Chosun Population and Housholds

Problem

오기수 교수의 논문 조선시대 각 도별 인구 및 전답과 조세부담액 분석에 등장하는 **연도별 호수 및 인구와 호당인구** 를 도표로 제시

```
knitr::include_graphics("../pics/chosun_population_households.png", dpi = 96)
```

〈표 1〉 연도별 호수 및 인구와 호당인구

연 도	호 수	인 구	호당인구	자료 출처
1404	153,403	322,746	2.1	「호구총수」
1406	180,246	370,365	2.1	「호구총수」
1432	201,853	692,475	3.4	세종실록지리지
1648	441,321	1,531,365	3.5	「증보문헌비고」
1657	658,771	2,290,083	3.5	「증보문헌비고」
1669	1,313,453	5,018,644	3.8	「증보문헌비고」
1672	1,178,144	4,701,359	4.0	현종실록
1678	1,342,428	5,246,972	3.9	「증보문헌비고」
1717	1,560,561	6,846,568	4.4	「증보문헌비고」
1724	1,572,086	6,865,286	4.4	「증보문헌비고」
1726	1,576,598	7,032,425	4.5	「증보문헌비고」
1777	1,715,371	7,238,546	4.2	「증보문헌비고」
1780	1,714,550	7,227,673	4.2	「증보문헌비고」
1783	1,733,757	7,316,924	4.2	정종실록
1786	1,740,591	7,330,965	4.2	「탁지지」, 정종실록
1789	1,752,814	7,403,606	4.2	「호구총수」
1792	1,741,395	7,446,256	4.3	정종실록
1795	1,726,489	7,308,194	4.2	정종실록
1798	1,741,184	7,412,686	4.3	정종실록
1807	1,765,504	7,561,406	4.3	「증보문헌비고」
1837	1,591,965	6,709,019	4.2	「증보문헌비고」
1852	1,588,875	6,918,838	4.4	「증보문헌비고」
1864	1,604,448	6,828,521	4.3	「증보문헌비고」

Data

```
Years <- c(1404, 1406, 1432, 1648, 1657, 1669, 1672, 1678, 1717, 1724, 1726, 1777)
Households <- c(153403, 180246, 201853, 441321, 658771, 1313453, 1178144, 1342428, 15
60561, 1572086, 1576598, 1715371)
Population <- c(322746, 370365, 692475, 1531365, 2290083, 5018644, 4701359, 5246972,
6846568, 6865286, 7032425, 7238546)
chosun.df <- data.frame(Years, Households, Population)
str(chosun.df)
```

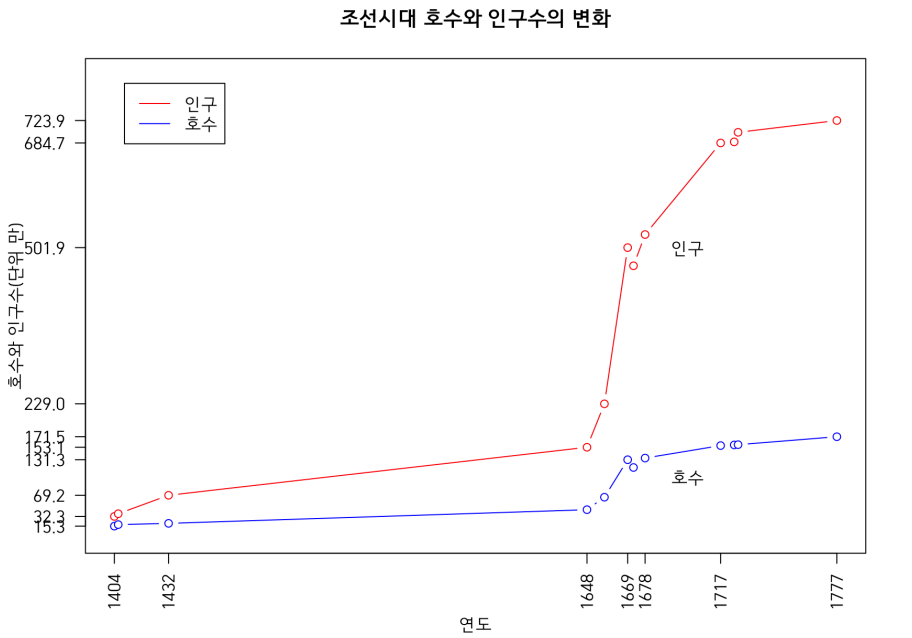
```
## 'data.frame':    12 obs. of  3 variables:
##  $ Years     : num  1404 1406 1432 1648 1657 ...
##  $ Households: num  153403 180246 201853 441321 658771 ...
##  $ Population: num  322746 370365 692475 1531365 2290083 ...
```

