Perlombongan Data Jujukan

```
data(mvad)
str(mvad)
```

```
## 'data.frame':    712 obs. of  86 variables:
##  $ id       : int  1 2 3 4 5 6 7 8 9 10 ...
##  $ weight   : num  0.33 0.57 1.59 1.59 0.57 1.59 0.57 2.75 2 3.6 ...
##  $ male     : Factor w/ 2 levels "no","yes": 1 1 2 1 2 2 2 2 1 1 ...
##  $ catholic : Factor w/ 2 levels "no","yes": 1 1 2 1 1 2 2 2 1 1 ...
##  $ Belfast  : Factor w/ 2 levels "no","yes": 1 1 1 1 1 1 1 1 1 1 ...
##  $ N.Eastern: Factor w/ 2 levels "no","yes": 1 1 1 1 1 1 1 1 1 1 ...
##  $ Southern : Factor w/ 2 levels "no","yes": 1 1 1 1 1 1 1 1 1 1 ...
##  $ S.Eastern: Factor w/ 2 levels "no","yes": 1 1 1 1 1 1 1 1 2 2 ...
##  $ Western  : Factor w/ 2 levels "no","yes": 2 2 2 2 2 2 2 2 1 1 ...
##  $ Grammar  : Factor w/ 2 levels "no","yes": 1 1 1 1 1 1 1 2 1 1 ...
##  $ funemp   : Factor w/ 2 levels "no","yes": 1 1 1 1 2 1 1 1 1 1 ...
##  $ gcse5eq  : Factor w/ 2 levels "no","yes": 1 2 1 1 1 1 1 1 1 1 ...
##  $ fmpr     : Factor w/ 2 levels "no","yes": 2 1 1 1 1 1 1 2 1 1 ...
##  $ livboth  : Factor w/ 2 levels "no","yes": 2 2 2 2 2 1 1 2 1 2 ...
##  $ Jul.93   : Factor w/ 6 levels "school","FE",..: 4 5 5 4 5 5 5 3 5 3 ...
##  $ Aug.93   : Factor w/ 6 levels "school","FE",..: 4 5 5 4 5 5 5 3 5 3 ...
##  $ Sep.93   : Factor w/ 6 levels "school","FE",..: 3 2 4 4 2 5 2 2 4 1 ...
##  $ Oct.93   : Factor w/ 6 levels "school","FE",..: 3 2 4 4 2 4 2 2 4 1 ...
##  $ Nov.93   : Factor w/ 6 levels "school","FE",..: 3 2 4 4 2 4 2 2 4 1 ...
##  $ Dec.93   : Factor w/ 6 levels "school","FE",..: 3 2 4 4 2 4 2 2 4 1 ...
##  $ Jan.94   : Factor w/ 6 levels "school","FE",..: 4 2 4 4 2 4 2 2 4 1 ...
##  $ Feb.94   : Factor w/ 6 levels "school","FE",..: 4 2 4 4 2 4 2 2 4 1 ...
##  $ Mar.94   : Factor w/ 6 levels "school","FE",..: 3 2 4 4 2 4 2 2 4 1 ...
##  $ Apr.94   : Factor w/ 6 levels "school","FE",..: 3 2 4 4 2 4 2 2 4 1 ...
##  $ May.94   : Factor w/ 6 levels "school","FE",..: 3 2 4 4 2 4 2 2 4 1 ...
##  $ Jun.94   : Factor w/ 6 levels "school","FE",..: 3 2 4 4 2 4 2 2 4 1 ...
##  $ Jul.94   : Factor w/ 6 levels "school","FE",..: 3 2 4 4 2 4 2 2 4 5 ...
##  $ Aug.94   : Factor w/ 6 levels "school","FE",..: 3 2 4 4 2 4 2 2 4 5 ...
##  $ Sep.94   : Factor w/ 6 levels "school","FE",..: 3 2 4 4 2 4 2 2 4 3 ...
##  $ Oct.94   : Factor w/ 6 levels "school","FE",..: 3 2 4 4 2 4 2 2 4 3 ...
##  $ Nov.94   : Factor w/ 6 levels "school","FE",..: 3 2 4 4 2 4 2 2 4 3 ...
##  $ Dec.94   : Factor w/ 6 levels "school","FE",..: 3 2 4 4 2 4 2 2 4 3 ...
##  $ Jan.95   : Factor w/ 6 levels "school","FE",..: 3 2 4 4 2 4 2 2 4 3 ...
##  $ Feb.95   : Factor w/ 6 levels "school","FE",..: 3 2 4 4 2 4 2 2 4 3 ...
##  $ Mar.95   : Factor w/ 6 levels "school","FE",..: 3 2 4 4 2 4 2 2 4 3 ...
##  $ Apr.95   : Factor w/ 6 levels "school","FE",..: 3 2 4 4 2 4 2 2 4 3 ...
##  $ May.95   : Factor w/ 6 levels "school","FE",..: 3 2 4 4 2 4 2 2 4 3 ...
##  $ Jun.95   : Factor w/ 6 levels "school","FE",..: 3 2 4 4 2 4 2 2 3 3 ...
##  $ Jul.95   : Factor w/ 6 levels "school","FE",..: 3 2 4 4 2 4 2 3 3 3 ...
##  $ Aug.95   : Factor w/ 6 levels "school","FE",..: 3 2 4 4 2 4 2 3 3 3 ...
##  $ Sep.95   : Factor w/ 6 levels "school","FE",..: 3 2 2 4 2 4 2 3 3 3 ...
##  $ Oct.95   : Factor w/ 6 levels "school","FE",..: 3 2 2 4 6 4 2 3 3 3 ...
```

```
##  $ Nov.95   : Factor w/ 6 levels "school","FE",..: 3 2 2 4 6 4 2 3 3 3 ...
##  $ Dec.95   : Factor w/ 6 levels "school","FE",..: 3 2 2 4 6 4 2 3 3 3 ...
##  $ Jan.96   : Factor w/ 6 levels "school","FE",..: 3 2 2 4 6 4 2 3 3 3 ...
##  $ Feb.96   : Factor w/ 6 levels "school","FE",..: 3 2 2 4 6 4 2 3 3 3 ...
##  $ Mar.96   : Factor w/ 6 levels "school","FE",..: 3 2 2 4 6 4 3 3 3 3 ...
##  $ Apr.96   : Factor w/ 6 levels "school","FE",..: 3 2 2 4 6 4 3 3 3 3 ...
##  $ May.96   : Factor w/ 6 levels "school","FE",..: 3 2 2 4 6 4 3 3 3 3 ...
##  $ Jun.96   : Factor w/ 6 levels "school","FE",..: 3 2 2 4 6 4 3 3 3 3 ...
##  $ Jul.96   : Factor w/ 6 levels "school","FE",..: 3 2 2 4 6 3 3 3 3 3 ...
##  $ Aug.96   : Factor w/ 6 levels "school","FE",..: 3 2 2 4 6 3 3 3 3 3 ...
##  $ Sep.96   : Factor w/ 6 levels "school","FE",..: 3 6 2 4 6 3 3 3 3 3 ...
##  $ Oct.96   : Factor w/ 6 levels "school","FE",..: 3 6 2 4 6 3 3 3 3 3 ...
##  $ Nov.96   : Factor w/ 6 levels "school","FE",..: 3 6 2 4 6 3 3 3 3 3 ...
##  $ Dec.96   : Factor w/ 6 levels "school","FE",..: 3 6 2 4 6 3 3 3 3 3 ...
##  $ Jan.97   : Factor w/ 6 levels "school","FE",..: 3 6 2 4 6 3 3 3 3 3 ...
##  $ Feb.97   : Factor w/ 6 levels "school","FE",..: 3 6 2 4 6 3 3 3 3 3 ...
##  $ Mar.97   : Factor w/ 6 levels "school","FE",..: 3 6 2 4 6 3 3 3 3 3 ...
##  $ Apr.97   : Factor w/ 6 levels "school","FE",..: 3 6 2 4 6 3 3 3 3 3 ...
##  $ May.97   : Factor w/ 6 levels "school","FE",..: 3 6 2 4 6 3 3 3 3 3 ...
##  $ Jun.97   : Factor w/ 6 levels "school","FE",..: 3 6 2 4 6 3 3 3 3 3 ...
##  $ Jul.97   : Factor w/ 6 levels "school","FE",..: 3 6 2 4 6 3 3 3 3 3 ...
##  $ Aug.97   : Factor w/ 6 levels "school","FE",..: 3 6 2 3 6 3 3 3 3 3 ...
##  $ Sep.97   : Factor w/ 6 levels "school","FE",..: 3 6 2 3 6 3 3 3 3 3 ...
##  $ Oct.97   : Factor w/ 6 levels "school","FE",..: 3 6 2 3 6 3 3 3 3 3 ...
##  $ Nov.97   : Factor w/ 6 levels "school","FE",..: 3 6 2 3 6 3 3 3 3 3 ...
##  $ Dec.97   : Factor w/ 6 levels "school","FE",..: 3 6 2 3 6 3 3 3 3 3 ...
##  $ Jan.98   : Factor w/ 6 levels "school","FE",..: 3 6 2 3 6 3 3 3 3 3 ...
##  $ Feb.98   : Factor w/ 6 levels "school","FE",..: 3 6 2 3 6 3 3 3 3 3 ...
##  $ Mar.98   : Factor w/ 6 levels "school","FE",..: 3 6 2 3 6 3 3 3 3 3 ...
##  $ Apr.98   : Factor w/ 6 levels "school","FE",..: 3 6 2 3 6 3 3 3 3 3 ...
##  $ May.98   : Factor w/ 6 levels "school","FE",..: 3 6 2 3 6 3 3 3 3 3 ...
##  $ Jun.98   : Factor w/ 6 levels "school","FE",..: 3 6 2 3 6 3 3 3 3 3 ...
##  $ Jul.98   : Factor w/ 6 levels "school","FE",..: 3 6 3 3 6 3 3 3 3 5 ...
##  $ Aug.98   : Factor w/ 6 levels "school","FE",..: 3 6 3 3 6 3 3 3 3 5 ...
##  $ Sep.98   : Factor w/ 6 levels "school","FE",..: 3 6 3 3 6 3 3 3 3 5 ...
##  $ Oct.98   : Factor w/ 6 levels "school","FE",..: 3 6 3 5 6 3 3 3 3 5 ...
##  $ Nov.98   : Factor w/ 6 levels "school","FE",..: 3 6 3 5 6 3 3 3 3 5 ...
##  $ Dec.98   : Factor w/ 6 levels "school","FE",..: 3 6 3 5 6 3 3 3 3 5 ...
##  $ Jan.99   : Factor w/ 6 levels "school","FE",..: 3 6 3 5 6 3 3 3 3 5 ...
##  $ Feb.99   : Factor w/ 6 levels "school","FE",..: 3 6 3 5 6 3 3 3 3 5 ...
##  $ Mar.99   : Factor w/ 6 levels "school","FE",..: 3 6 3 5 6 3 3 3 3 5 ...
##  $ Apr.99   : Factor w/ 6 levels "school","FE",..: 3 6 3 5 6 3 3 3 3 5 ...
##  $ May.99   : Factor w/ 6 levels "school","FE",..: 3 6 5 5 6 3 3 3 3 5 ...
##  $ Jun.99   : Factor w/ 6 levels "school","FE",..: 3 6 5 5 6 3 3 3 3 5 ...
```

