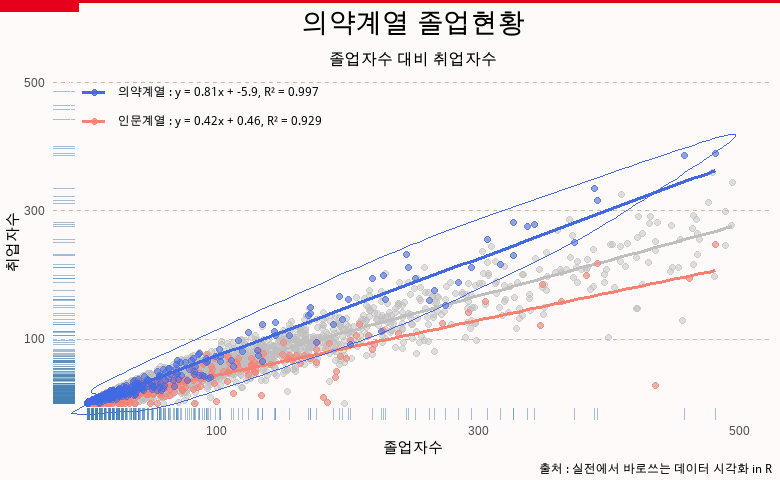
1. 실전 시각화

# 비교 그룹간 분포 비교와 회귀 방정식 표기

1. 목표 : 비교의 대상이 되는 두 개의 그룹에 대한 산점도와 추세선을 각각 그리고 추세선의 선형회귀 방정식을 표현하여 각각의 그룹의 분포를 서로 비교하고 통계적 유의성을 전달  
   활용 시각화 : 산점도, 회귀선, 클러스터 산점도, 러그 플롯, 선형회귀

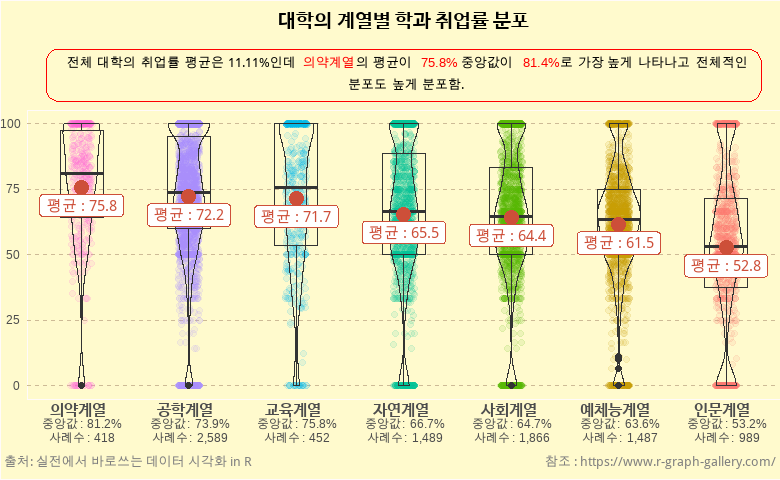
library(grid)  
library(ggalt)  
  
df\_의약 <- df\_취업통계 |> filter(대계열 == '의약계열')  
df\_인문 <- df\_취업통계 |> filter(대계열 == '인문계열')  
  
model\_lm\_의약 <- lm(df\_의약$취업자\_합계\_계 ~ df\_의약$졸업자\_계)  
model\_lm\_인문 <- lm(df\_인문$취업자\_합계\_계 ~ df\_인문$졸업자\_계)  
  
glance\_의약 <- broom::glance(model\_lm\_의약)  
glance\_인문 <- broom::glance(model\_lm\_인문)  
  
tidy\_의약 <- broom::tidy(model\_lm\_의약)  
tidy\_인문 <- broom::tidy(model\_lm\_인문)  
  
equ\_의약 <- paste0('의약계열 : y = ', round(tidy\_의약$estimate[2], 2), 'x + ', round(tidy\_의약$estimate[1], 2), ', R\u00B2', ' = ',round(glance\_의약$r.squared, 3))  
  
