

```
require 'plot numeric jpeg viewmat'
```

```
NB. *****
```

```
NB. Principal Analysis
```

```
NB. common util
```

```
mean=:+/% #
```

```
NB. mean
```

```
mp=:+/. *
```

```
NB. inner products
```

```
NB. Correlation matrix
```

```
dev=: -"1 mean
```

```
NB. residue for multiple("1)
```

```
ss=: +/@:*:@dev
```

```
NB. square sum of residue
```

```
sd=: %:@(ss % #)
```

```
NB. standard deviation
```

```
stand=: dev % "1 sd
```

```
NB. standardization
```

```
cov=: (|: mp ]) % #
```

```
NB. Valiance Covariance matrix
```

```
cor=: cov@stand
```

```
NB. Correlation atrix
```

```
NB. principal=: (stand DAT) mp pick_avec corr DAT
```

```
principal=: stand mp pick_avec@cor
```

```
reg=: % . 1& .@] NB. rinear regression
```

```
reg1=: 3 : '({: "1 y) % . 1& . {"1 y'
```

```
plot_reg=: 3 : 0
```

```
NB. Usage: u STYLE //2 principals
```

```
DAT0=. 2{"1 y
```

```
REG=. reg1 DAT0
```

```
DAT1=. REG&p. { . |: DAT0
```

```
pd 'reset'
```

```
pd 'type marker'
```

```
pd { |: DAT0
```

```
pd 'color red'
```

```
pd 'type line'
```

```
pd { |: /:~({: "1 DAT0), .DAT1
```

```
pd 'show'
```

```
)
```

```
NB. -----
```

```
NB. sample data(G.Suzuki) propotion of Miss Universe
```

```
STYLE=: 165 53 86 56 92 160 47 84 52 92 166 55 86 64 89 164 56 90 60 95
```

```
STYLE=: STYLE,168 55 87 56 87 164 54 87 57 92 168 54 94 58 97 169 55 88 57 92
```

```
STYLE=: STYLE,169 53 86 58 93 166 56 84 57 90 165 53 85 55 90 163 49 84 59 90
```

```
STYLE=: STYLE,164 52 87 58 90 167 53 86 59 88 169 58 89 60 90 169 51 84 60 90
```

```
STYLE=: STYLE,166 50 86 59 87 168 53 88 60 88 165 54 88 62 90 167 50 88 58 89
```

```
STYLE=: STYLE,170 55 88 60 90 168 57 84 62 92 168 56 85 62 94 163 52 83 60 88
```

```
STYLE=: 24 5 $ STYLE
```

```
NB. *****
```

```
NB. -----
```

```
NB. find Eigenvalue and Eigenvector
```

```
NB. Levierre Faddeev Method
```

```
NB. -----
```

```
tr=: (<0 1)&|:
```

```
NB. trace
```

```
NB. umatrix=: (=/~)@i.@#
```

```
char_lf=: 3 : 0
```

```
ANS=.TR_SUM=. +/ tr MAT=. y NB. sum of trace
```

```

UMAT=. =/~ i. # y
for_LF. i.<: # y do.
MAT=. y +/ . * MAT - UMAT * TR_SUM
TR_SUM=. (% 2+LF)* +/ tr MAT
ANS=. ANS,TR_SUM
end.
(p. POL), (<POL=.(-|.ANS),1)
)

char_lf_evec=: 3 : 0
EIGEN=. {@> ; 1{ char_lf y
EIGEN2=. {@> L:0 EIGEN ^/ L:0 |. i. # EIGEN
ADJMAT=. char_lf_evec_sub y
ANS=. <'
for_LF. i. # y do.
TMP=. +/> ( > LF{ EIGEN2) * L:0 ADJMAT
ANS=. ANS,<TMP
end.
EIGEN,;}. ANS
)

char_lf_evec_sub=: 3 : 0
NB. modified char_lf
TR_SUM=. +/ tr MAT=. y NB. sum of trace
ANS=. <UMAT=. =/~ i. # y
for_LF. i.<: # y do.
MAT=. y +/ . * TMP=. MAT - UMAT * TR_SUM
TR_SUM=. (% 2+LF)* +/ tr MAT
ANS=. ANS,<TMP
end.
)

norm0=: ] % [:%: [: +/ *:

pick_evec=: 3 : 0
TMP=.,./}. char_lf_evec y NB. jisuuno narashi
|: ;("1) norm0 L:0 ,.({@> i. # TMP){"1 L:0 TMP
)

NB.+++++
NB. Cluster analysis
NB. Script is written in Jsoftware.com Essay/Dendrite
dist=:+/&.:*:@:-"1/~
dist2=: %:@(+/@):*:@:-"1/~ NB. same dist

NB. Usage: 7 mstc dat1
mstc=: 4 : 0
z=. 0 2$f=. i.k=. x[w=. 0$~0,x
for_e. y do.
if. ~:/j=. |.^:(>/) e{f do.
z=. z,e
if. 1=k.<:k do. z;w,x#0 return. end.
w=.w,f=. ({.j) (f I.@:= {j)} f
end.
end.
assert. 0 [ 'graph is not connected'
)

