes     62.5  41.4  25.2   24
## Sum    100.0 100.0 100.0  100
```

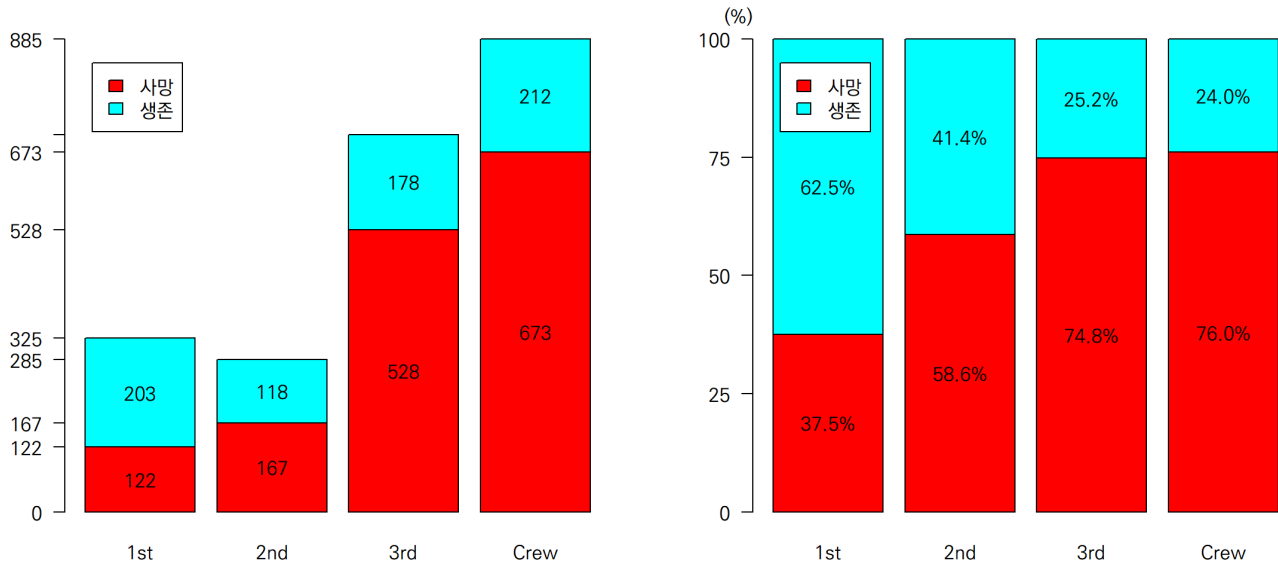
## Plots

```

par(mfrow = c(1, 2), family = "KoPubWorldDotum Medium")
#> Titanic %>%
#>   apply(MARGIN = c(4, 1), FUN = sum)
pos <- function(x){
  cumsum(x) - x / 2
}
pos <- . %>% {`-`(cumsum(.), . / 2)}
b1 <- Surv_Class %>%
  barplot(yaxt = "n", col = rainbow(2))
axis(side = 2,
      at = Surv_Class %>%
        apply(MARGIN = 2, FUN = cumsum) %>% c(0, .),
        labels = Surv_Class %>%
          apply(MARGIN = 2, FUN = cumsum) %>% c(0, .),
        las = 2)
y1_text <- apply(Surv_Class,
                 MARGIN = 2,
                 FUN = pos)
# y1_text <- c(Surv_Class[1, ] / 2, Surv_Class[1, ] + Surv_Class[2, ] / 2)
# text(x = rep(b1, times = 2),
#      y = y1_text,
#      labels = c(Surv_Class[1, ], Surv_Class[2, ]))
text(x = rep(b1, each = 2),
     y = y1_text,
     labels = Surv_Class)
legend("topleft", inset = 0.05, fill = rainbow(2), legend = c("사망", "생존"))
#> Titanic %>%
#>   apply(c(4, 1), sum)
p1 <- Surv_Class %>%
  prop.table(margin = 2)
b1_p <- p1 %>%
  barplot(yaxt = "n", col = rainbow(2))
axis(side = 2,
      at = seq(0, 1, by = 0.25),
      labels = seq(0, 100, by = 25),
      las = 2)
mtext("("%", side = 2, at = 1.05, line = 0, las = 2)
p1_text <- apply(p1,
                 MARGIN = 2,
                 FUN = pos)
# p1_text <- c(p1[1, ] / 2, p1[1, ] + p1[2, ] / 2)
text(x = b1_p %>%
      rep(each = 2),
      y = p1_text,
      labels = p1 %>%
        `*(100) %>%
        format(digits = 2, nsmall = 1) %>%
        paste0("%"))
legend("topleft", inset = 0.05, fill = rainbow(2), legend = c("사망", "생존"))
title(main = "객실 등급별 생존/사망", line = -1, outer = TRUE, cex.main = 1.5,
      family = "KoPubWorldDotum Bold")

```

## 객실 등급별 생존/사망