equ\_인문 <- paste0('인문계열 : y = ', round(tidy\_인문$estimate[2], 2), 'x + ', round(tidy\_인문$estimate[1], 2), ', R\u00B2', ' = ',round(glance\_인문$r.squared, 3))  
  
df\_취업통계 |>   
 ggplot() +  
 ## X축이 졸업자\_계, Y축이 취업자\_합계\_계에 매핑된 geom\_point 레이어 생성  
 geom\_point(aes(x = 졸업자\_계, y = 취업자\_합계\_계), color = 'grey75', alpha = 0.5) +   
 geom\_smooth(aes(x = 졸업자\_계, y = 취업자\_합계\_계), color = 'grey75', se = F, method = 'lm') +   
 geom\_point(data = df\_인문,  
 aes(x = 졸업자\_계, y = 취업자\_합계\_계, color = '인문계열'), alpha = 0.5) +   
 geom\_smooth(data = df\_인문,  
 aes(x = 졸업자\_계, y = 취업자\_합계\_계, color = '인문계열'), se = F, method = 'lm') +   
 geom\_point(data = df\_의약,  
 aes(x = 졸업자\_계, y = 취업자\_합계\_계, color = '의약계열'), alpha = 0.5) +   
 geom\_smooth(data = df\_의약,  
 aes(x = 졸업자\_계, y = 취업자\_합계\_계, color = '의약계열'), se = F, method = 'lm') +   
 geom\_encircle(data = df\_의약,   
 aes(x = 졸업자\_계, y = 취업자\_합계\_계, color='의약계열')) +   
 geom\_rug(data = df\_의약,  
 aes(x = 졸업자\_계, y = 취업자\_합계\_계), col= "steelblue", alpha=0.5) +   
 ## X축과 Y축의 범위를 설정  
 labs(title = '의약계열 졸업현황', x = '졸업자수', y = '취업자수', subtitle = '졸업자수 대비 취업자수', caption = '출처 : 실전에서 바로쓰는 데이터 시각화 in R') +  
 scale\_x\_continuous(breaks = c(100, 300, 500), labels = c(100, 300, 500), limits = c(0, 500)) +   
 scale\_y\_continuous(breaks = c(100, 300, 500), labels = c(100, 300, 500), limits = c(0, 500)) +   
 scale\_color\_manual(name = NULL, values = c('의약계열' = '#4169E1', '인문계열' = '#FA8072'),   
 labels = c(equ\_의약, equ\_인문)) +  
 theme(strip.text.x = element\_blank(),  
 strip.background = element\_rect(colour="white", fill="white"),  
 legend.position=c(.2,.9),   
 legend.background = element\_rect(fill = NA),   
 legend.key = element\_rect(fill = NA),   
 plot.title = element\_text(size = 20, family = 'NanumBarunGothicBold'),  
 plot.subtitle = element\_text(vjust = 0.5, size = 12, family = 'NanumBarunGothic'),  
 axis.line = element\_blank(),   
 plot.background = element\_rect(fill = '#FFFAFA'),   
 panel.background = element\_rect(fill = '#FFFAFA'),   
 plot.margin = margin(0.025, 0.01, 0.01, 0.01, "npc")  
 )  
  
grid.lines(  
 x = c(0, 1),  
 y = 1,  
 gp = gpar(col = "#e5001c", lwd = 4)  
)  
  
grid.rect(  
 x = 0,  
 y = 1,  
 width = 0.1,  
 height = 0.025,  
 just = c("left", "top"),  
 gp = gpar(fill = "#e5001c", col = "#e5001c", lwd = 0)  
)



# 전체 그룹의 비교 시각화와 설명문 삽입

1. 목표 : 전체 데이터의 그룹별 분포와 기술 통계를 시각화하여 전달하고 시각화를 통해 전달하고자 하는 인사이트를 삽입 활용 시각화 : 박스 플롯, 바이올린 플롯, 산점도(jitter)