Lajur 1-14 adalah maklumat demografi, bukan data jujukan.

Data jujukan bermula lajur 15-86.

Takrifkan label dan kod bagi setiap keadaan.

```
mvad.labels = c('employment','further education','higher education','joblessness','school','training')
mvad.scode = c('EM','FE','HE','JL','SC','TR')
```

Bina data kelas jujukan

```
mvad.seq = seqdef(mvad, 15:86, states=mvad.scode, labels = mvad.labels,
                  xtstep=6)
```

```
##  [>] state coding:

##       [alphabet]  [label]  [long label]

##      1  employment  EM       employment

##      2  FE          FE       further education

##      3  HE          HE       higher education

##      4  joblessness JL       joblessness

##      5  school      SC       school

##      6  training    TR       training

##  [>] 712 sequences in the data set

##  [>] min/max sequence length: 72/72
```

```
head(mvad.seq,10)
```

```
##    Sequence
## 1  TR-TR-EM-EM-EM-EM-TR-TR-EM-EM-EM-EM-EM-EM-EM-EM-EM-EM-EM-EM-EM-EM-EM-EM-EM-EM-EM-EM-EM-EM-EM-EM-EI
## 2  JL-JL-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FI
## 3  JL-JL-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-FE-FE-FE-FE-FE-FE-FI
## 4  TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TI
## 5  JL-JL-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-HE-HE-HE-HE-HE-HE-HI
## 6  JL-JL-JL-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TI
## 7  JL-JL-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-EI
## 8  EM-EM-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-FE-EM-EM-EM-EM-EM-EM-EM-EM-EI
## 9  JL-JL-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-TR-EM-EM-EM-EM-EM-EM-EM-EM-EM-EM-EI
## 10 EM-EM-SC-SC-SC-SC-SC-SC-SC-SC-SC-SC-JL-JL-EM-EM-EM-EM-EM-EM-EM-EM-EM-EM-EM-EM-EM-EM-EM-EM-EM-EM-EI
```

```
class(mvad.seq)
```

```
## [1] "stslist"    "data.frame"
```

Penunjuk ringkasan statistik

1. Min (purata) masa proses berada dalam setiap keadaan.

```
seqmeant(mvad.seq)
```

```
##    Mean
## EM 32.2
## FE 11.7
## HE  8.4
## JL  6.2
## SC  6.1
## TR  7.4
```

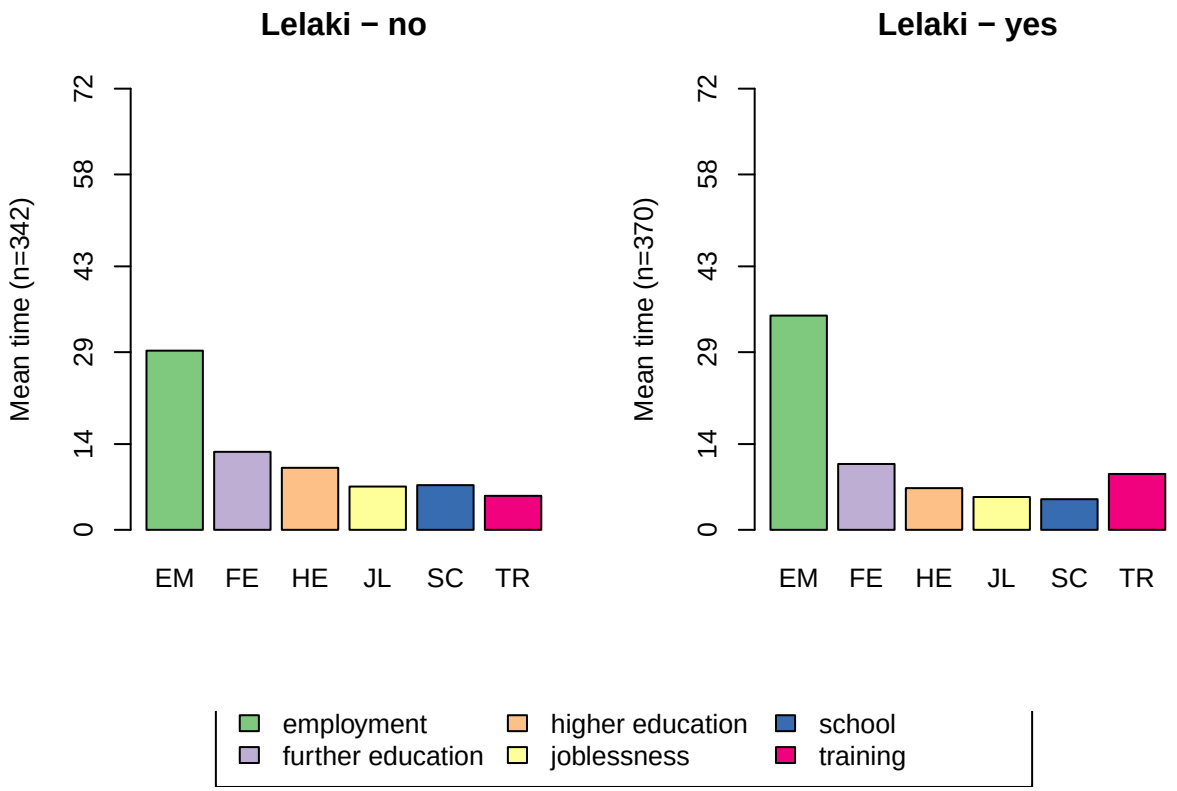
2. Min (purata) masa proses berada dalam setiap keadaan bagi kumpulan tertentu.

Bagi kumpulan Jantina

```
by(mvad.seq,mvad$male,seqmeant)
```

```
## mvad$male: no
##    Mean
## EM 29.2
## FE 12.7
## HE 10.1
## JL  7.1
## SC  7.3
## TR  5.5
## ------------------------------------------------------------
## mvad$male: yes
##    Mean
## EM 35.0
## FE 10.8
## HE  6.8
## JL  5.4
## SC  5.0
## TR  9.1
```

```
seqmtplot(mvad.seq, group = mvad$male, main='Lelaki')
```