```

```

boxclust=: (</. i.@#)"1
NB. USAGE:   boxclust 1{::7 mstc dat1

od2=: 2&# #: i.@*:   NB. 2 coord odometer
edgesort=: (([] /: ({~ <"1)) (#~ </"1)) od2@#
NB. USAGE:   |:edgesort dist2 dat2
NB. Usage:D=: boxclust 1{:: (# mstc edgesort) dists dat2

nok=: 3 : 0
z=. (i.{$y),}y
for_i. i.<:#y do. z=. z /:"1 i{z end.
)

trimbox=: {.@(;).0~ _2 _2&({!.1)@(-&2)@{:@$)@":
iceview=: (# {. }. ) ([: trimbox </.)"1 {
linkage=: {~ <"1
icicle=: {.@] , <@:iceview@nok@(1&{::)@] , (<@,.@linkage 0&{::)
NB. Usage:   (icicle (# mstc edgesort)) dist2 4|. dat2

silnok=: 3 : 'nok 1{:: (# mstc edgesort) dist y'
silview=: viewmat@silnok
NB. Usage: silview dat2

nsf=: #~ _2&(+. / \ ~:)@,

NB. -----DATABlock-----

NB. sample data (T.Suga)
DAT0=:1 165 50 110
DAT0=: DAT0,2 165 55 97
DAT0=: DAT0,3 160 52 108
DAT0=:DAT0,4 175 65 96
DAT0=: DAT0,5 175 68 105
DAT0=: DAT0,6 165 70 96
DAT0=: 6 4 $ DAT0

NB. Showcase dendride
dat1=: _2]\1 3 5 6 3 4 3 6 4 6 3 5 2 5 1 4 0 1 2 3 0 2 0 3
NB.   7 mstc e

dat2=: sharma=: _2]\5 5 6 6 15 14 16 15 25 20 30 19

NB. Suzuki 7 type of dogs upper-jaw
dat3=: 9.7 21.0 19.4 7.7 32.0 36.5
dat3=: dat3,8.1 16.7 18.3 7.0 30.3 32.9
dat3=: dat3,13.5 27.3 26.8 10.6 41.9 48.1
dat3=: dat3,11.5 24.3 24.5 9.3 40.0 44.6
dat3=: dat3,10.7 23.5 21.4 8.5 28.8 37.6
dat3=: dat3,9.6 22.6 21.1 8.3 34.4 43.1
dat3=: dat3,10.3 22.1 22.1 8.1 32.3 35.0
dat3=: 7 6 $ dat3
NB. -----

```

```

NB. Arima&Ishimura p80
dat4=: 22.9 24.9 19.3 22.0 28.6 42.6 41.3
dat4=: dat4,.13.7 16.2 11.3 10.4 24.9 26.5 20.3

```