Plot (R Base)

```
par(family = "HCR Dotum LVT")
plot(Population / 10000 ~ Years,
     data = chosun.df,
     type = "b",
     pch = 21,
     col = "red",
     bg = "white",
     ylim = c(0, 800),
     xaxt = "n",
     yaxt = "n",
     ann = FALSE)
lines(Households / 10000 ~ Years,
      data = chosun.df,
      type = "b",
      pch = 21,
      col = "blue",
      bg = "white")
Years.ticks <- c(1404, 1432, 1648, 1669, 1678, 1717, 1777)
Years %in% Years.ticks
```

```
##  [1]  TRUE FALSE  TRUE  TRUE FALSE  TRUE FALSE  TRUE  TRUE FALSE FALSE
## [12]  TRUE
```

```
Households.ticks <- Households[Years %in% c(1404, 1669, 1777)]
Population.ticks <- Population[Years %in% c(1404, 1432, 1648, 1657, 1669, 1717, 1777
)]
y.breaks <- c(Population.ticks, Households.ticks) / 10000
y.labels <- format(c(Population.ticks, Households.ticks) / 10000, digits = 3, nsmall
 = 0)
axis(side = 1,
     at = Years.ticks,
     labels = Years.ticks,
     las = 2)
axis(side = 2,
     at = c(Population.ticks, Households.ticks) / 10000,
     labels = format(c(Population.ticks, Households.ticks) / 10000, digits = 3, nsmal
l = 0),
     las = 2)
legend("topleft",
       inset = 0.05,
       legend = c("인구", "호수"),
       lty = 1,
       col = c("red", "blue"))
text(x = 1700,
     y = c(500, 100),
     labels = c("인구", "호수"))
main.title <- "조선시대 호수와 인구수의 변화"
x.lab <- "연도"
y.lab <- "호수와 인구수(단위 만)"
title(main = main.title,
      xlab = x.lab,
      ylab = y.lab)
```




```
dev.copy(png,
         file = "../pics/chosun_demo.png",
         width = 800,
         height = 450)
```

```
## quartz_off_screen
##                 3
```

```
dev.off()
```

```
## quartz_off_screen
##                 2
```

ggplot

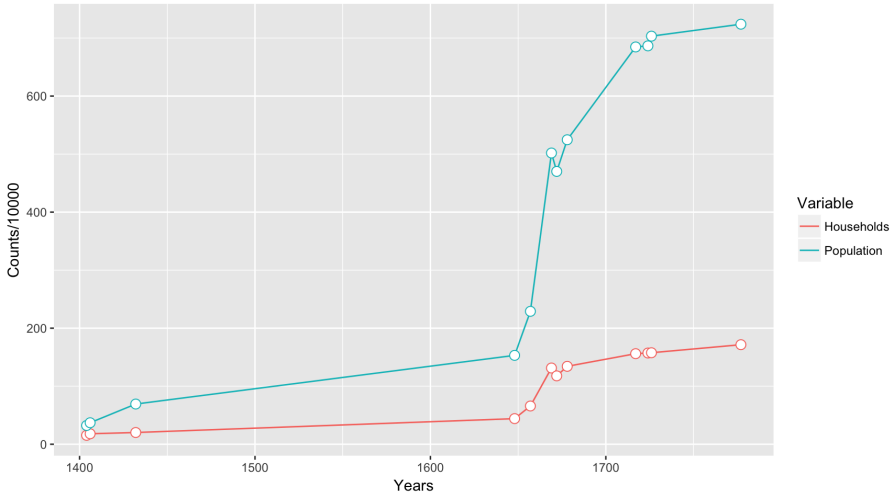
Reshaping

```
library(ggplot2)
library(reshape2)
source("./theme_kr.R")
chosun.melt <- melt(chosun.df,
                    id.vars = "Years",
                    measure.vars = c("Households", "Population"),
                    variable.name = "Variable",
                    value.name = "Counts")
str(chosun.melt)
```