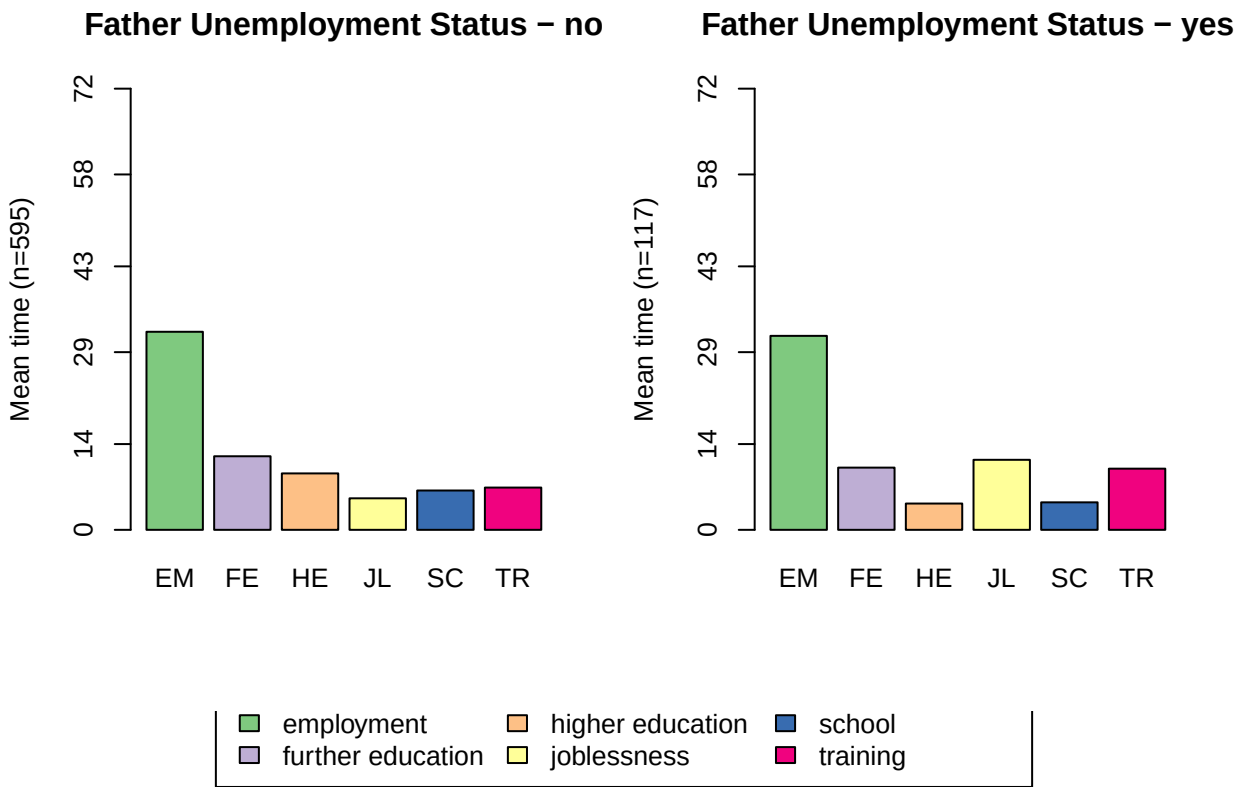



```
by(mvad.seq,mvad$funemp,seqmeant)
```

```
## mvad$funemp: no
##    Mean
## EM 32.3
## FE 12.0
## HE  9.2
## JL  5.1
## SC  6.4
## TR  6.9
## ------------------------------------------------------------
## mvad$funemp: yes
##    Mean
## EM 31.7
## FE 10.2
## HE  4.3
## JL 11.4
## SC  4.5
## TR 10.0
```

Pengvisualan

```
seqmtplot(mvad.seq, group = mvad$funemp, main='Father Unemployment Status')
```

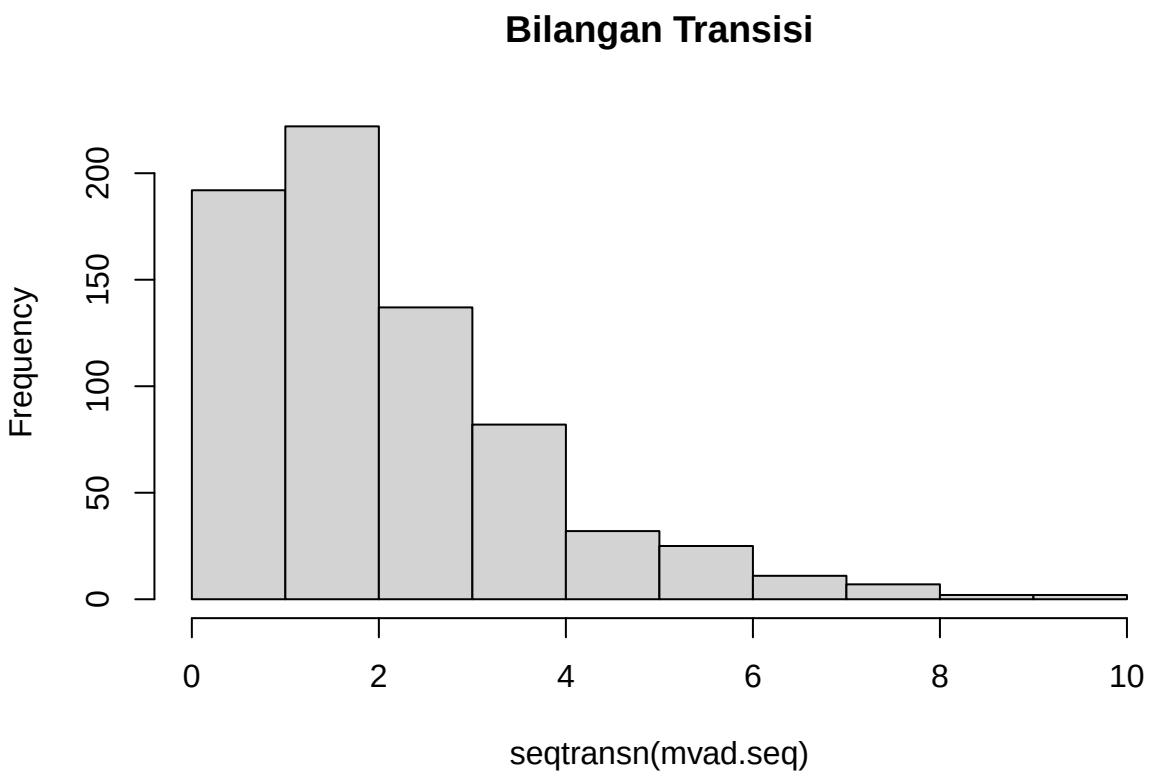


3. Bilangan transisi (peralihan)

```
head(seqtransn(mvad.seq),10)
```

```
##    Trans.
## 1       3
## 2       2
## 3       4
## 4       2
## 5       2
## 6       2
## 7       2
## 8       2
## 9       2
## 10      4
```

```
hist(seqtransn(mvad.seq), main = 'Bilangan Transisi')
```



4. Kadar peralihan.

```
mvad.trate = seqtrate(mvad.seq)
```

```
##  [>] computing transition probabilities for states EM/FE/HE/JL/SC/TR ...
```

```
mvad.trate
```

```
##            [-> EM]      [-> FE]     [-> HE]     [-> JL]      [-> SC]
## [EM ->] 0.98156148 0.0051218100 0.002494099 0.006502472 0.0017369617
## [FE ->] 0.02727710 0.9525354482 0.006488825 0.008771930 0.0009613074
## [HE ->] 0.01023541 0.0001705902 0.987205732 0.001876493 0.0000000000
## [JL ->] 0.04226660 0.0278680910 0.002090107 0.903855086 0.0090571296
## [SC ->] 0.01357883 0.0115074799 0.017031070 0.005293441 0.9482163406
## [TR ->] 0.03742401 0.0039893617 0.000000000 0.013107903 0.0007598784
##              [-> TR]
## [EM ->] 0.0025831737
## [FE ->] 0.0039653929
## [HE ->] 0.0005117707
## [JL ->] 0.0148629819
## [SC ->] 0.0043728423
## [TR ->] 0.9447188450
```

5. Keadaan peralihan yang bergantung terhadap masa.

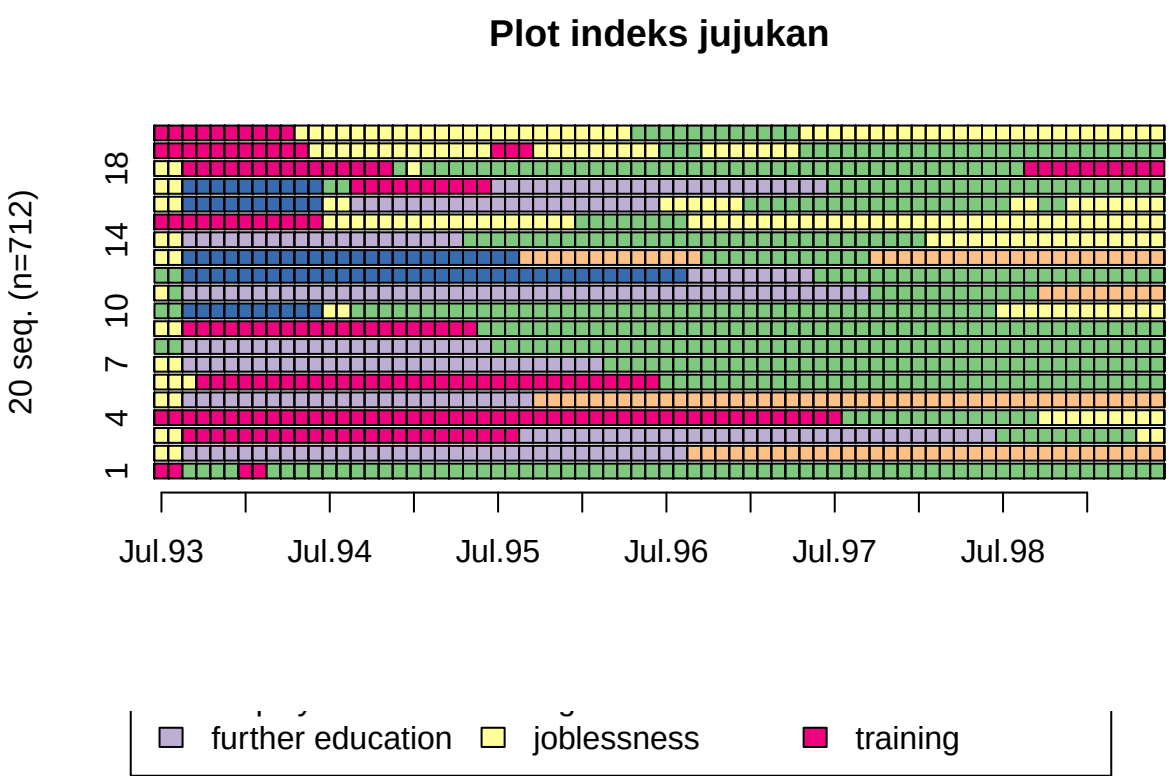
```
, , Jul.93

           [-> EM]     [-> FE] [-> HE]    [-> JL] [-> SC]     [-> TR]
[EM ->] 0.982658960 0.000000000       0 0.01156069       0 0.005780347
[FE ->] 0.000000000 1.000000000       0 0.00000000       0 0.000000000
[HE ->] 0.000000000 0.000000000       0 0.00000000       0 0.000000000
[JL ->] 0.037837838 0.005405405       0 0.92972973       0 0.027027027
[SC ->] 0.000000000 0.000000000       0 0.00000000       1 0.000000000
[TR ->] 0.008196721 0.000000000       0 0.00000000       0 0.991803279

, , Aug.93

           [-> EM]    [-> FE] [-> HE]     [-> JL]    [-> SC]    [-> TR]
[EM ->] 0.382022472 0.39887640       0 0.005617978 0.16853933 0.04494382
[FE ->] 0.000000000 1.00000000       0 0.000000000 0.00000000 0.00000000
[HE ->] 0.000000000 0.00000000       0 0.000000000 0.00000000 0.00000000
[JL ->] 0.057471264 0.49425287       0 0.086206897 0.21264368 0.14942529
[SC ->] 0.007407407 0.12592593       0 0.000000000 0.81481481 0.05185185
[TR ->] 0.031496063 0.02362205       0 0.007874016 0.01574803 0.92125984
```