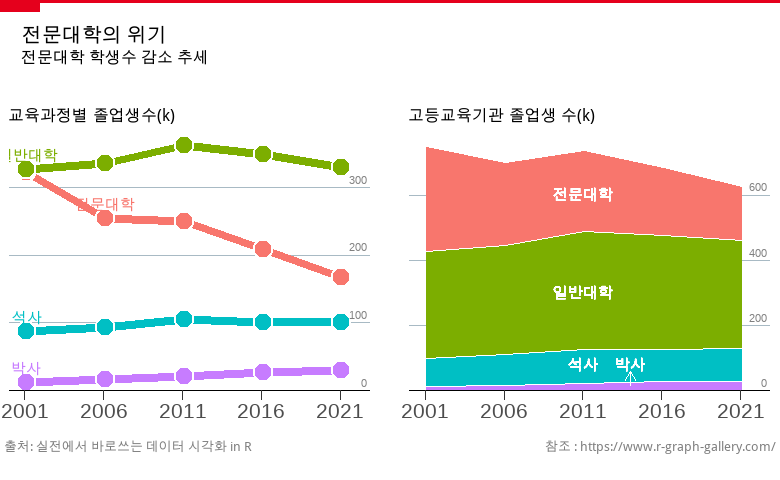
library(ggtext)  
font\_add('NanumBarunGothicBold', 'c:/windows/fonts/NanumBarunGothicBold.ttf')  
  
font\_add('NanumBarunGothic', 'c:/windows/fonts/NanumBarunGothic.ttf')  
  
df\_전체\_요약 <- df\_취업통계 |>  
 summarise(mean = mean(취업률\_계), median = median(취업률\_계), n = n())  
  
subtitle <- paste0('전체 사례수 : ', scales::comma(df\_전체\_요약$n, accuracy = 1))  
  
df\_계열\_요약 <- df\_취업통계 |>  
 group\_by(대계열) |>  
 summarise(median = median(취업률\_계), n = n())  
  
labels <- paste0('<span style= "font-family: NanumBarunGothicBold;font-size: 12pt" >', df\_계열\_요약$대계열, '</span> <br>', '중앙값 : ', scales::percent(df\_계열\_요약$median, scale = 1), '<br>', '사례수 : ', scales::comma(df\_계열\_요약$n, accuracy = 1))  
  
labels\_name <- pull(df\_계열\_요약, 대계열)  
  
title <- "<b><span style= 'font-family: NanumBarunGothicBold;font-size: 15pt'>대학의 계열별 학과 취업률 분포</b>"  
  
subtitle <- "<span style = 'font-size:10pt'>전체 대학의 취업률 평균은 11.11%인데 <span style = 'color:red;'>의약계열</span>의 평균이 <span style = 'color:red;'> 75.8%</span> 중앙값이 <span style = 'color:red;'> 81.4%</span>로 가장 높게 나타나고 전체적인 분포도 높게 분포함.</span>"  
  
df\_취업통계$대계열 = reorder(df\_취업통계$대계열, df\_취업통계$취업률\_계, mean)  
  