```
dev.copy(png, "../pics/Titanic_barplot01.png", width = 840, height = 420)
```

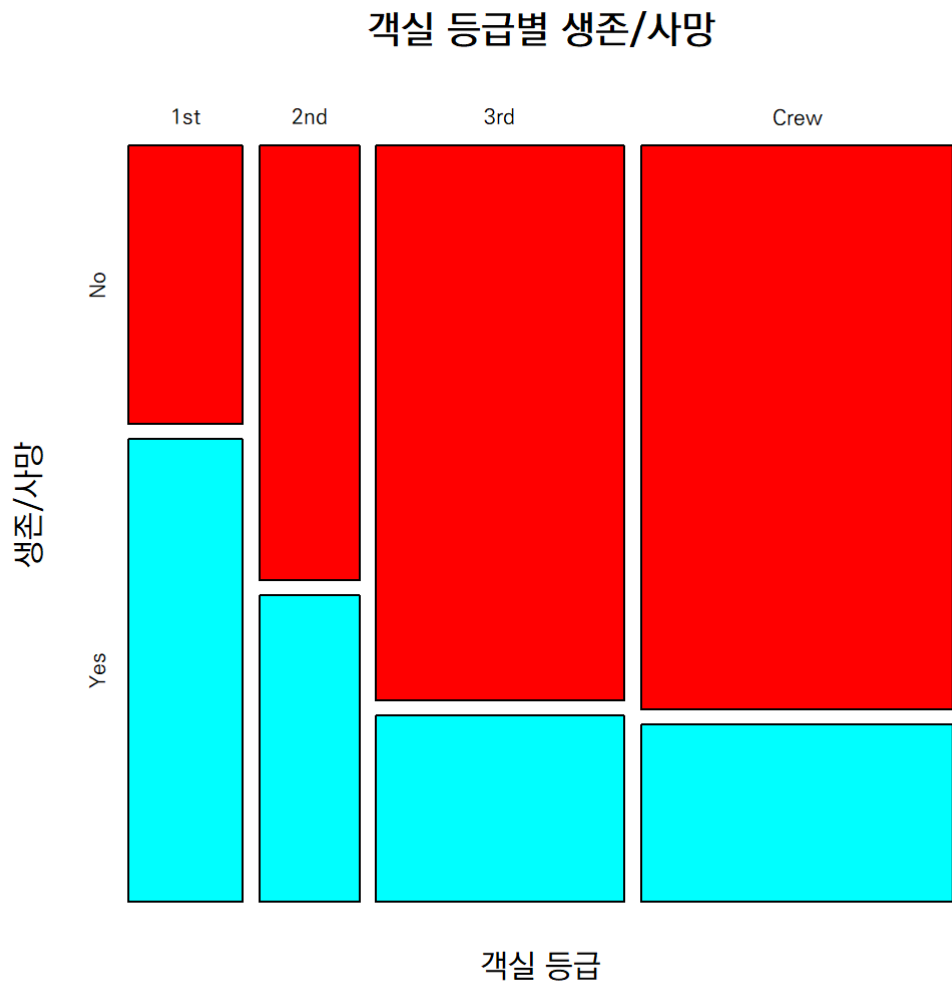
```
## png
## 3
```

```
dev.off()
```

```
## png
## 2
```

## Mosaic Plot

```
par(mfrow = c(1, 1), family = "KoPubWorldDotum Medium")
mosaicplot(t(Surv_Class), main = "객실 등급별 생존/사망",
            xlab = "객실 등급", ylab = "생존/사망",
            col = rainbow(2))
```



```
dev.copy(png, "../pics/Titanic_mosaicplot01.png", width = 320, height = 320)
```

```
## png
## 3
```

```
dev.off()
```

```
## png
## 2
```

## 성별 생존/사망

```
Titanic %>% apply(MARGIN = 2:3, FUN = sum)
```

```
##           Age
## Sex      Child Adult
## Male      64  1667
## Female    45   425
```

```
Titanic %>% apply(MARGIN = c(2,4), FUN = sum)
```

```
##           Survived
## Sex           No Yes
##   Male    1364 367
##   Female    126 344
```

```
Surv_Sex <- Titanic %>%
  apply(MARGIN = c(4,2), FUN = sum)
```

```
Surv_Sex %>%
  prop.table(margin = 2) %>%
  `*`(100) %>%
  rbind(., "Sum" = colSums(.))
```

```
##           Male Female
## No      78.8   26.8
## Yes     21.2   73.2
## Sum    100.0  100.0
```

## Plots

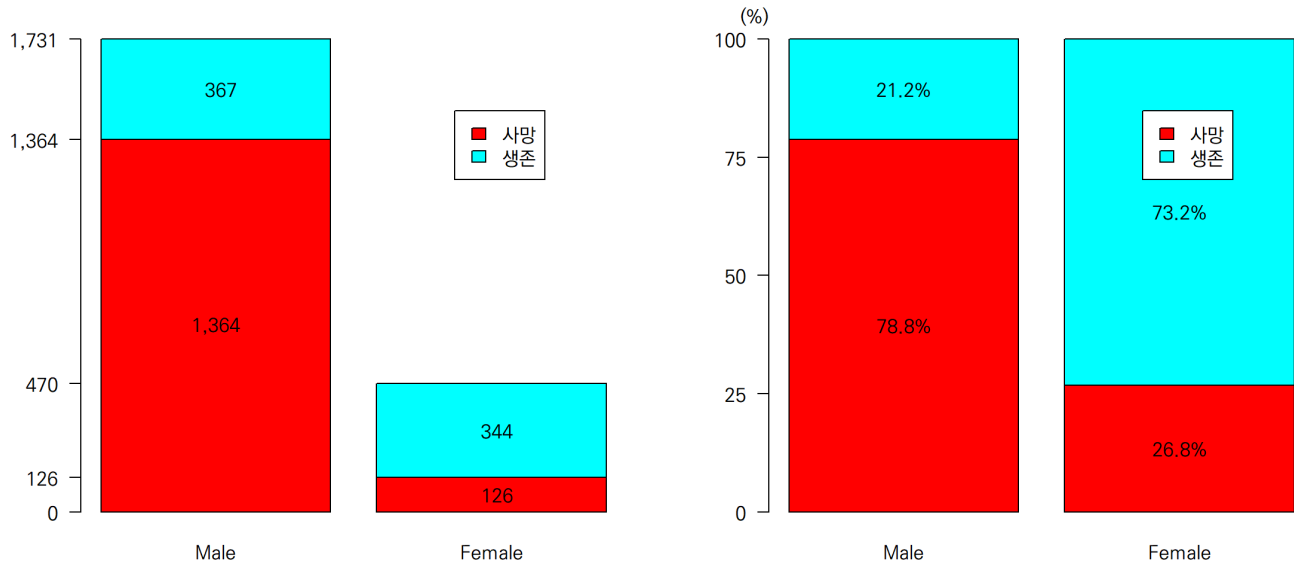
```