Pengvisualan

Plot indeks jujukan

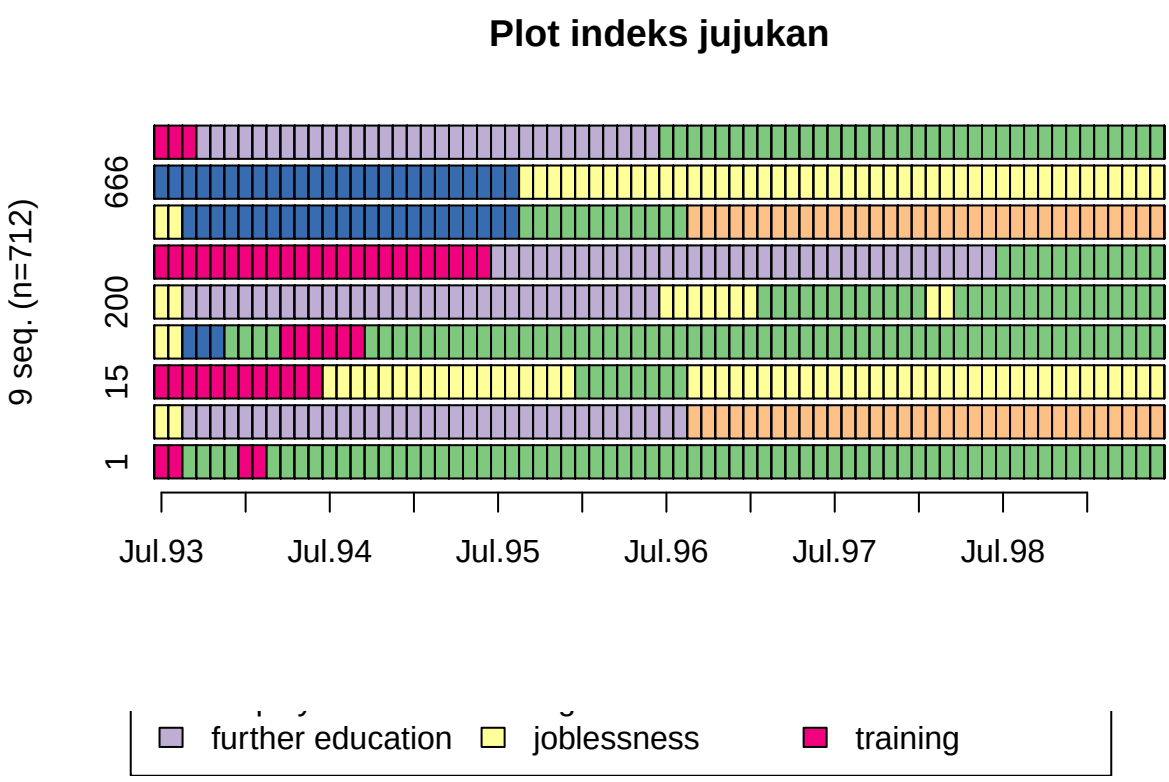
20 Individu pertama

```
seqiplot(mvad.seq, main='Plot indeks jujukan',
         idxs=1:20)
```



pilih individu khusus (1,2,15,90,200,267, 456,666,700)

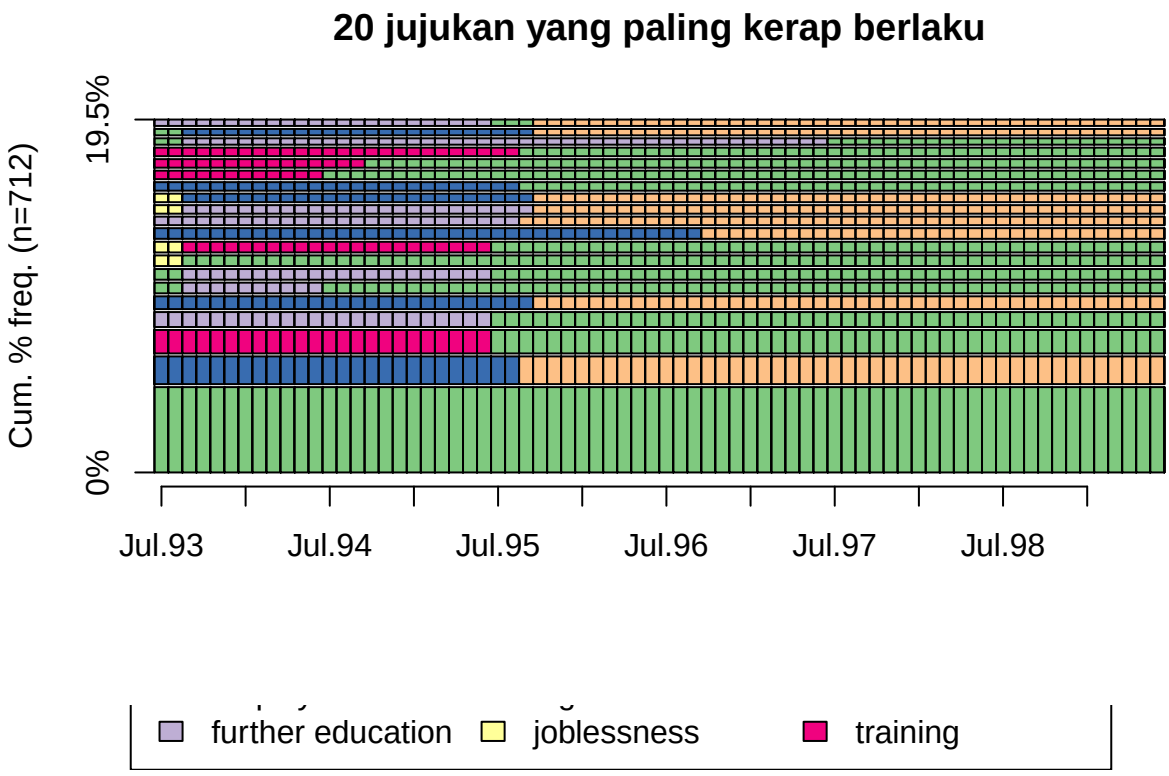
```
seqiplot(mvad.seq, main='Plot indeks jujukan',
         idxs=c(1,2,15,90,200,267, 456,666,700))
```



Plot Jujukan kekerapan

20 jujukan yang paling kerap berlaku

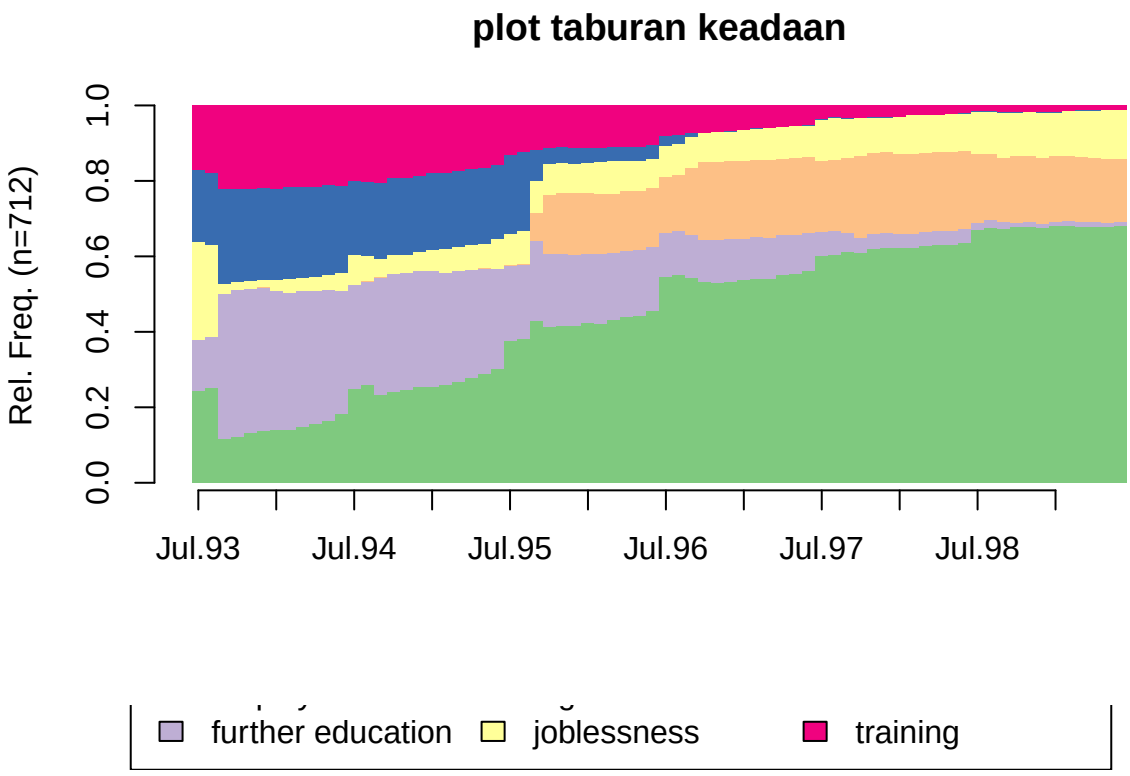
```
seqfplot(mvad.seq, main='20 jujukan yang paling kerap berlaku',
         idxs=1:20)
```