df\_취업통계 |>  
 ggplot(aes(x = 대계열, y = 취업률\_계)) +  
 geom\_jitter(aes(color = 대계열), width = 0.1, alpha = 0.1, show.legend = F) +  
 geom\_boxplot(fill = NA, width = 0.4) +  
 geom\_violin(fill = NA, width = 0.4) +  
 geom\_point(aes(x = 대계열, y = 취업률\_계), stat = 'summary', fun.y = 'mean', color = 'tomato3', size = 4) +  
 geom\_label(aes(x = 대계열, y = 취업률\_계, label = paste0('평균 : ', round(..y.., 1))), stat = 'summary', fun.y = 'mean', color = 'tomato3', size = 4, nudge\_y = -7) +   
 labs(title = title, x = NULL, y = NULL, subtitle = subtitle) +  
 scale\_x\_discrete(expand = expansion(add = c(0.5, 0.5)), labels = setNames(labels, labels\_name), limits = rev) +  
 theme(strip.text.x = element\_blank(),  
 strip.background = element\_rect(colour="white", fill="white"),  
 legend.position=c(.2,.9),   
 legend.background = element\_rect(fill = NA),   
 legend.key = element\_rect(fill = NA),   
 plot.title = element\_textbox\_simple(halign = 0.5),  
 plot.subtitle = element\_textbox\_simple(width = unit(0.95, "npc"), size = 13,  
 lineheight = 1,  
 padding = margin(5.5, 0.5, 5.5, 5.5),  
 margin = margin(10, 0, 5.5, 0),  
 halign = 0.5,   
 box.color = 'red',  
 r = grid::unit(8, "pt"),  
 linetype = 1),  
 axis.line = element\_blank(),   
 plot.background = element\_rect(fill = 'lemonchiffon'),   
 panel.background = element\_rect(fill = 'lemonchiffon'),   
 axis.text.x = element\_markdown(),   
 plot.margin = margin(0.025, 0, 0.075, 0, "npc"),  
 )  
  
  
grid.text(  
 '출처: 실전에서 바로쓰는 데이터 시각화 in R',   
 x = 0.005,   
 y = 0.03,   
 just = c("left", "bottom"),  
 gp = gpar(  
 col = "grey50",  
 fontsize = 10,  
 fontfamily = "Econ Sans Cnd"  
 )  
)  
  
# Add third caption  
grid.text(  
 "참조 : https://www.r-graph-gallery.com/",   
 x = 0.995,   
 y = 0.03,   
 just = c("right", "bottom"),  
 gp = gpar(  
 col = "grey50",  
 fontsize = 10,  
 fontfamily = "Econ Sans Cnd"  
 )  
)



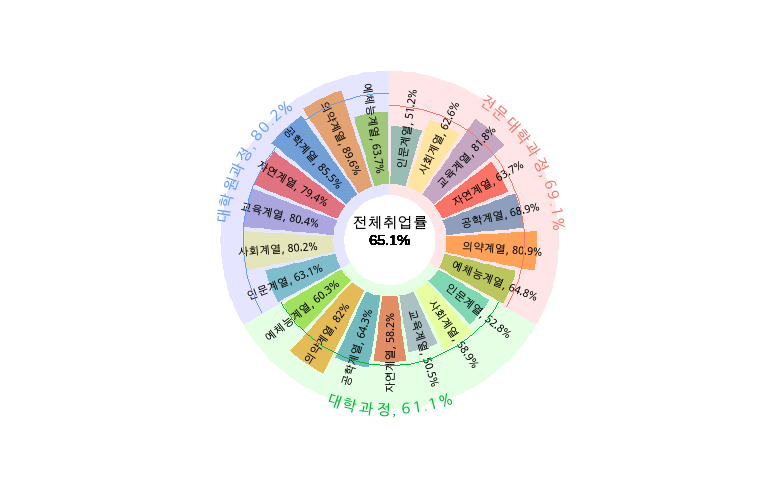
# 종합

1. 목표 : 비교의 대상이 되는 두 개의 그룹에 대한 산점도와 추세선을 각각 그리고 추세선의 선형회귀 방정식을 표현하여 각각의 그룹의 분포를 서로 비교하고 통계적 유의성을 전달 활용 시각화 : 박스 플롯, 바이올린 플롯, 산점도

library(ggtext)  
library(grid)  
library(tidyverse)  
  
theme\_set(  
 theme\_grey()  
)  
  
df\_total\_line <- df\_입학자\_long |> filter(지역 == '전체', lubridate::year(연도) %in% c(seq(from = 2001, to = 2021, by = 5)), 학교종류 %in% c('전문대학', '일반대학', '석사', '박사'))   
  
