1. Test Pertama

K-means clustering with 2 clusters of sizes 199913, 87

Cluster means:

DAYA KWHLWBP KWHWBP

1 -0.01701271 -0.01600802 -0.01609205

2 39.09266180 36.78403009 36.97711770

Clustering vector:

[1] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[32] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[63] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[94] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[125] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[156] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[187] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[218] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[249] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[280] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[311] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[342] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[373] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[404] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[435] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[466] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[497] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[528] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[559] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[590] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[621] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[652] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[683] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[714] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[745] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[776] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[807] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[838] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[869] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[900] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[931] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[962] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

[993] 1 1 1 1 1 1 1 1

[ reached getOption("max.print") -- omitted 199000 entries ]

Within cluster sum of squares by cluster:

[1] 87102.37 143104.85

(between\_SS / total\_SS = 61.6 %)

Available components:

[1] "cluster" "centers" "totss" "withinss"

[5] "tot.withinss" "betweenss" "size" "iter"

[9] "ifault"

Gap statictical Method

Clustering Gap statistic ["clusGap"] from call:

clusGap(x = data10, FUNcluster = kmeans, K.max = 10, B = 50, nstart = 25)

B=50 simulated reference sets, k = 1..10; spaceH0="scaledPCA"

--> Number of clusters (method 'firstmax'): 1

logW E.logW gap SE.sim

[1,] 7.790109 12.35337 4.563265 0.002367602

[2,] 7.684584 11.84400 4.159418 0.002597382

[3,] 7.565985 11.62427 4.058281 0.002214755

[4,] 7.513395 11.50754 3.994147 0.001753829

[5,] 7.319664 11.43821 4.118548 0.001933672

[6,] 7.247742 11.39381 4.146064 0.002039190

[7,] 7.069548 11.35497 4.285420 0.001895753

[8,] 7.111901 11.31383 4.201928 0.002029793

[9,] 6.903308 11.27381 4.370506 0.001992878

[10,] 6.873889 11.23599 4.362097 0.001919789

K-means clustering with 9 clusters of sizes 188, 55, 13, 179149, 66, 16916, 2949, 37, 627

Cluster means:

DAYA KWHLWBP KWHWBP

1 5.59020644 6.69453842 0.92248840

2 22.31943505 20.23538449 18.86752286

3 63.63518309 87.49592184 100.84423257

4 -0.08863443 -0.08653068 -0.01794770

5 13.46149503 8.81863467 6.62738080

6 0.28479215 0.29206140 -0.04581655

7 1.10971622 1.17511802 -0.04581655

8 44.57707259 33.84044423 31.88399612

9 3.42117671 2.79562851 -0.02196740

Clustering vector:

[1] 4 4 4 4 4 4 4 4 4 4 4 6 4 4 4 4 6 4 4 4 4 4 4 4 4 4 4 4 4 4 4

[32] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 4 4 4 4

[63] 4 4 4 4 4 4 4 4 4 4 7 4 4 4 4 4 6 6 4 4 4 4 4 4 6 4 4 4 4 4 4

[94] 4 4 4 6 4 4 6 4 4 4 4 4 6 4 4 6 4 4 4 4 4 4 4 4 4 6 4 4 6 4 4

[125] 4 4 4 4 4 4 4 4 4 4 4 4 6 4 4 4 4 4 4 4 6 4 4 6 4 4 4 4 4 6 4

[156] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 7 4 7 4 4 4 4 4

[187] 7 6 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 6 4 4 4 4 4 4

[218] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 4 4 6 4 4 6 4 4 4 4 4 4 4 4

[249] 4 4 4 4 4 4 4 4 4 4 6 6 4 4 4 4 4 6 4 4 4 4 4 6 6 4 6 6 4 4 4

[280] 4 7 4 4 4 4 4 4 4 4 4 4 4 4 4 6 4 4 6 4 4 4 4 4 4 4 4 4 4 4 4

[311] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 4 4 4 4 4

[342] 4 4 4 4 4 4 4 4 6 4 4 4 4 4 4 4 4 4 4 4 7 4 4 4 4 4 7 4 4 4 4

[373] 4 4 4 1 4 4 4 4 6 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 4 4 4 4 4 4

[404] 6 4 4 4 6 4 6 4 4 4 4 4 4 4 4 6 6 4 4 4 4 4 6 4 4 4 4 4 4 4 4

[435] 4 4 4 4 4 4 4 4 4 4 4 4 6 4 6 4 4 4 7 4 4 4 4 4 4 4 4 4 4 4 4

[466] 4 4 4 4 4 4 6 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 4 4 6 4 4

[497] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 9 6 4 4 4 4 4 4 4 6 4 4 4 7 4 6

[528] 6 4 4 6 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 4

[559] 4 4 4 4 4 4 4 6 4 4 4 4 4 6 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4

[590] 4 4 4 4 4 4 4 4 4 4 4 4 4 9 4 4 4 4 4 4 4 4 4 4 4 4 6 4 4 4 4

[621] 4 4 4 4 4 6 4 4 4 4 4 4 7 7 4 4 4 4 4 4 4 4 6 4 4 4 4 4 4 4 4

[652] 4 6 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 4 6 4 7 4 4 4

[683] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 6 4 4 4 4 6 4 4 4 4 4 4