par(mfrow = c(1, 2), family = "KoPubWorldDotum Medium")
b2 <- Surv_Sex %>%
  barplot(yaxt = "n", col = rainbow(2))
axis(side = 2,
      at = Surv_Sex %>%
        apply(MARGIN = 2, FUN = cumsum) %>% c(0, .),
      labels = Surv_Sex %>%
        apply(MARGIN = 2, FUN = cumsum) %>% c(0, .) %>%
        format(big.mark = ","),
      las = 2)
# y2_text <- c(Surv_Sex[1, ] / 2, Surv_Sex[1, ] + Surv_Sex[2, ] / 2)
y2_text <- apply(Surv_Sex,
                 MARGIN = 2,
                 FUN = pos)
text(x = rep(b2, each = 2),
     y = y2_text,
     labels = Surv_Sex %>%
       format(big.mark = ","))
legend("topright", inset = 0.15, fill = rainbow(2), legend = c("사망", "생존"))
p2 <- Surv_Sex %>%
  prop.table(margin = 2)
b2_p <- p2 %>%
  barplot(yaxt = "n", col = rainbow(2))
axis(side = 2,
      at = seq(0, 1, by = 0.25),
      labels = seq(0, 100, by = 25),
      las = 2)
mtext("(%)", side = 2, at = 1.05, line = 0, las = 2)
# p2_text <- c(p2[1, ] / 2, p2[1, ] + p2[2, ] / 2)
p2_text <- apply(p2,
                 MARGIN = 2,
                 FUN = pos)
text(x = b2_p %>%
      rep(each = 2),
     y = p2_text,
     labels = p2 %>%
       `*`(100) %>%
       format(digits = 2, nsmall = 1) %>%
       paste0("%"))
legend("topright", inset = 0.15, fill = rainbow(2), legend = c("사망", "생존"))
title(main = "성별 생존/사망", line = -1, outer = TRUE, cex.main = 1.5,
      family = "KoPubWorldDotum Bold")

```



## 성별 생존/사망



```
dev.copy(png, "../pics/Titanic_barplot02.png", width = 840, height = 420)
```

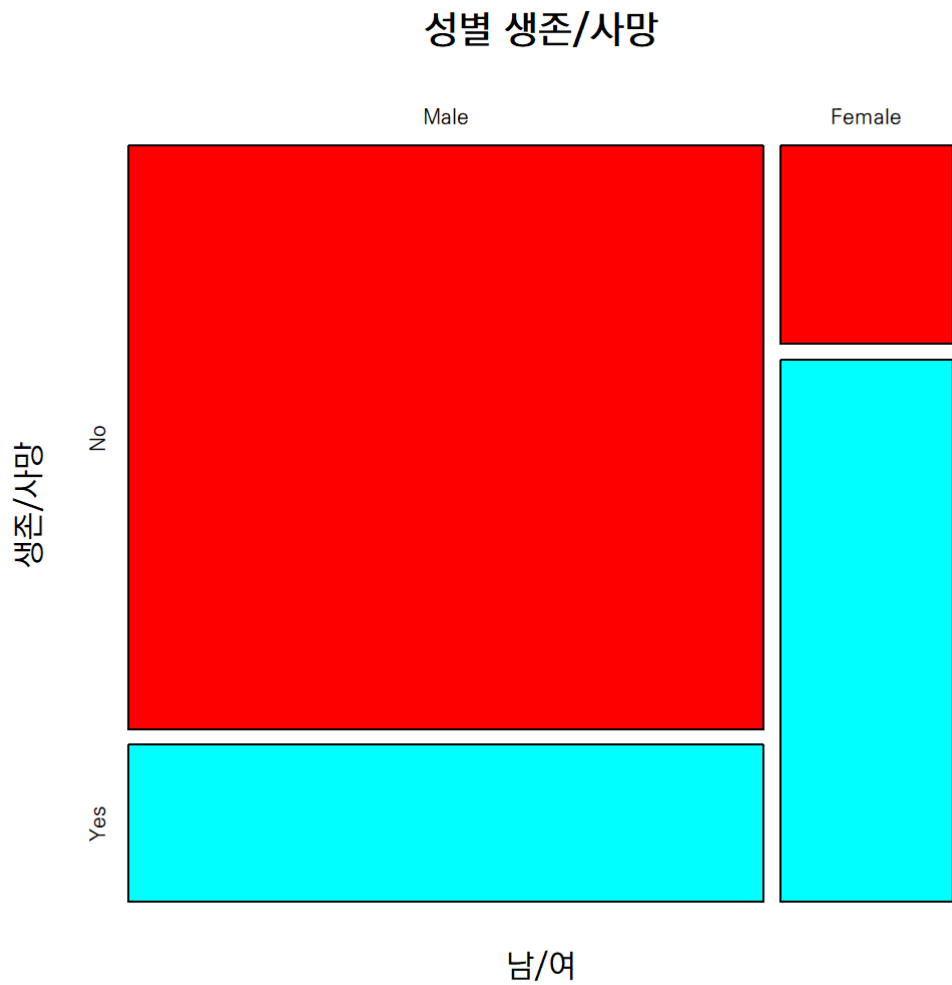
```
## png
## 3
```

