HW6 – 1678094 김지원

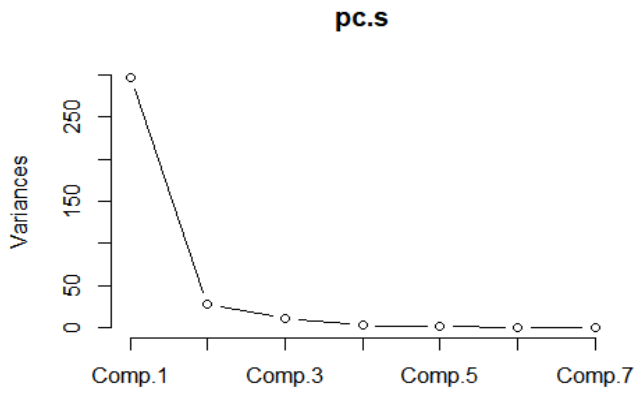
```
dt <- read.csv("C:/temp/MSA/airpollution.csv")

dim(dt)
## [1] 42  7
#1
s<-var(dt)
pc.s<-princomp(dt,cor=FALSE)
eigen(s)

## eigen() decomposition
## $values
## [1] 304.2578640  28.2761046  11.4644830   2.5243296   1.2795247   0.5287288
## [7]   0.2096157
##
## $vectors
##              [,1]        [,2]        [,3]          [,4]          [,5]
## [1,]  0.010039244  0.07622439  0.03087761  0.9203045748  0.3423859285
## [2,] -0.993199405  0.11615518  0.00659069 -0.0002118679  0.0022391022
## [3,] -0.014062314 -0.09956775 -0.18282641 -0.1382922410  0.6500776063
## [4,]  0.004710175  0.01320423 -0.13021553 -0.3277842624  0.6431560485
## [5,] -0.024255644 -0.15038113 -0.95526318  0.1023719020 -0.2065840405
## [6,] -0.112429558 -0.97335904  0.16981025  0.0632480276 -0.0002935726
## [7,] -0.002340785 -0.02382046 -0.08519558  0.1095073458  0.0619613872
##              [,6]         [,7]
## [1,]  0.011779079 -0.169729925
## [2,]  0.003353218 -0.001781987
## [3,] -0.563893916  0.443577538
## [4,]  0.497513370 -0.462855916
## [5,] -0.009009299 -0.105029951
## [6,]  0.051067254 -0.066992404
## [7,]  0.657012233  0.738019426

pc.s$loadings

##
## Loadings:
##    Comp.1 Comp.2 Comp.3 Comp.4 Comp.5 Comp.6 Comp.7
## X1                          0.920  0.342         0.170
## X2 -0.993  0.116
## X3                -0.183 -0.138  0.650 -0.564 -0.444
## X4                -0.130 -0.328  0.643  0.498  0.463
## X5         -0.150 -0.955  0.102 -0.207         0.105
## X6 -0.112 -0.973  0.170
## X7                          0.110         0.657 -0.738
##
##                Comp.1 Comp.2 Comp.3 Comp.4 Comp.5 Comp.6 Comp.7
## SS loadings     1.000  1.000  1.000  1.000  1.000  1.000  1.000
```

```
## Proportion Var  0.143  0.143  0.143  0.143  0.143  0.143  0.143
## Cumulative Var  0.143  0.286  0.429  0.571  0.714  0.857  1.000
```

```
#2
summary(pc.s)
```

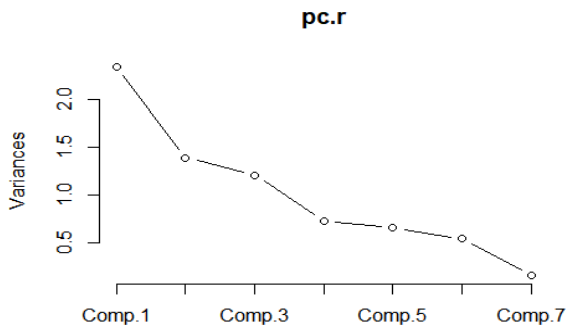
```
## Importance of components:
##                            Comp.1     Comp.2     Comp.3      Comp.4      Comp.5
## Standard deviation     17.234083 5.25384279 3.34537279 1.569785488 1.117613433
## Proportion of Variance  0.872948 0.08112714 0.03289281 0.007242569 0.003671092
## Cumulative Proportion   0.872948 0.95407514 0.98696795 0.994210520 0.997881611
##                             Comp.6       Comp.7
## Standard deviation     0.718428856 0.4523547944
## Proportion of Variance 0.001516979 0.0006014096
## Cumulative Proportion  0.999398590 1.0000000000
```