[714] 4 4 4 4 4 4 4 4 6 4 4 4 4 4 4 6 4 6 4 4 4 4 4 4 4 4 4 4 4 4 4

[745] 4 4 4 4 4 1 4 4 4 4 4 4 4 4 4 4 4 7 6 4 4 7 4 4 4 4 4 4 4 6 4

[776] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4

[807] 4 4 4 4 4 4 7 4 4 4 4 4 4 4 4 4 4 6 4 4 4 4 4 4 4 6 4 6 4 4 4

[838] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 4 4 4

[869] 4 4 4 7 4 6 4 4 4 4 4 4 4 4 4 4 6 4 6 6 4 4 4 4 4 4 4 4 4 4 4

[900] 4 4 4 4 4 9 4 4 6 4 4 4 4 4 4 4 4 4 6 4 4 4 4 6 4 4 4 4 9 4 4

[931] 4 4 4 4 4 4 6 4 4 6 4 4 4 4 4 4 4 4 6 4 4 4 4 4 4 4 4 4 4 4 4

[962] 4 4 4 4 4 4 4 4 4 6 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 4

[993] 4 4 4 4 4 4 4 4

[ reached getOption("max.print") -- omitted 199000 entries ]

Within cluster sum of squares by cluster:

[1] 2596.156 6462.388 3266.157 1599.743 1891.831 1584.731

[7] 1757.366 11503.146 1900.830

(between\_SS / total\_SS = 94.6 %)

Available components:

[1] "cluster" "centers" "totss" "withinss"

[5] "tot.withinss" "betweenss" "size" "iter"

[9] "ifault"

K-means clustering with 7 clusters of sizes 37, 57, 10035, 818, 188933, 13, 107

Cluster means:

DAYA KWHLWBP KWHWBP

1 44.57707259 33.84044423 31.88399612

2 22.16176927 19.92860274 18.68676963

3 0.64186838 0.64351226 -0.04581655

4 3.57049103 3.48194423 0.02808244

5 -0.07565617 -0.07246416 -0.01939090

6 63.63518309 87.49592184 100.84423257

7 11.14305123 8.03291263 5.08925498

Clustering vector:

[1] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5

[32] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5

[63] 5 5 5 5 5 5 5 5 5 5 3 5 5 5 5 5 5 3 5 5 5 5 5 5 5 5 5 5 5 5 5

[94] 5 5 5 5 5 5 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 5 5 3 5 5

[125] 5 5 5 5 5 5 5 5 5 5 5 5 3 5 5 5 5 5 5 5 5 5 5 3 5 5 5 5 5 3 5

[156] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 5 3 5 5 5 5 5

[187] 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 5 5 5 5 5 5 5

[218] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 5 5 3 5 5 5 5 5 5 5 5 5 5 5

[249] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 3 5 5 5 5 5 5

[280] 5 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 5 5 5 5 5 5 5 5 5 5 5 5

[311] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 5 5 5 5 5

[342] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 5 5 5 5 5 3 5 5 5 5

[373] 5 5 5 4 5 5 5 5 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 5 5 5 5 5 5

[404] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 5 5 5 5 5 5 5 5

[435] 5 5 5 5 5 5 5 5 5 5 5 5 3 5 5 5 5 5 3 5 5 5 5 5 5 5 5 5 5 5 5

[466] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5

[497] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 5 5 5 5 5 5 5 5 3 5 5 5 3 5 3

[528] 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5

[559] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5

[590] 5 5 5 5 5 5 5 5 5 5 5 5 5 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5

[621] 5 5 5 5 5 5 5 5 5 5 5 5 3 3 5 5 5 5 5 5 5 5 3 5 5 5 5 5 5 5 5

[652] 5 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 5 5 5

[683] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 5 5 5 5 5 5 5 5 5 5 5

[714] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 5 5 5 5 5 5 5 5 5 5 5 5 5

[745] 5 5 5 5 5 7 5 5 5 5 5 5 5 5 5 5 5 3 3 5 5 3 5 5 5 5 5 5 5 5 5

[776] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5

[807] 5 5 5 5 5 5 3 5 5 5 5 5 5 5 5 5 5 3 5 5 5 5 5 5 5 5 5 3 5 5 5

[838] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5

[869] 5 5 5 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5

[900] 5 5 5 5 5 4 5 5 5 5 5 5 5 5 5 5 5 5 3 5 5 5 5 3 5 5 5 5 4 5 5

[931] 5 5 5 5 5 5 5 5 5 3 5 5 5 5 5 5 5 5 3 5 5 5 5 5 5 5 5 5 5 5 5

[962] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 5

[993] 5 5 5 5 5 5 5 5

[ reached getOption("max.print") -- omitted 199000 entries ]

Within cluster sum of squares by cluster:

[1] 11503.146 6711.760 4256.869 5356.217 3122.984 3266.157

[7] 3601.988

(between\_SS / total\_SS = 93.7 %)

Available components:

[1] "cluster" "centers" "totss" "withinss"

[5] "tot.withinss" "betweenss" "size" "iter"

[9] "ifault"