Plot taburan keadaan

corak umum keseluruhan set trajektori dalam data jujukan

```
seqdplot(mvad.seq, border=NA,
    main='plot taburan keadaan')
```

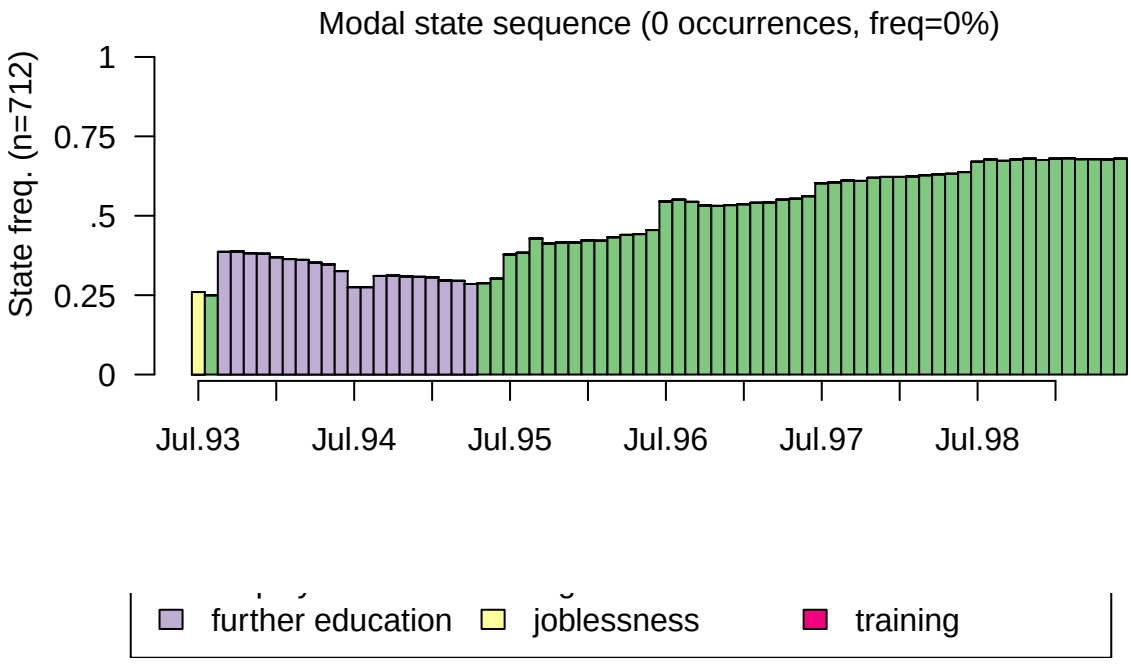


Plot keadaan modal

jujukan bagi keadaan yang paling kerap berlaku pada setiap kedudukan

keadaan dominan pada setiap masa

```
seqmsplot(mvad.seq)
```



Indeks Entropi

Ukuran terhadap variasi keadaan dalam dalam data jujukan

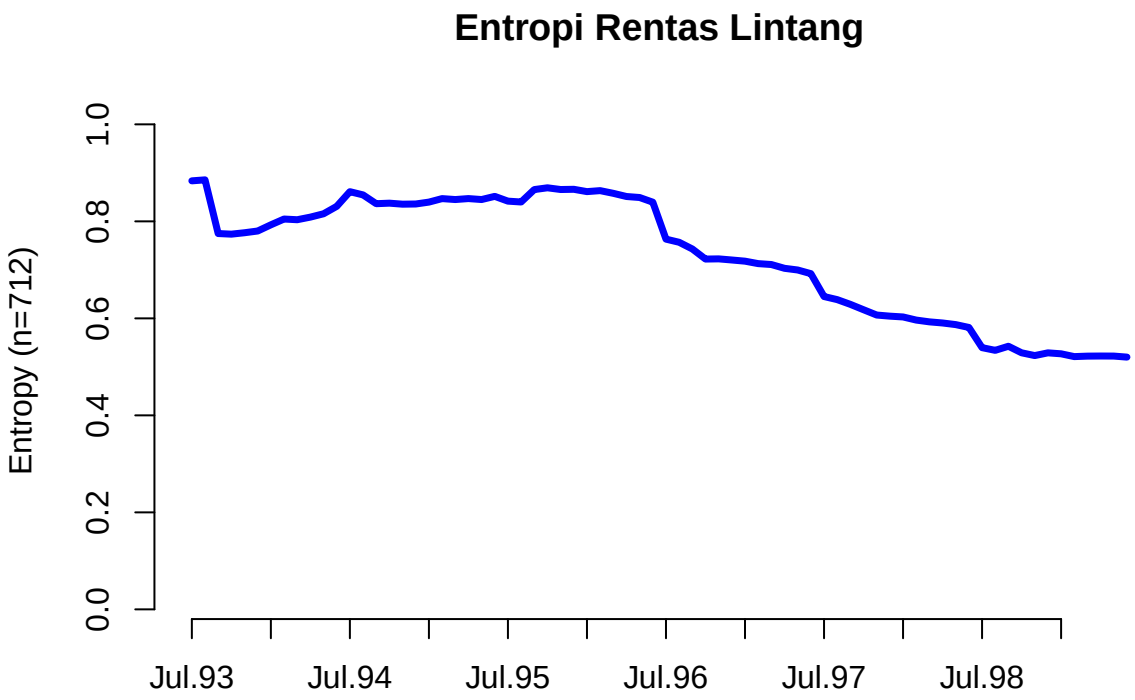
$$h(p_1, \ldots, p_a) = -\sum_{i=1}^{a} p_i \log(p_i)$$

dengan p_i ialah perkadaran entiti dalam keadaan-i, a ialah bilangan keadaan.

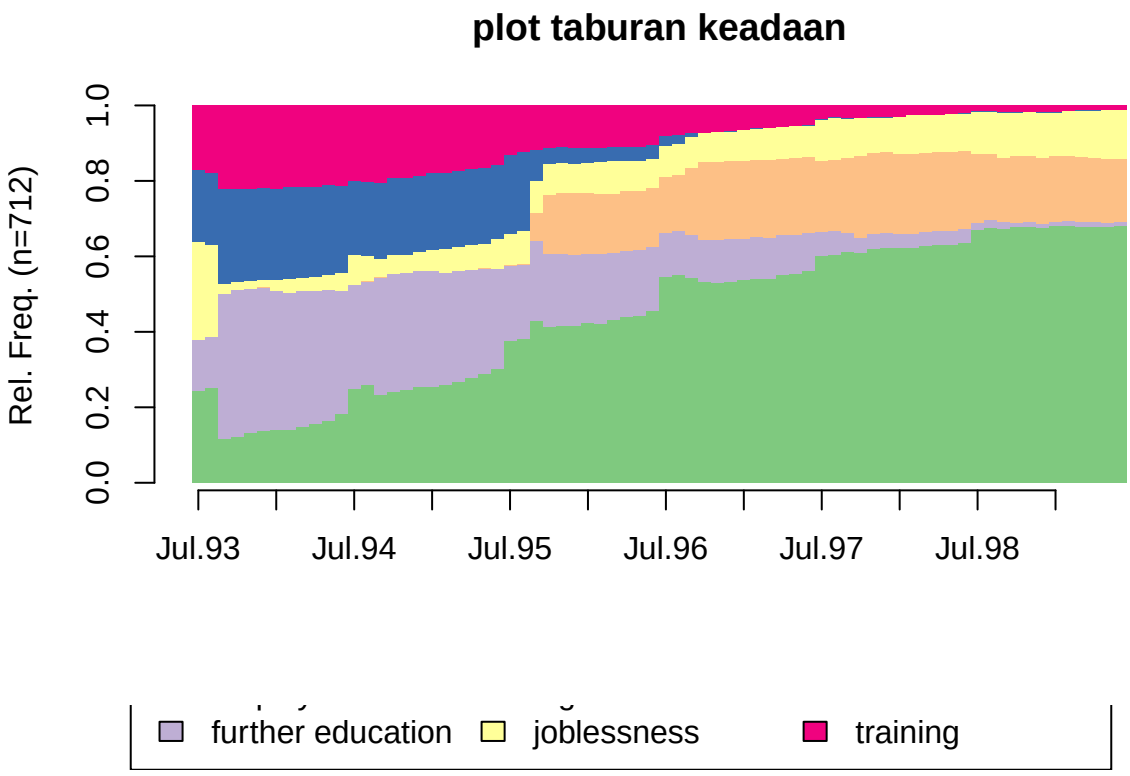
Jika nilai entropi= 0 menunjukkan bahawa semua entiti berada dalam keadaan yang sama (variasi adalah 0)

Entropi Rentas Lintang

```
seqHtplot(mvad.seq, main='Entropi Rentas Lintang')
```




```
seqdplot(mvad.seq, border=NA, main='plot taburan keadaan')
```