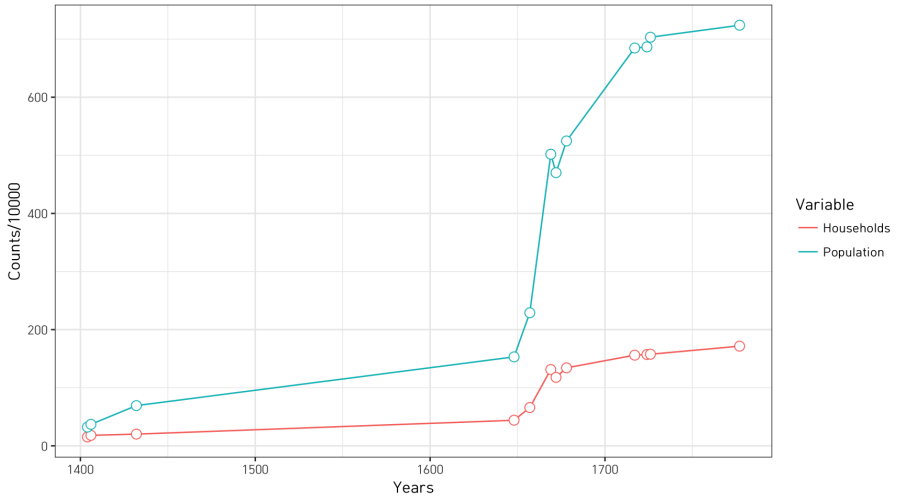
```
## 'data.frame':    24 obs. of  3 variables:
##  $ Years   : num  1404 1406 1432 1648 1657 ...
##  $ Variable: Factor w/ 2 levels "Households","Population": 1 1 1 1 1 1 1 1 1 1 ...
##  $ Counts  : num  153403 180246 201853 441321 658771 ...
```

geom_line(), geom_point(), ...

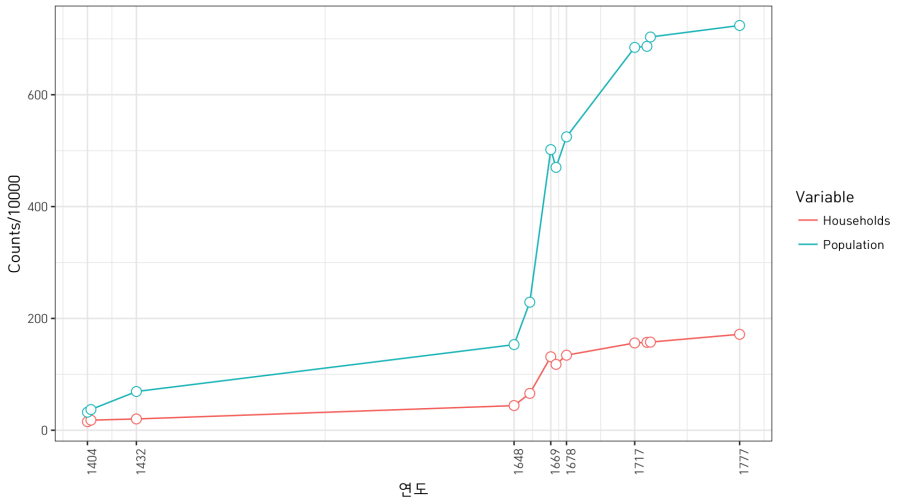
```
g1 <- ggplot(data = chosun.melt,
             mapping = aes(x = Years,
                           y = Counts / 10000,
                           colour = Variable)) +
  geom_line() +
  geom_point(shape = 21,
             fill = "white",
             size = 3,
             show.legend = FALSE)
g1
```