data\_labels <- bind\_rows(df\_total\_line |> filter(lubridate::year(연도) == 2001, 학교종류 %in% c('일반대학', '석사', '박사')), df\_total\_line |> filter(lubridate::year(연도) == 2006, 학교종류 %in% c('전문대학')))  
  
df\_total\_line |>  
 ggplot(aes(x = 연도, y = (입학생수)/1000)) +   
 ## geom\_line 레이어를 생성  
 geom\_line(aes(group = 학교종류, color = 학교종류), size = 2.4) +  
 geom\_point(aes(fill = 학교종류), size = 5,   
 shape = 21, # Type of point that allows us to have both color (border) and fill.  
 color = "white",   
 stroke = 1 # The width of the border, i.e. stroke.  
 ) +   
 scale\_x\_date(  
 expand = c(0, 0), # The horizontal axis does not extend to either side  
 limits = c(as.Date('2000-01-01'), as.Date('2022-12-01')),   
 breaks = seq(from = as.Date("2001-01-01"), to = as.Date("2021-01-01"),  
 by = "5 years"),   
 labels = lubridate::year(seq(from = as.Date("2001-01-01"), to = as.Date("2021-01-01"),  
 by = "5 years")) # Set custom break locations  
 # Set custom break locations  
# labels = c("2008", "12", "16", "20") # And custom labels on those breaks!  
 ) +   
 scale\_y\_continuous(  
 limits = c(0, 380),  
 expand = c(0, 0)  
 ) -> line\_ch7\_1  
  
line\_ch7\_1 +  
 theme(  
 # Set background color to white  
 panel.background = element\_rect(fill = "white"),  
 # Remove all grid lines  
 panel.grid = element\_blank(),  
 # But add grid lines for the vertical axis, customizing color and size   
 panel.grid.major.y = element\_line(color = "#A8BAC4", size = 0.3),  
 # Remove tick marks on the vertical axis by setting their length to 0  
 axis.ticks.length.y = unit(0, "mm"),   
 # But keep tick marks on horizontal axis  
 axis.ticks.length.x = unit(2, "mm"),  
 # Remove the title for both axes  
 axis.title = element\_blank(),  
 # Only the bottom line of the vertical axis is painted in black  
 axis.line.x.bottom = element\_line(color = "black"),  
 # Remove labels from the vertical axis  
 axis.text.y = element\_blank(),  
 # But customize labels for the horizontal axis  
 axis.text.x = element\_text(family = "Econ Sans Cnd", size = 16)  
 ) -> line\_ch7\_2  
  
  
  
line\_ch7\_2 +   
 geom\_text(data = data\_labels, aes(x = 연도, y = (입학생수/1000) + 20, label = 학교종류, color = 학교종류), show.legend = F) +   
 geom\_text(  
 data = data.frame(x = as.Date('2022-09-01'), y = seq(0, 300, by = 100)),  
 aes(x, y, label = y),  
 hjust = 1, # Align to the right  
 vjust = -0.5, # Align to the bottom  
 family = "Econ Sans Cnd",  
 size = 3,   
 color = 'grey50'  
 ) +   
 theme(legend.position = 'none') +  
 labs(  
 title = "\*\*교육과정별 졸업생수(k)\*\*",  
 ) +   
 theme(  
 # theme\_markdown() is provided by ggtext and means the title contains   
 # Markdown that should be parsed as such (the '\*\*' symbols)  
 plot.title = element\_markdown(  
 family = "Econ Sans Cnd",   
 size = 12  
 )  
 ) -> line\_ch7\_3  
  