```
dev.off()
```

```
## png
## 2
```

## Mosaic Plot

```
par(mfrow = c(1, 1), family = "KoPubWorldDotum Medium")
mosaicplot(t(Surv_Sex), main = "성별 생존/사망",
            xlab = "남/여", ylab = "생존/사망",
            col = rainbow(2))
```



```
dev.copy(png, "../pics/Titanic_mosaicplot02.png", width = 320, height = 320)
```

```
## png
## 3
```

```
dev.off()
```

```
## png
## 2
```

### 연령별 생존/사망

```
Surv_Age <- Titanic %>%
  apply(MARGIN = 4:3, FUN = sum)
```

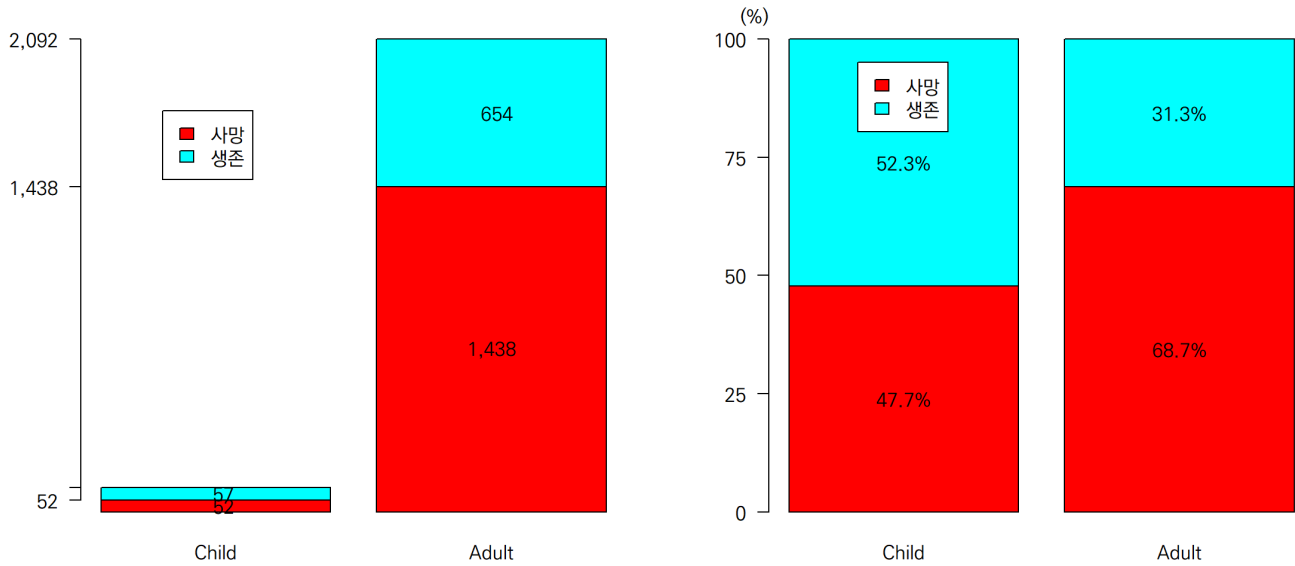
```
Surv_Age %>%
  prop.table(margin = 2) %>%
  `*`(100) %>%
  rbind(., "Sum" = colSums(.))
```

```
##      Child Adult
## No   47.7   68.7
## Yes  52.3   31.3
## Sum 100.0 100.0
```

## Plots

```
par(mfrow = c(1, 2), family = "KoPubWorldDotum Medium")
b3 <- Surv_Age %>%
  barplot(yaxt = "n", col = rainbow(2))
axis(side = 2,
      at = Surv_Age %>%
        apply(MARGIN = 2, FUN = cumsum) %>% c,
      labels = Surv_Age %>%
        apply(MARGIN = 2, FUN = cumsum) %>% c %>%
        format(big.mark = ",", ),
      las = 2)
# y3_text <- c(Surv_Age[1, ] / 2, Surv_Age[1, ] + Surv_Age[2, ] / 2)
y3_text <- apply(Surv_Age,
                 MARGIN = 2,
                 FUN = pos)
text(x = rep(b3, each = 2),
     y = y3_text,
     labels = Surv_Age %>%
       format(big.mark = ",", ))
legend("topleft", inset = 0.15, fill = rainbow(2), legend = c("사망", "생존"))
p3 <- Surv_Age %>%
  prop.table(margin = 2)
b3_p <- p3 %>%
  barplot(yaxt = "n", col = rainbow(2))
axis(side = 2,
      at = seq(0, 1, by = 0.25),
      labels = seq(0, 100, by = 25),
      las = 2)
mtext("("%", side = 2, at = 1.05, line = 0, las = 2)
# p3_text <- c(p3[1, ] / 2, p3[1, ] + p3[2, ] / 2)
p3_text <- apply(p3,
                 MARGIN = 2,
                 FUN = pos)
text(x = b3_p %>%
      rep(each = 2),
     y = p3_text,
     labels = p3 %>%
       `*`(100) %>%
       format(digits = 2, nsmall = 1) %>%
       paste0("%"))
legend(x = 0.5, y = 0.95, fill = rainbow(2), legend = c("사망", "생존"))
title(main = "연령별 생존/사망", line = -1, outer = TRUE, cex.main = 1.5,
      family = "KoPubWorldDotum Bold")
```

## 연령별 생존/사망



