Mingjie Zhao HW11

1a

age height weight sbp

-0.74604 -0.63553 -0.03193 -0.19620

Codes

WCGS = read.table("WCGS22.dat",header=T)

sir1 = dr(behtype~age+height+weight+sbp,data=WCGS)

> summary(sir1)

Call:

dr(formula = behtype ~ age + height + weight + sbp, data = WCGS)

Method:

sir with 2 slices, n = 3154.

Slice Sizes:

1565 1589

Estimated Basis Vectors for Central Subspace:

age height weight sbp

-0.74604 -0.63553 -0.03193 -0.19620

Dir1

Eigenvalues 0.01338

R^2(OLS|dr) 1.00000

Large-sample Marginal Dimension Tests:

Stat df p.value

0D vs >= 1D 42.19 4 1.525e-08

1B

A=as.matrix(WCGS[,1:4])

B=scale(A, center=TRUE, scale=TRUE)

pca= prcomp(B,scale=T)$rotation

pca

PC1 PC2 PC3 PC4

age -0.05970874 0.7168447 -0.69433596 -0.02158959

height 0.64308663 -0.2556292 -0.33903380 0.63729849

weight 0.70208842 0.0181220 -0.01953981 -0.71159092

sbp 0.29991049 0.6484281 0.63448550 0.29499642

1c

[,1]

[1,] 0.4454195

Codes

avector =matrix(c(-0.74604474, -0.63553407, -0.03193239, -0.19619891),nrow=4)

bvector =matrix(c(-0.05970874 , 0.64308663, 0.70208842 , 0.29991049),nrow=4)

n1=norm(avector,type="F")

n1

n2=norm(bvector,type="F")

n2

abs(t(avector/n1)%\*%( bvector/n2))

d

The cos of the angle between the eigenvectors from results of 1a and 1b

2a

library(mclust)

mm=Mclust(A, G=3, modelName = "EEE")

mm$parameters

> mm=Mclust(A, G=3, modelName = "VVV")

> mm$parameters

$Vinv

NULL

$pro

[1] 0.2140580 0.4344230 0.3515189

$mean

[,1] [,2] [,3]

age 48.46151 49.25700 41.26874

height 70.10494 69.56962 69.83570

weight 180.82813 166.04348 168.16415

sbp 144.42159 124.85952 123.68151

$variance

$variance$modelName

[1] "VVV"

$variance$d

[1] 4

$variance$G

[1] 3

$variance$sigma

, , 1

age height weight sbp

age 27.511009 -2.242718 -26.8722933 4.9253748

height -2.242718 5.888541 29.8254061 -3.2411225

weight -26.872293 29.825406 729.6744870 0.4585937

sbp 4.925375 -3.241122 0.4585937 343.7153637

, , 2

age height weight sbp

age 22.506858 -1.3401559 -3.512587 3.1854746

height -1.340156 6.2726750 25.187599 -0.3102377

weight -3.512587 25.1875990 297.208420 35.8470927

sbp 3.185475 -0.3102377 35.847093 115.6123850

, , 3

age height weight sbp

age 3.2504044 -0.1453900 0.2751522 0.5238596

height -0.1453900 6.7247155 28.4910110 0.5252217

weight 0.2751522 28.4910110 359.8729154 53.4622605

sbp 0.5238596 0.5252217 53.4622605 103.8612375

$variance$cholsigma

, , 1

age height weight sbp

age 5.245094 -0.427584 -5.12332 0.9390442

height 0.000000 2.388663 11.56913 -1.1887829

weight 0.000000 0.000000 -23.86590 -0.7970702

sbp 0.000000 0.000000 0.00000 -18.4603639

, , 2

age height weight sbp

age 4.744139 -0.2824866 -0.7404055 0.67145468

height 0.000000 -2.4885490 -10.0373527 0.04844621

weight 0.000000 0.0000000 -13.9968486 -2.63134325

sbp 0.000000 0.0000000 0.0000000 -10.40361568

, , 3

age height weight sbp

age 1.802888 -0.08064285 0.1526175 0.290567

height 0.000000 -2.59195144 -10.9968567 -0.211676

weight 0.000000 0.00000000 -15.4569973 -3.305309

sbp 0.000000 0.00000000 0.0000000 -9.633636

>

c

MM=Mclust(A)

best model: ellipsoidal, unconstrained with 5 components

BEST=mclustBIC(A)

summary(BEST, data=A)

classification table:

1 2 3 4 5

229 1172 645 498 610

best BIC values:

VVV,5 VVV,4 VVV,6

-86143.33 -86157.55 -86216.62

2b

> library(mclust)

> mm=Mclust(A, G=3, modelName = "EEE")

> mm$parameters

$Vinv

NULL

$pro

[1] 0.03116471 0.91132863 0.05750667

$mean

[,1] [,2] [,3]

age 45.97170 46.09582 49.34310

height 71.06087 69.73581 69.74698

weight 220.66590 168.07841 172.18961

sbp 140.77057 125.96522 164.32987

$variance

$variance$modelName

[1] "EEE"

$variance$d

[1] 4

$variance$G

[1] 3

$variance$sigma

, , 1

age height weight sbp

age 29.931965 -1.3211352 -4.229393 7.2181541

height -1.321135 6.3392960 26.324673 0.1780036

weight -4.229393 26.3246731 361.250562 52.4090359

sbp 7.218154 0.1780036 52.409036 144.1172970

, , 2

age height weight sbp

age 29.931965 -1.3211352 -4.229393 7.2181541

height -1.321135 6.3392960 26.324673 0.1780036

weight -4.229393 26.3246731 361.250562 52.4090359

sbp 7.218154 0.1780036 52.409036 144.1172970

, , 3

age height weight sbp

age 29.931965 -1.3211352 -4.229393 7.2181541

height -1.321135 6.3392960 26.324673 0.1780036

weight -4.229393 26.3246731 361.250562 52.4090359

sbp 7.218154 0.1780036 52.409036 144.1172970

$variance$Sigma

age height weight sbp

age 29.931965 -1.3211352 -4.229393 7.2181541

height -1.321135 6.3392960 26.324673 0.1780036

weight -4.229393 26.3246731 361.250562 52.4090359

sbp 7.218154 0.1780036 52.409036 144.1172970

$variance$cholSigma

age height weight sbp

age 5.471011 -0.2414792 -0.7730551 1.3193455

height 0.000000 2.5061891 10.4293791 0.1981487

weight 0.000000 0.0000000 -15.8707592 -3.2362910

sbp 0.000000 0.0000000 0.0000000 -11.4831956

>