Data Jujukan Peristiwa

```
mvad.seqe = seqecreate(mvad.seq)
head(mvad.seqe)
```

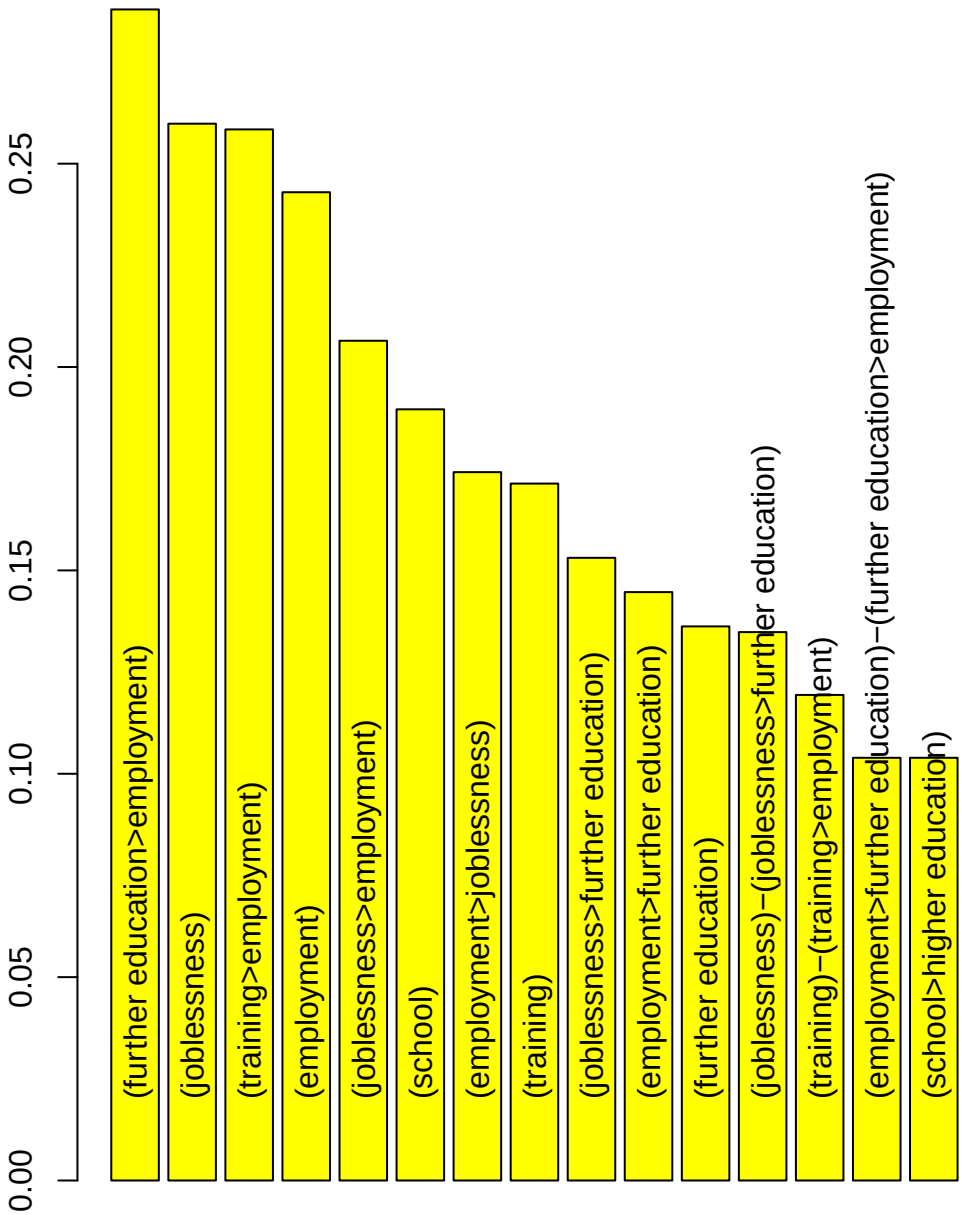
```
## [1] (training)-2-(training>employment)-4-(employment>training)-2-(training>employment)-64
## [2] (joblessness)-2-(joblessness>further education)-36-(further education>higher education)-34
## [3] (joblessness)-2-(joblessness>training)-24-(training>further education)-34-(further education>empl
## [4] (training)-49-(training>employment)-14-(employment>joblessness)-9
## [5] (joblessness)-2-(joblessness>further education)-25-(further education>higher education)-45
## [6] (joblessness)-3-(joblessness>training)-33-(training>employment)-36
```

Sub-jujukan

```
fsubseq = seqefsub(mvad.seqe, pmin.support=0.05)
```

15 subjujukan paling kerap

```
plot(fsubseq[1:15], col='yellow')
```


0.00
0.05
0.10
0.15
0.20
0.25
(further education>employment)
(joblessness)
(training>employment)
(employment)
(joblessness>employment)
(school)
(employment>joblessness)
(training)
(joblessness>further education)
(employment>further education)
(further education)
(joblessness)−(joblessness>further education)
(training)−(training>employment)
(employment>further education)−(further education>employment)
(school>higher education)

Mengkategorikan corak

```
library(cluster)
```

```
submat = seqsubm(mvad.seq, method = 'TRATE')
```

```
##  [>] creating substitution-cost matrix using transition rates ...
```

```
##  [>] computing transition probabilities for states EM/FE/HE/JL/SC/TR ...
```

```
submat
```

```
##          EM       FE       HE       JL       SC       TR
## EM 0.000000 1.967601 1.987270 1.951231 1.984684 1.959993
## FE 1.967601 0.000000 1.993341 1.963360 1.987531 1.992045
## HE 1.987270 1.993341 0.000000 1.996033 1.982969 1.999488
## JL 1.951231 1.963360 1.996033 0.000000 1.985649 1.972029
## SC 1.984684 1.987531 1.982969 1.985649 0.000000 1.994867
## TR 1.959993 1.992045 1.999488 1.972029 1.994867 0.000000
```

```
dist.om = seqdist(mvad.seq, method='OM',sm=submat)
```

```
##  [>] 712 sequences with 6 distinct states
```

```
##  [>] checking 'sm' (size and triangle inequality)
```

```
##  [>] 557 distinct  sequences
```

```
##  [>] min/max sequence lengths: 72/72
```

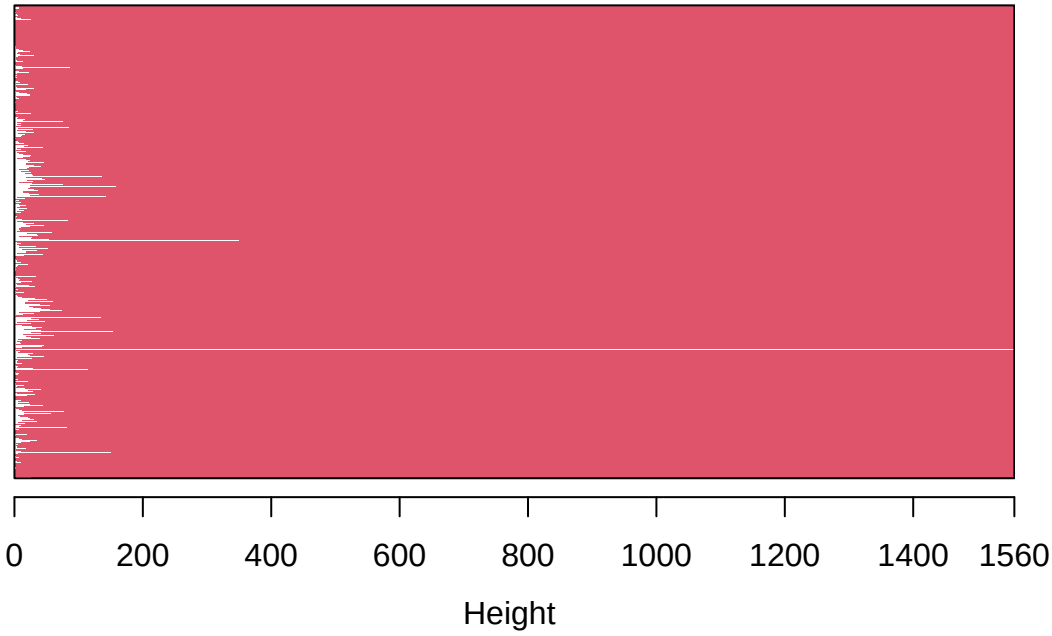
```
##  [>] computing distances using the OM metric
```

```
##  [>] elapsed time: 0.86 secs
```