```
dev.copy(png, "../pics/Titanic_barplot03.png", width = 840, height = 420)
```

```
## png
## 3
```

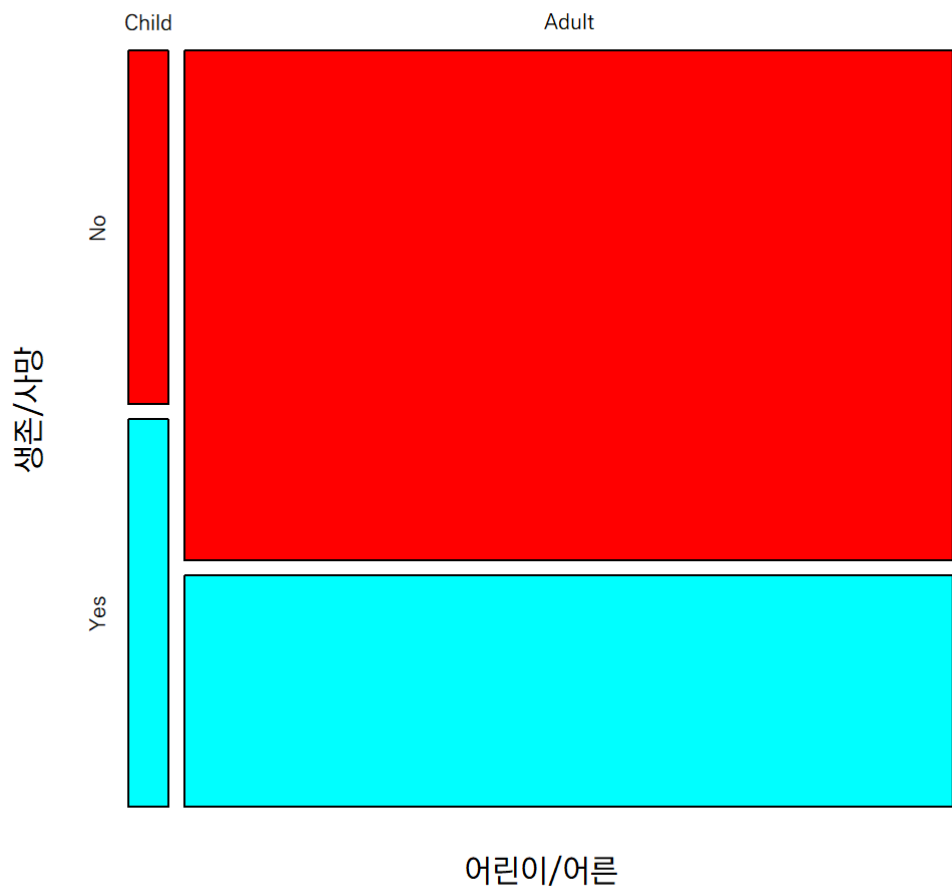
```
dev.off()
```

```
## png
## 2
```

## Mosaic Plot

```
par(mfrow = c(1, 1), family = "KoPubWorldDotum Medium")
mosaicplot(t(Surv_Age), main = "연령별 생존/사망",
            xlab = "어린이/어른", ylab = "생존/사망",
            col = rainbow(2))
```

연령별 생존/사망



```
dev.copy(png, "../pics/Titanic_mosaicplot03.png", width = 320, height = 320)
```

```
## png
## 3
```

```
dev.off()
```

```
## png
## 2
```

어린이들의 객실 등급별 생존/사망

```
Child_df <- Titanic %>%  
  as.data.frame %>%  
  subset(Age == "Child")  
Adult_df <- Titanic %>%  
  as.data.frame %>%  
  subset(Age == "Adult")  
Child_Class <- Child_df %>%  
  xtabs(Freq ~ Survived + Class, data = ., drop.unused.levels = TRUE)  
Child_Class %>%  
  prop.table(margin = 2) %>%  
  `*`(100) %>%  
  rbind(., "Sum" = colSums(.))
```