  
ggplot(df\_total\_line) +  
 # color = "white" indicates the color of the lines between the areas  
 geom\_area(aes(x = 연도, y = (입학생수)/1000, group = 학교종류, fill = 학교종류), color = "white") +  
# scale\_fill\_manual(values = c('grey', 'brown', 'green', 'blue')) +  
 theme(legend.position = "None") + # no legend +  
 scale\_x\_date(  
 expand = c(0, 0), # The horizontal axis does not extend to either side  
 limits = c(as.Date('2000-01-01'), as.Date('2022-12-01')),   
 breaks = seq(from = as.Date("2001-01-01"), to = as.Date("2021-01-01"),  
 by = "5 years"),   
 labels = lubridate::year(seq(from = as.Date("2001-01-01"), to = as.Date("2021-01-01"),  
 by = "5 years")) # Set custom break locations  
 # Set custom break locations  
 # labels = c("2008", "12", "16", "20") # And custom labels on those breaks!  
 ) +   
 scale\_y\_continuous(  
 limits = c(0, 790),  
 expand = c(0, 0)  
 ) -> area\_ch7\_1  
  
area\_ch7\_1 +   
 theme(  
 # Set background color to white  
 panel.background = element\_rect(fill = "white"),  
 # Remove all grid lines  
 panel.grid = element\_blank(),  
 # But add grid lines for the vertical axis, customizing color and size   
 panel.grid.major.y = element\_line(color = "#A8BAC4", size = 0.3),  
 # Remove tick marks on the vertical axis by setting their length to 0  
 axis.ticks.length.y = unit(0, "mm"),   
 # But keep tick marks on horizontal axis  
 axis.ticks.length.x = unit(2, "mm"),  
 # Remove the title for both axes  
 axis.title = element\_blank(),  
 # Only the bottom line of the vertical axis is painted in black  
 axis.line.x.bottom = element\_line(color = "black"),  
 # Remove labels from the vertical axis  
 axis.text.y = element\_blank(),  
 # But customize labels for the horizontal axis  
 axis.text.x = element\_text(family = "Econ Sans Cnd", size = 16)  
 ) -> area\_ch7\_2  
  
area\_ch7\_2 +   
 geom\_text(aes(x = as.Date('2011-01-01'), y = 600), label = '전문대학', color = 'white') +   
 geom\_text(aes(x = as.Date('2011-01-01'), y = 300), label = '일반대학', color = 'white') +   
 geom\_text(aes(x = as.Date('2011-01-01'), y = 80), label = '석사', color = 'white') +   
 geom\_text(aes(x = as.Date('2014-01-01'), y = 80), label = '박사', color = 'white') +   
 geom\_segment(aes(x = as.Date('2014-01-01'), xend = as.Date('2014-01-01'), y = 12, yend = 60), color = 'white', arrow = arrow(angle = 30, length = unit(0.1, "inches"))) +   
 geom\_text(  
 data = data.frame(x = as.Date('2022-09-01'), y = seq(0, 800, by = 200)),  
 aes(x, y, label = y),  
 hjust = 1, # Align to the right  
 vjust = -0.5, # Align to the bottom  
 family = "Econ Sans Cnd",  
 size = 3,   
 color = 'grey50'  
 ) +   
 theme(legend.position = 'none') +   
 labs(  
 title = "고등교육기관 졸업생 수(k)",  
 ) +   
 theme(  
 plot.title = element\_markdown(  
 family = "Econ Sans Cnd",   
 size = 12  
 )  
 ) -> area\_ch7\_3  
  
  
plt1 <- line\_ch7\_3 + theme(plot.margin = margin(0, 0.05, 0, 0, "npc"))  
plt2 <- area\_ch7\_3 + theme(plot.margin = margin(0, 0, 0.05, 0, "npc"))  
plt <- plt1 | plt2  
  
title\_theme <- theme(  
 plot.title = element\_text(  
 hjust = 0.02,  
 size = 15,  
 margin = margin(0.8, 0, 0.3, 0, "npc")  
 ),  
 plot.subtitle = element\_text(  
 hjust = 0.02,  
 size = 12,  
 margin = margin(0.4, 0, 0.5, 0, "npc")  
 )  
)  
  