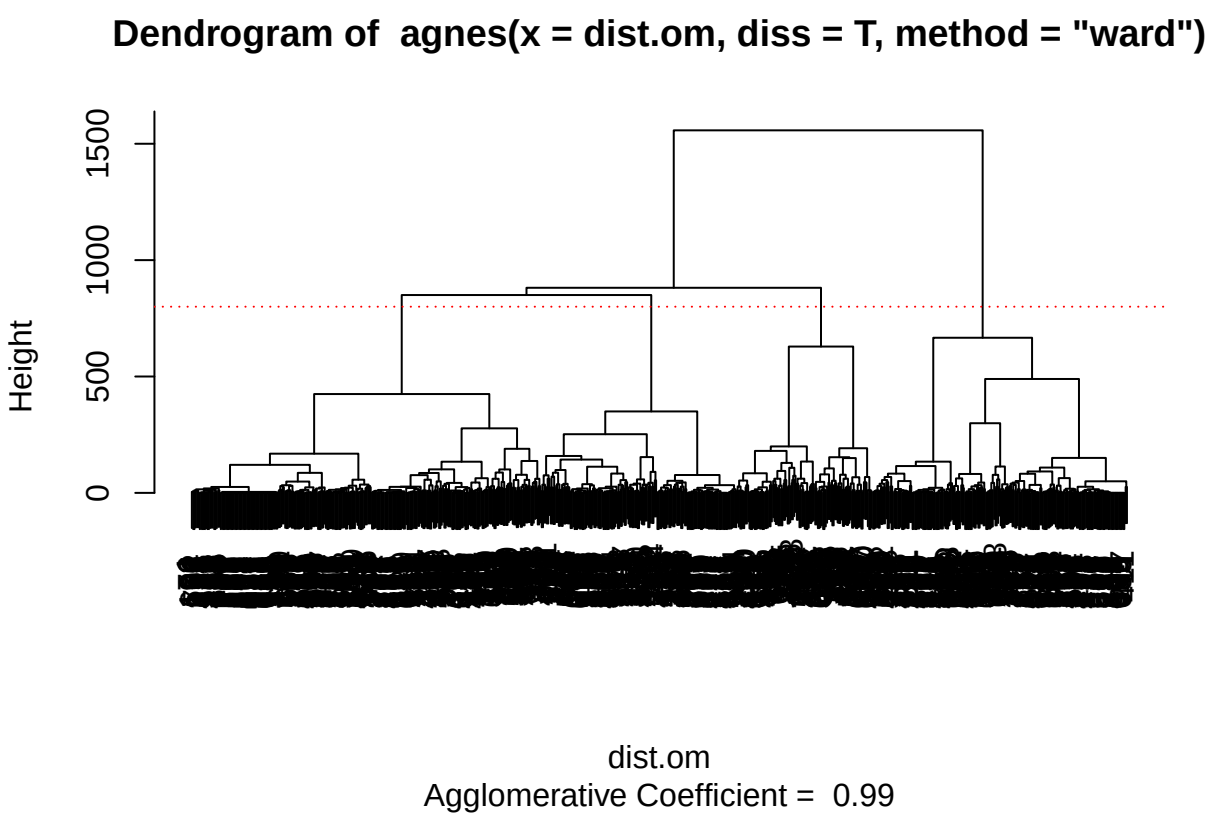
dapatkan kelompok dalam data berdasarkan jarak optimum

```
clusterward = agnes(dist.om, diss=T, method='ward')
plot(clusterward);abline(h=800, lty='dotted', col='red')
```

Banner of agnes(x = dist.om, diss = T, method = "ward")



Agglomerative Coefficient = 0.99



misalkan k=4 kelompok adalah signifikan

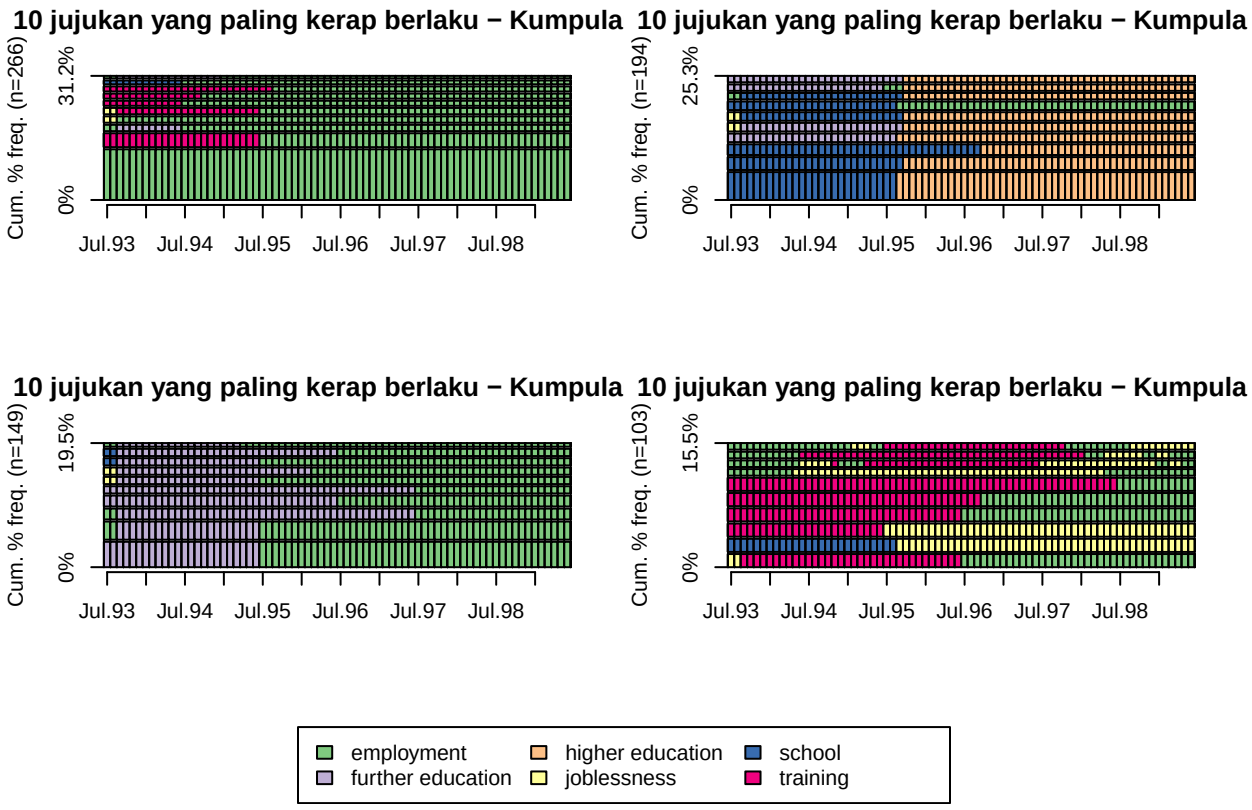
```
cl.4 = cutree(clusterward, 4)
cl4fac = factor(cl.4, labels=paste("Kumpulan", 1:4))
head(cl4fac)
```

```
## [1] Kumpulan 1 Kumpulan 2 Kumpulan 3 Kumpulan 4 Kumpulan 2 Kumpulan 4
## Levels: Kumpulan 1 Kumpulan 2 Kumpulan 3 Kumpulan 4
```

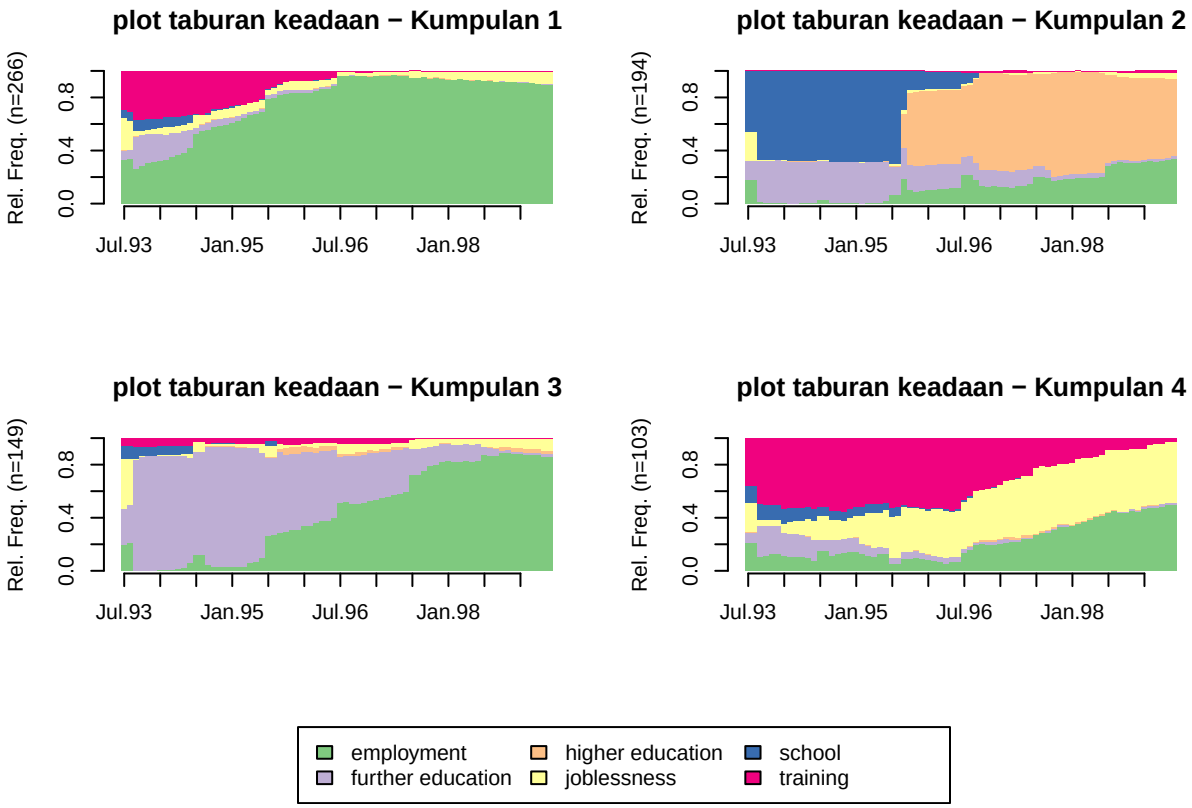
Jalankan analisis lanjutan terhadap setiap group