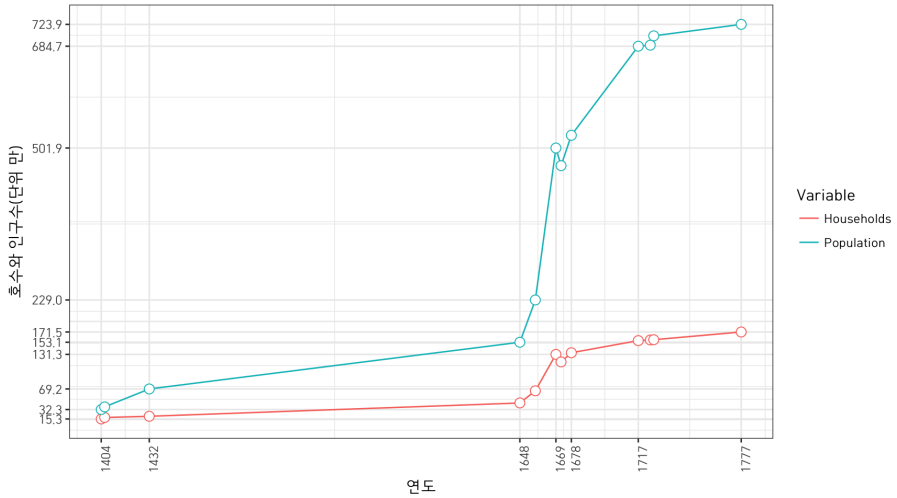

```
g2 <- g1 +
  theme_bw() +
  theme.kr
g2
```



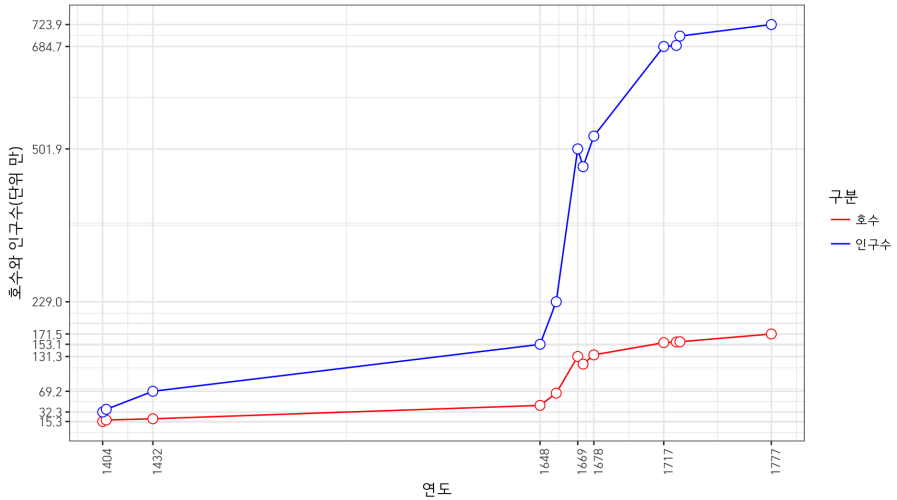

```
g3 <- g2 +
#  theme(panel.grid.major = element_line(linetype = "dotted", colour = "black")) +
  scale_x_continuous(name = x.lab,
                     breaks = Years.ticks,
                     labels = Years.ticks) +
  theme(axis.text.x = element_text(angle = 90))
g3
```