plt <- plt + plot\_annotation(  
 title = "전문대학의 위기",  
 subtitle = "전문대학 학생수 감소 추세",  
 theme = title\_theme  
) +  
 theme(  
 plot.margin = margin(0.075, 0, 0.1, 0, "npc"),  
 )  
   
plt  
  
# Add line on top of the chart  
grid.lines(  
 x = c(0, 1),  
 y = 1,  
 gp = gpar(col = "#e5001c", lwd = 4)  
)  
  
# Add rectangle on top-left  
# lwd = 0 means the rectangle does not have an outer line  
# 'just' gives the horizontal and vertical justification  
grid.rect(  
 x = 0,  
 y = 1,  
 width = 0.05,  
 height = 0.025,  
 just = c("left", "top"),  
 gp = gpar(fill = "#e5001c", col = "#e5001c", lwd = 0)  
)  
# Add first caption  
grid.text(  
 '출처: 실전에서 바로쓰는 데이터 시각화 in R',   
 x = 0.005,   
 y = 0.06,   
 just = c("left", "bottom"),  
 gp = gpar(  
 col = "grey50",  
 fontsize = 10,  
 fontfamily = "Econ Sans Cnd"  
 )  
)  
  
# Add third caption  
grid.text(  
 "참조 : https://www.r-graph-gallery.com/",   
 x = 0.995,   
 y = 0.06,   
 just = c("right", "bottom"),  
 gp = gpar(  
 col = "grey50",  
 fontsize = 10,  
 fontfamily = "Econ Sans Cnd"  
 )  
)



library(tidyverse)  
library(patchwork)  
showtext\_auto()  
  
font\_add('NanumBarunGothic', 'c:/windows/fonts/NanumBarunGothic.ttf')  
  
df\_취업통계$대계열 = fct\_relevel(df\_취업통계$대계열, '인문계열', '사회계열', '교육계열', '자연계열', '공학계열', '의약계열', '예체능계열')  
  
df\_취업통계$과정구분 = fct\_relevel(df\_취업통계$과정구분, '전문대학과정', '대학과정', '대학원과정')  
  
  
df\_취업통계\_계열별 <- df\_취업통계 |>  
 group\_by(과정구분, 대계열) |>   
 summarise(졸업자 = sum(졸업자\_계),   
 취업자 = sum(취업자\_합계\_계),   
 진학자 = sum(진학자\_계),   
 입대자 = sum(입대자),  
 취업불가능자 = sum(취업불가능자\_계),   
 외국인유학생 = sum(외국인유학생\_계),   
 제외인정자 = sum(제외인정자\_계),  
 ## 백분률인 취업률은 그 자체로 합계나 평균을 낼 수 없으니 각 그룹별로 재계산  
 취업률 = 취업자 / (졸업자 - (진학자+입대자+취업불가능자+외국인유학생+제외인정자))) |>  
 ## 계열의 표시 순서를 설정하기 위해 레벨을 재조정  
 arrange(과정구분, 대계열) |>  
 ungroup() |>  
 mutate(id = seq(1:n())) |>  
 mutate(angle = 90 - (id-0.5)/n() \* 360) |>  
 mutate(angle1 = case\_when(  
 id > n()/2 ~ angle + 180,   
 id <= n()/2 ~ angle  
 ))  
  
  
df\_취업통계\_과정별 <- df\_취업통계 |>   
 group\_by(과정구분) |>   
 summarise(졸업자 = sum(졸업자\_계),   
 취업자 = sum(취업자\_합계\_계),   
 진학자 = sum(진학자\_계),   
 입대자 = sum(입대자),  
 취업불가능자 = sum(취업불가능자\_계),   
 외국인유학생 = sum(외국인유학생\_계),   
 제외인정자 = sum(제외인정자\_계),  
 ## 백분률인 취업률은 그 자체로 합계나 평균을 낼 수 없으니 각 그룹별로 재계산  
 취업률 = 취업자 / (졸업자 - (진학자+입대자+취업불가능자+외국인유학생+제외인정자))) |>  
 ## 계열의 표시 순서를 설정하기 위해 레벨을 재조정  
 arrange(과정구분) |>  
 ungroup() |>  
 mutate(id = seq(1:n())) |>  
 mutate(angle = 90 - (id-0.5)/n() \* 360) |>  
 mutate(angle1 = case\_when(  
 id >= n()/2 ~ angle + 270,   
 id < n()/2 ~ angle -90,   
 ))  
  