```
screeplot(pc.s,type="lines")
```



```r
#3
R<-cor(dt)
eigen(R)

## eigen() decomposition
## $values
## [1] 2.3367826 1.3860007 1.2040659 0.7270865 0.6534765 0.5366888 0.1558989
##
## $vectors
##            [,1]         [,2]       [,3]         [,4]        [,5]         [,6]
## [1,]  0.2368211  0.278445138  0.6434744  0.172719491  0.56053441 -0.223579220
## [2,] -0.2055665 -0.526613869  0.2244690  0.778136601 -0.15613432 -0.005700851
## [3,] -0.5510839 -0.006819502 -0.1136089  0.005301798  0.57342221 -0.109538907
## [4,] -0.3776151  0.434674253 -0.4070978  0.290503052 -0.05669070 -0.450234781
## [5,] -0.4980161  0.199767367  0.1965567 -0.042428178  0.05021430  0.744968707
## [6,] -0.3245506 -0.566973655  0.1598465 -0.507915905  0.08024349 -0.330583071
## [7,] -0.3194032  0.307882771  0.5410484 -0.143082348 -0.56607057 -0.266469812
##             [,7]
## [1,] -0.24146701
## [2,] -0.01126548
## [3,]  0.58524622
## [4,] -0.46088973
## [5,] -0.33784371
## [6,] -0.41707805
## [7,]  0.31391372

pc.r<-princomp(dt,cor=T)

pc.r$loadings

##
## Loadings:
##    Comp.1 Comp.2 Comp.3 Comp.4 Comp.5 Comp.6 Comp.7
## X1  0.237  0.278  0.643  0.173  0.561  0.224  0.241
## X2 -0.206 -0.527  0.224  0.778 -0.156
## X3 -0.551        -0.114         0.573  0.110 -0.585
## X4 -0.378  0.435 -0.407  0.291         0.450  0.461
## X5 -0.498  0.200  0.197               -0.745  0.338
## X6 -0.325 -0.567  0.160 -0.508         0.331  0.417
## X7 -0.319  0.308  0.541 -0.143 -0.566  0.266 -0.314
##
##                Comp.1 Comp.2 Comp.3 Comp.4 Comp.5 Comp.6 Comp.7
## SS loadings     1.000  1.000  1.000  1.000  1.000  1.000  1.000
## Proportion Var  0.143  0.143  0.143  0.143  0.143  0.143  0.143
## Cumulative Var  0.143  0.286  0.429  0.571  0.714  0.857  1.000

#4

summary(pc.r)

## Importance of components:
##                           Comp.1    Comp.2    Comp.3    Comp.4     Comp.5
## Standard deviation     1.5286539 1.1772853 1.0972994 0.8526937 0.80837896
## Proportion of Variance 0.3338261 0.1980001 0.1720094 0.1038695 0.09335379
```

```
## Cumulative Proportion  0.3338261 0.5318262 0.7038356 0.8077051 0.90105889
##                            Comp.6     Comp.7
## Standard deviation     0.73259047 0.39484041
## Proportion of Variance 0.07666983 0.02227128
## Cumulative Proportion  0.97772872 1.00000000
screeplot(pc.r,type="lines")
```




```
#5
```