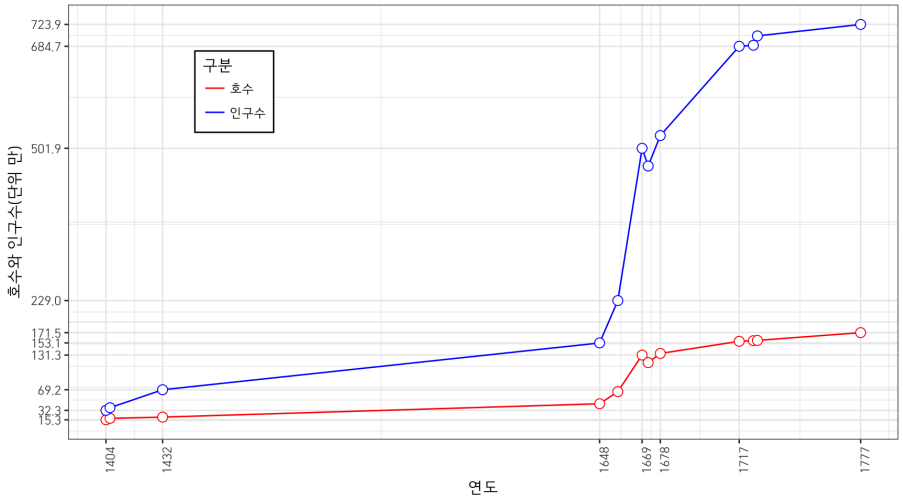
```
g4 <- g3 +
  scale_y_continuous(name = y.lab,
                     breaks = y.breaks,
                     labels = y.labels) +
  theme(axis.text.y = element_text(angle = 0))
g4
```



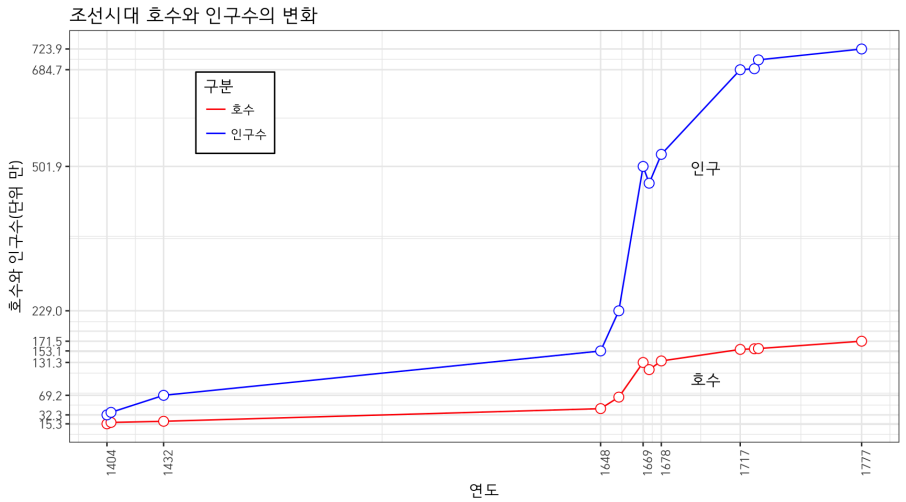

```
g5 <- g4 + scale_colour_manual(name = "구분",
                               values = c("red", "blue"),
                               labels = c("호수", "인구수"))
g5
```




```
g6 <- g5 +
  theme(legend.position = c(0.2, 0.8),
        legend.background = element_rect(colour = "black",
                                         linetype = "solid"))
g6
```




```
g7 <- g6 +
  ggtitle(main.title) +
  annotate("text",
           x = 1700,
           y = c(500, 100),
           label = c("인구", "호수"),
           family = "HCR Dotum LVT")
g7
```




```
ggsave("../pics/chosun_demo_ggplot.png", width = 9, height = 81/16, units = "in", dpi
 = 72)
```