df\_취업통계\_전체 <- df\_취업통계 |>   
 summarise(## 백분률인 취업률은 그 자체로 합계나 평균을 낼 수 없으니 각 그룹별로 재계산  
 취업률 = sum(취업자\_합계\_계) / (sum(졸업자\_계) - (sum(진학자\_계)+sum(입대자)+sum(취업불가능자\_계)+sum(외국인유학생\_계)+sum(제외인정자\_계)))) |>  
 select(취업률) |>  
 pull()  
  
#View(df\_취업통계\_계열별)  
# angle <- 90 - (df\_취업통계\_계열별$id-0.5)/nrow(df\_취업통계\_계열별) \* 360  
# calculate the ANGLE of the labels  
# I substract 0.5 because the letter must have the angle of the center of the bars. Not extreme right(1) or extreme left (0)  
  
# calculate the alignment of labels: right or left  
# If I am on the left part of the plot, my labels have currently an angle < -90  
#label\_data$hjust<-ifelse( angle < -90, 1, 0)  
  
# flip angle BY to make them readable  
#label\_data$angle<-ifelse(angle < -90, angle+180, angle)  
library(geomtextpath)  
  
df\_취업통계\_계열별 |>  
 ggplot(aes(x = id, y = 취업률, fill = 대계열)) +   
 geom\_col(position = 'dodge', show.legend = F)+   
 scale\_y\_continuous(labels = scales::percent, limits = c(-0.5, 1.2)) +  
 scale\_x\_continuous(limits = c(0.5, 21.5)) +  
 annotate(xmin = 0.5, xmax = 7.5, ymin = -0.1, ymax = 1, alpha = 0.1, geom = 'rect', fill = 'red') +  
 annotate(xmin = 7.5, xmax = 14.5, ymin = -0.1, ymax = 1, alpha = 0.1, geom = 'rect', fill = 'green') +  
 annotate(xmin = 14.5, xmax = 21.5, ymin = -0.1, ymax = 1, alpha = 0.1, geom = 'rect', fill = 'blue') +  
 geom\_textpath(data = df\_취업통계\_과정별,aes(x = 4+((id-1)\*7), y = 1.0, label = paste0(과정구분, ', ', round(취업률\*100, 1), '%'), color = as.factor(id)), inherit.aes = F, show.legend = F, rich = TRUE, family = 'NanumBarunGothic') +  
 geom\_text(data = df\_취업통계\_계열별, aes(x=id, y=0.5, label=paste0(대계열, ', ', round(취업률\*100, 1), '%'), angle= angle1), color="black", inherit.aes = FALSE, size = rel(3), hjust = 0.5) +  
 geom\_segment(data = df\_취업통계\_과정별, aes(x = 0.5+((id-1)\*7), xend = 7.5+((id-1)\*7), y = 취업률, yend = 취업률, color = as.factor(id)), inherit.aes = F, show.legend = F) +   
 scale\_fill\_brewer(palette = 'Set3') +   
 coord\_curvedpolar() +  
 theme\_void() +   
 theme(plot.title = element\_text(hjust = 0.5, size = 20),   
 plot.margin = margin(0.25, 0, 0, 0),   
 text = element\_text(family = 'NanumBarunGothic')) +   
 annotate(x = 0.5, y = -0.35, geom = 'text', label = '전체취업률') +   
 geom\_text(aes(x = 0.5, y = -0.5, label = paste0(round(df\_취업통계\_전체, 3)\*100, '%')), size = rel(4))



## Lists

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## Reference

see figure and table !