

```

1  ###主成分分析
2  write.csv(mtcars,                                #サンプルデータmtcarsを読み込み保存
3           "data/mtcars.csv")
4  b.dat <- read.csv("data/mtcars.csv",           #mtcarsの内容は最後に
5                  header = T ,row.names = 1 )
6  head(b.dat , 3)
7  ##欠測値処理
8  anyNA(b.dat)                                    #NAがある時返り値TRUE
9  library(psych)
10 describe(b.dat[,c(1:7,10,11)]) ###statistic
11 cor.plot(cor(b.dat[,c(1:7,10,11)]))
12 pairs.panels(b.dat[,c(1:7,10,11)],
13             hist.col="red",rug=F,ellipses=F,
14             lm=T,density=F)
15 ###scree.plot
16 VSS.scree(b.dat[,c(1:7,10,11)])
17
18 ###Principal()関数:固有値,主成分負荷量を出力する
19 library(psych)
20 pca.princ <- principal(b.dat[,c(1:7,10,11)],
21                       nfactors = 3,
22                       rotate = "none" ,
23                       scores = T)
24 print(pca.princ)
25 round(pca.princ$values,3)   #Eigenvalue
26 round(pca.princ$loadings,4) #PCloading
27 head(pca.princ$scores)     #Score(標準化されている)
28 ###ScatterPlot
29 biplot(pca.princ)
30
31 ###FactoMineRのPCA()関数:固有値,主成分負荷量を出力する
32 library(FactoMineR)
33 pca <- PCA(b.dat[,c(1:7,10,11)])
34 pca                                     #ScatterPlotは自動で出力
35 pca$var$coord                          #主成分負荷量
36 pca$ind$coord                          #標準化されていない
37 z.score <- scale(pca$ind$coord)
38 head(z.score)                          #標準化
39
40 ###Procomp()関数:固有値,主成分負荷量は出力しない(計算が必要)
41 pca.prco <- prcomp(data = b.dat[,c(1:7,10,11)],
42                   ~ ., scale = T)
43 print(pca.prco) #固有ベクトル
44 round(pca.prco$sdev^2,5)                #固有値
45 round(t(t(pca.prco$rotation)*
46         pca.prco$sdev)[,drop = F],4) #主成分負荷量
47 head(pca.prco$x , 5)                   #Score(標準化されていない)
48 pc.score <- scale(pca.prco$x)          #標準化
49 head(pc.score)
50 #score.dat <- data.frame(b.dat , pc.score ) ##b.datにscore書き出す
51 #write.csv(score.dat,"data/pc.score.csv")
52 ###ScatterPlot
53 biplot(pca.prco)
54 abline(v=0,lty=3);abline(h=0,lty=3)
55
56 ###見栄えの良いScatterPlot
57 library(factoextra)
58 library(ggplot2)
59 fviz_pca_biplot(pca.prco, axes = c(1, 2),
60                 geom = c("point", "text"),

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```
61         col.ind = "black", col.var = "red",
62         repel = T, title = "PCA - Biplot")+
63     theme_bw(base_size = 15)#+
64     #xlim(-6.0, 5.0) + ylim (-4.0, 4.2)
65     fviz_pca_ind(pca.prco, axes = c(1, 2),
66                 geom = c("point", "text"),
67                 repel = T)+
68     theme_bw(base_size = 15)
69     fviz_pca_var(pca.prco, axes = c(1, 2),
70                 geom = c("arrow", "text"),
71                 repel = T, col.var = "red")+
72     theme_bw(base_size = 15)
73
74     #mtcars {datasets}
75     #A data frame with 32 observations on 11 (numeric) variables.
76     #[, 1] mpg Miles/(US) gallon
77     #[, 2] cyl Number of cylinders
78     #[, 3] disp Displacement (cu.in.)
79     #[, 4] hp Gross horsepower
80     #[, 5] drat Rear axle ratio
81     #[, 6] wt Weight (1000 lbs)
82     #[, 7] qsec 1/4 mile time
83     #[, 8] vs Engine (0 = V-shaped, 1 = straight)
84     #[, 9] am Transmission (0 = automatic, 1 = manual)
85     #[,10] gear Number of forward gears
86     #[,11] carb Number of carburetors
87
88
89
```