```
##      1st 2nd   3rd Crew  
## No      0   0  65.8  NaN  
## Yes  100 100  34.2  NaN  
## Sum  100 100 100.0  NaN
```

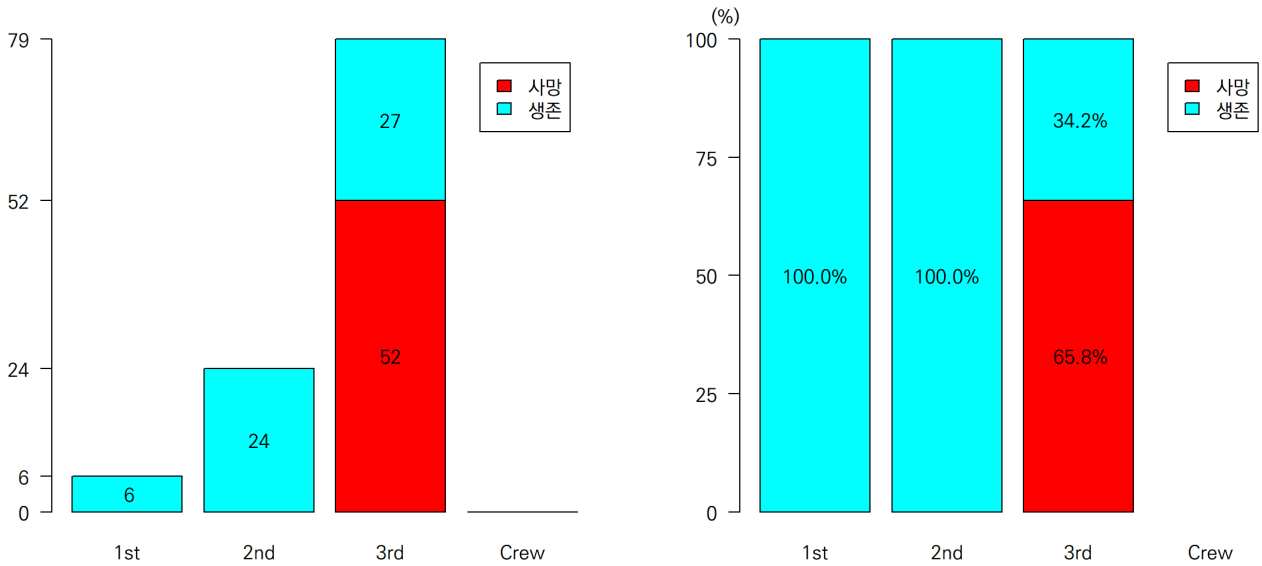
## Plots

```

par(mfrow = c(1, 2), family = "KoPubWorldDotum Medium")
b4 <- Child_Class %>%
  barplot(yaxt = "n", col = rainbow(2))
axis(side = 2,
      at = Child_Class %>%
        apply(MARGIN = 2, FUN = cumsum) %>% c(0, .),
      labels = Child_Class %>%
        apply(MARGIN = 2, FUN = cumsum) %>% c(0, .) %>%
        format(big.mark = ","),
      las = 2)
# y4_text <- c(Child_Class[1, ] / 2, Child_Class[1, ] + Child_Class[2, ] / 2)
y4_text <- apply(Child_Class,
                 MARGIN = 2,
                 FUN = pos)
y4_text[c(1, 3, 7, 8)] <- NA
text(x = rep(b4, each = 2),
     y = y4_text,
     labels = Child_Class %>%
       format(big.mark = ","))
legend("topright", inset = 0.05, fill = rainbow(2), legend = c("사망", "생존"))
p4 <- Child_Class %>%
  prop.table(margin = 2)
b4_p <- p4 %>%
  barplot(yaxt = "n", col = rainbow(2))
axis(side = 2,
      at = seq(0, 1, by = 0.25),
      labels = seq(0, 100, by = 25),
      las = 2)
mtext("(%)", side = 2, at = 1.05, line = 0, las = 2)
# p4_text <- c(p4[1, ] / 2, p4[1, ] + p4[2, ] / 2)
p4_text <- apply(p4,
                 MARGIN = 2,
                 FUN = pos)
p4_text[c(1, 3)] <- NA
text(x = b4_p %>%
      rep(each = 2),
     y = p4_text,
     labels = p4 %>%
       `*`(100) %>%
       format(digits = 2, nsmall = 1) %>%
       paste0("%"))
legend("topright", inset = 0.05, fill = rainbow(2), legend = c("사망", "생존"))
title(main = "어린이들의 객실 등급별 생존/사망", line = -1, outer = TRUE, cex.main = 1.5,
      family = "KoPubWorldDotum Bold")

```

## 어린이들의 객실 등급별 생존/사망



```
dev.copy(png, "../pics/Titanic_barplot04.png", width = 840, height = 420)
```

```
## png
## 3
```

```
dev.off()
```

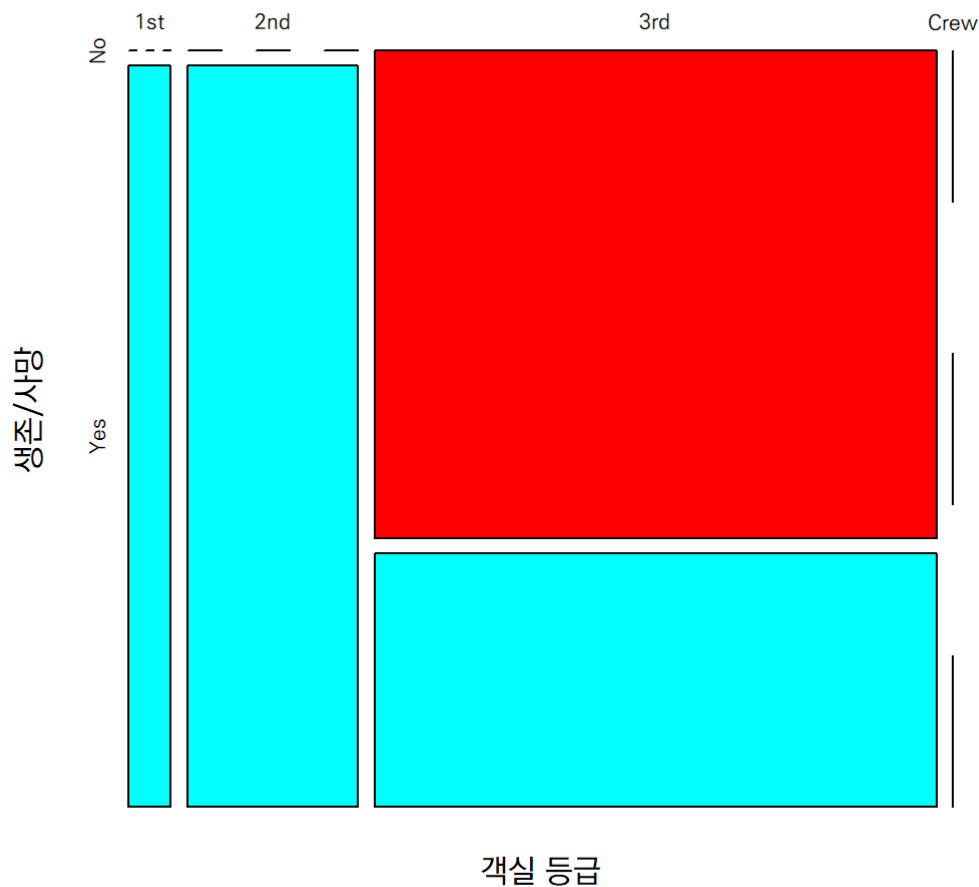
```
## png
## 2
```

## Mosaic Plot