setiap individu dalam kumpulan yang sama akan mempunyai ciri yang hampir sama

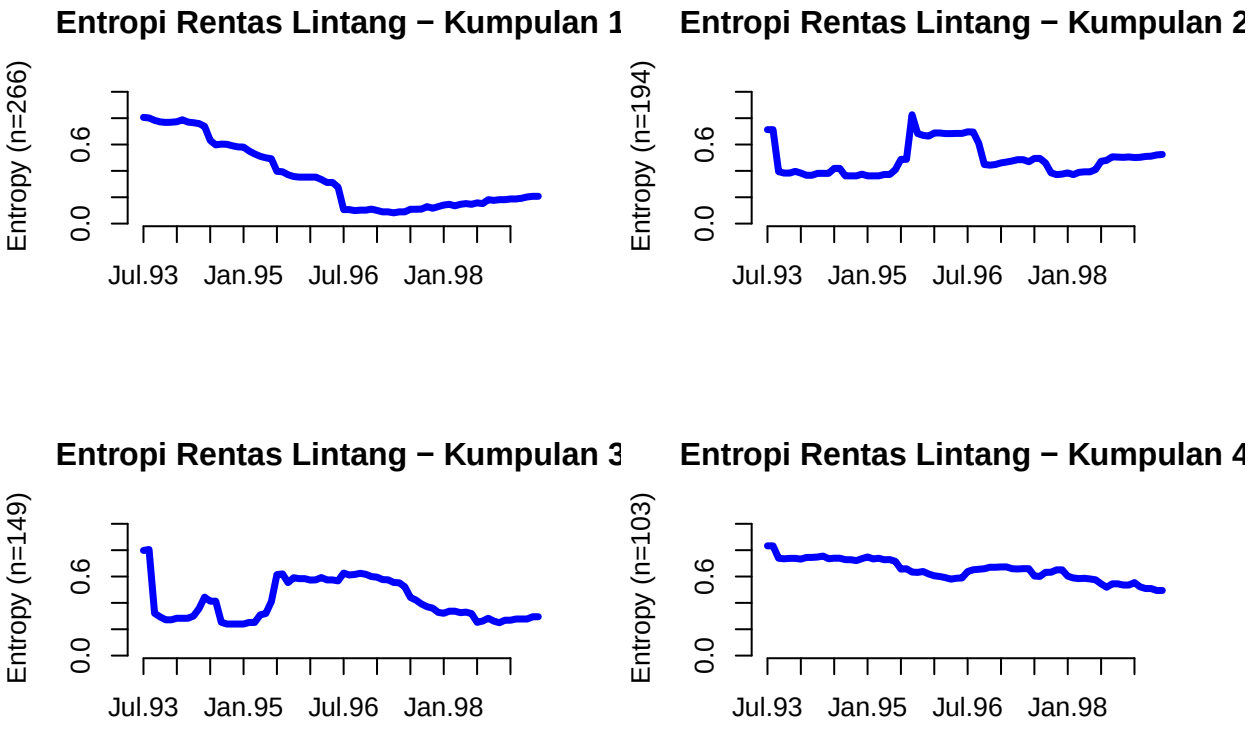
```
seqfplot(mvad.seq, group = cl4fac,
         main='10 jujukan yang paling kerap berlaku',
         idxs=1:10)
```



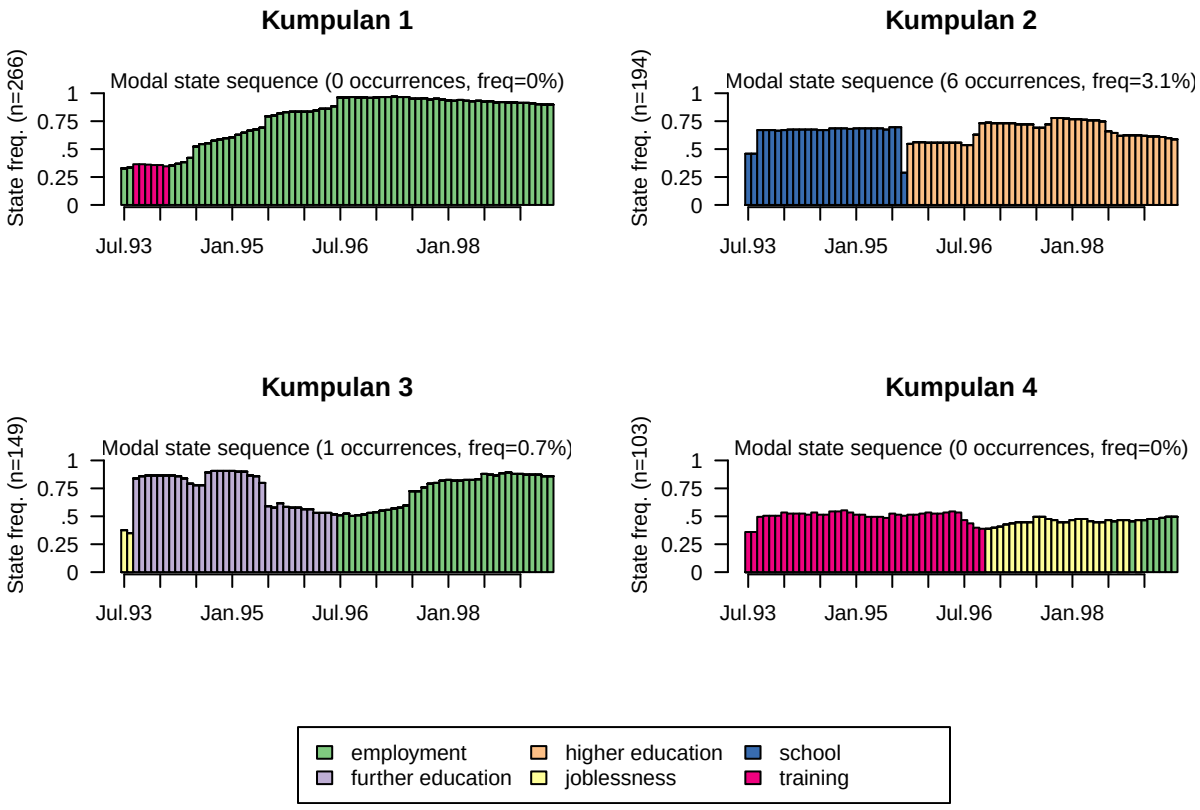

```
seqdplot(mvad.seq,
         group=cl4fac,
         border=NA,
         main='plot taburan keadaan')
```




```
seqHtplot(mvad.seq,group=cl4fac, main='Entropi Rentas Lintang')
```

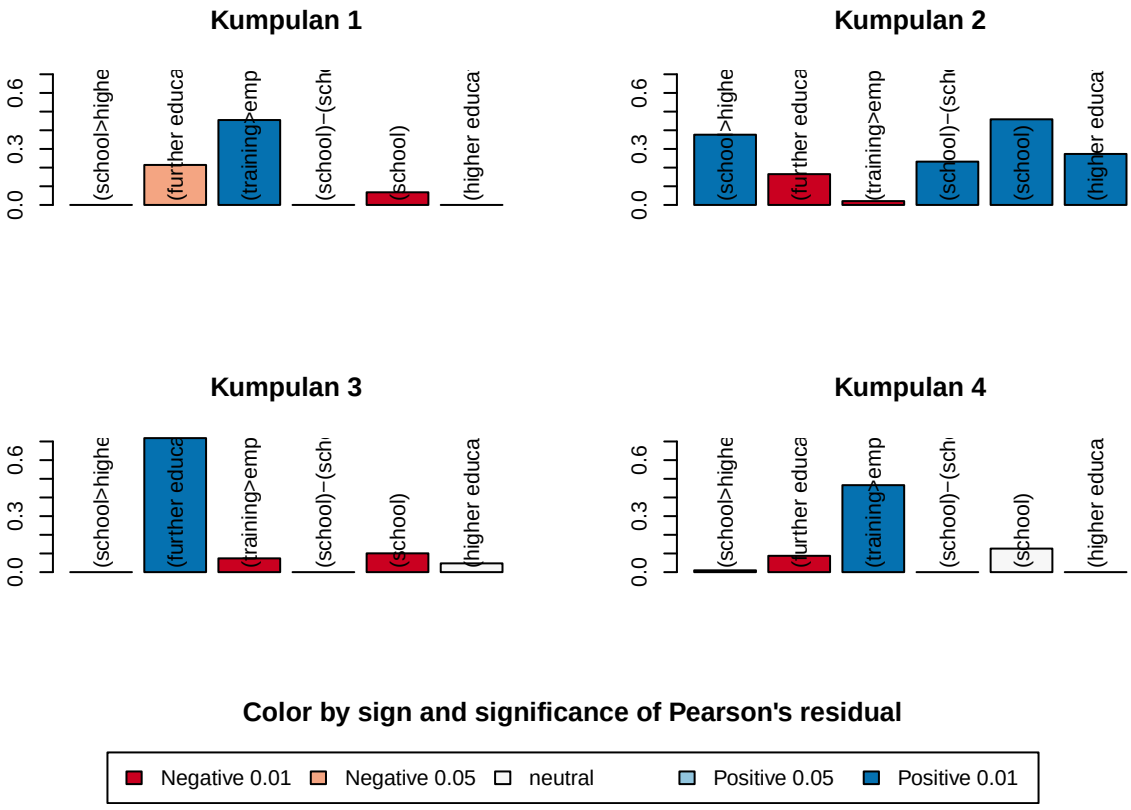



```
seqmsplot(mvad.seq, group=cl4fac)
```



sub-jujukan bagi setiap group

```
disc = seqecmpgroup(fsubseq, group = cl4fac)
plot(disc[1:6])
```


Kumpulan 1
Kumpulan 2
Kumpulan 3
Kumpulan 4
0.0
0.3
0.6
(school>highe
(further educa
(training>emp
(school)−(sch
(school)
(higher educa
Color by sign and significance of Pearson's residual
Negative 0.01
Negative 0.05
neutral
Positive 0.05
Positive 0.01