```
par(mfrow = c(1, 1), family = "KoPubWorldDotum Medium")
mosaicplot(t(Child_Class), main = "어린이들의 객실 등급별 생존/사망",
           xlab = "객실 등급", ylab = "생존/사망",
           col = rainbow(2))
```



어린이들의 객실 등급별 생존/사망



```
dev.copy(png, "../pics/Titanic_mosaicplot04.png", width = 320, height = 320)
```

```
## png
## 3
```

```
dev.off()
```

```
## png
## 2
```

여성들의 등급별 생존/사망

```
Female_df <- Titanic %>%
  as.data.frame %>%
  subset(Sex == "Female")
Male_df <- Titanic %>%
  as.data.frame %>%
  subset(Sex == "Male")
Female_Class <- Female_df %>%
  xtabs(Freq ~ Survived + Class, data = ., drop.unused.levels = TRUE)
Female_Class %>%
  prop.table(margin = 2) %>%
  `*`(100) %>%
  rbind(., "Sum" = colSums(.))
```

```
##      1st   2nd   3rd Crew
## No    2.76  12.3  54.1   13
## Yes  97.24  87.7  45.9   87
## Sum 100.00 100.0 100.0  100
```

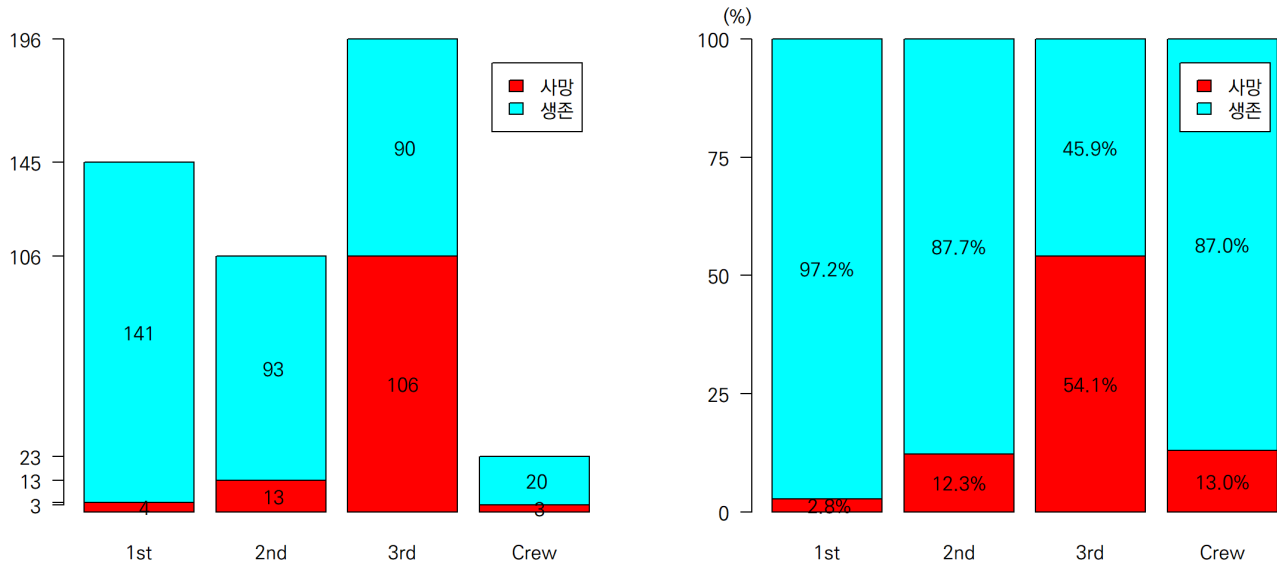
## Plots

```

par(mfrow = c(1, 2), family = "KoPubWorldDotum Medium")
b5 <- Female_Class %>%
  barplot(yaxt = "n", col = rainbow(2))
axis(side = 2,
      at = Female_Class %>%
        apply(MARGIN = 2, FUN = cumsum) %>% c,
      labels = Female_Class %>%
        apply(MARGIN = 2, FUN = cumsum) %>% c %>%
        format(big.mark = ","),
      las = 2)
# y5_text <- c(Female_Class[1, ] / 2, Female_Class[1, ] + Female_Class[2, ] / 2)
y5_text <- apply(Female_Class,
                 MARGIN = 2,
                 FUN = pos)
#> y5_text[c(1:2, 4, 8)] <- NA
text(x = rep(b5, each = 2),
     y = y5_text,
     labels = Female_Class %>%
       format(big.mark = ","))
legend("topright", inset = 0.05, fill = rainbow(2), legend = c("사망", "생존"))
p5 <- Female_Class %>%
  prop.table(margin = 2)
b5_p <- p5 %>%
  barplot(yaxt = "n", col = rainbow(2))
axis(side = 2,
      at = seq(0, 1, by = 0.25),
      labels = seq(0, 100, by = 25),
      las = 2)
mtext("(%)", side = 2, at = 1.05, line = 0, las = 2)
# p5_text <- c(p5[1, ] / 2, p5[1, ] + p5[2, ] / 2)
p5_text <- apply(p5,
                 MARGIN = 2,
                 FUN = pos)
#> p5_text[1:2] <- NA
text(x = b5_p %>%
      rep(each = 2),
     y = p5_text,
     labels = p5 %>%
       `*`(100) %>%
       format(digits = 2, nsmall = 1) %>%
       paste0("%"))
legend("topright", inset = 0.05, fill = rainbow(2), legend = c("사망", "생존"))
title(main = "여성들의 객실 등급별 생존/사망", line = -1, outer = TRUE, cex.main = 1.5,
      family = "KoPubWorldDotum Bold")

```

## 여성들의 객실 등급별 생존/사망



```
dev.copy(png, "../pics/Titanic_barplot05.png", width = 840, height = 420)
```

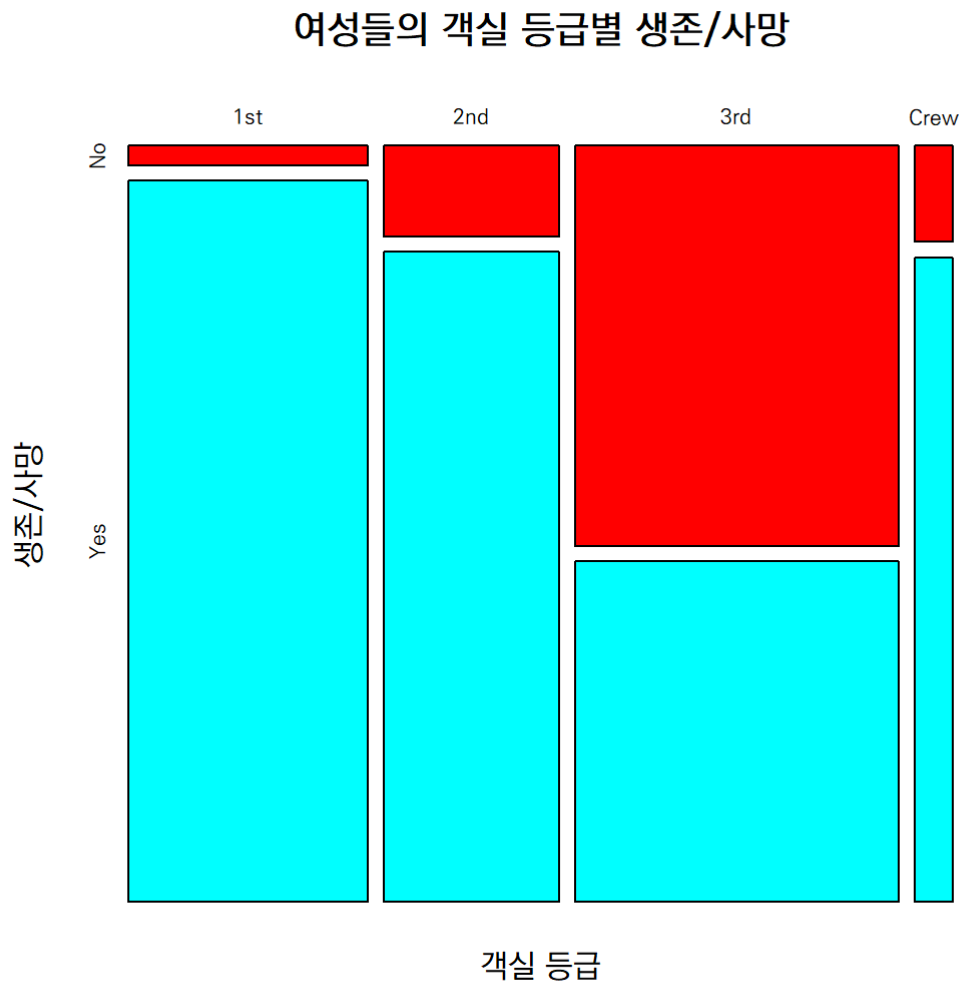
```
## png
## 3
```

```
dev.off()
```

```
## png
## 2
```

## Mosaic Plot

```
par(mfrow = c(1, 1), family = "KoPubWorldDotum Medium")
mosaicplot(t(Female_Class),
            main = "여성들의 객실 등급별 생존/사망", xlab = "객실 등급", ylab = "생존/사망",
            col = rainbow(2))
```



```
dev.copy(png, "../pics/Titanic_mosaicplot05.png", width = 320, height = 320)
```

```
## png
## 3
```

```
dev.off()
```

```
## png
## 2
```

Save