NbClust(data = EMEUboneclean, diss = NULL, distance = "euclidean", min.nc = 2, max.nc = 15, method = "ward.D2")

\*\*\* : The Hubert index is a graphical method of determining the number of clusters.

In the plot of Hubert index, we seek a significant knee that corresponds to a

significant increase of the value of the measure i.e the significant peak in Hubert

index second differences plot.

\*\*\* : The D index is a graphical method of determining the number of clusters.

In the plot of D index, we seek a significant knee (the significant peak in Dindex

second differences plot) that corresponds to a significant increase of the value of

the measure.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

\* Among all indices:

\* 3 proposed 2 as the best number of clusters

\* 8 proposed 3 as the best number of clusters

\* 2 proposed 4 as the best number of clusters

\* 1 proposed 5 as the best number of clusters

\* 6 proposed 6 as the best number of clusters

\* 1 proposed 7 as the best number of clusters

\* 1 proposed 12 as the best number of clusters

\* 1 proposed 15 as the best number of clusters

\*\*\*\*\* Conclusion \*\*\*\*\*

\* According to the majority rule, the best number of clusters is 3

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

$All.index

KL CH Hartigan CCC Scott Marriot TrCovW TraceW Friedman Rubin Cindex DB Silhouette Duda

2 2.9470 1923.879 1552.1379 -22.9149 3595.199 28062699 10559187.3 5648.984 1.3085 1.4650 0.1413 1.4502 0.3921 0.5151

3 5.2031 2098.406 1291.8626 -42.5995 5804.395 37025991 3765891.2 4107.801 2.1228 2.0147 0.1388 1.0617 0.4075 0.6043

4 1.1856 2265.962 966.0241 -38.5583 8121.882 37602469 1738443.2 3130.121 3.4543 2.6440 0.1565 1.0465 0.3121 0.5344

5 1.5564 2337.445 868.9175 -36.8777 9827.143 38914172 1151233.5 2537.343 4.6931 3.2617 0.1441 1.0428 0.3162 0.5629

6 0.1082 2436.193 337.8742 -34.5102 11286.202 39389006 999386.8 2096.652 5.9249 3.9472 0.1183 1.1218 0.3068 0.6733

7 1.4673 2251.894 367.1101 -39.2452 12000.497 45114845 707889.5 1938.203 6.6749 4.2699 0.1106 1.1897 0.2896 0.5654

8 1.3385 2153.608 357.8757 -41.9811 12646.659 50408444 677554.7 1780.053 7.3405 4.6493 0.1221 1.1786 0.2866 0.6735

9 1.1280 2091.884 324.2138 -43.8069 13311.730 54328058 677271.5 1638.139 8.1065 5.0521 0.1205 1.1299 0.2902 0.5711

10 2.0277 2040.953 348.1011 -45.3730 13966.314 57260534 512580.7 1518.902 8.9695 5.4487 0.1156 1.1308 0.2811 0.5685

11 2.1568 2026.036 345.6806 -45.9072 14668.331 58476296 378339.8 1400.805 9.9641 5.9080 0.1138 1.0910 0.2821 0.4325

12 2.0891 2027.022 329.8978 -45.9650 15291.359 59866562 370837.8 1292.565 10.8585 6.4028 0.1462 1.0017 0.2826 0.6694

13 1.2932 2033.633 328.1841 -45.8458 15957.638 59813276 287846.6 1196.890 11.9718 6.9146 0.1411 1.0205 0.2557 0.6409

14 0.2107 2051.260 244.2454 -45.3911 16548.071 60147063 285571.4 1108.703 12.9476 7.4646 0.1323 1.0586 0.2523 0.5438

15 1.7699 2034.476 246.7738 -45.9523 17020.621 61596685 281030.2 1046.725 13.8212 7.9066 0.1260 1.0494 0.2570 0.5299

Pseudot2 Beale Ratkowsky Ball Ptbiserial Frey McClain Dunn Hubert SDindex Dindex SDbw

2 1146.7191 0.9407 0.3673 2824.4922 0.4729 -0.4888 0.3803 0.0067 2e-04 6.3540 0.9403 1.4088

3 1910.0016 0.6546 0.4087 1369.2671 0.5423 1.7266 0.3885 0.0072 2e-04 4.5541 0.8232 0.8481

4 816.4711 0.8704 0.3940 782.5302 0.4589 0.0132 0.9319 0.0040 2e-04 4.4837 0.7153 0.9543

5 1518.3939 0.7763 0.3723 507.4687 0.4816 0.6693 0.9502 0.0040 3e-04 4.0522 0.6508 0.7618

6 465.7589 0.4847 0.3528 349.4420 0.4437 0.4731 1.3848 0.0040 3e-04 4.2693 0.5742 0.6447

7 214.4304 0.7658 0.3308 276.8862 0.4345 0.0040 1.5027 0.0040 3e-04 4.9696 0.5426 0.5867

8 142.5110 0.4831 0.3132 222.5067 0.4371 -0.0846 1.4936 0.0044 3e-04 4.8725 0.5256 0.5206

9 491.1249 0.7498 0.2985 182.0154 0.4397 0.4829 1.4809 0.0044 3e-04 4.6677 0.5135 0.4678

10 202.6979 0.7563 0.2857 151.8902 0.4331 0.0175 1.5512 0.0044 3e-04 4.6145 0.4920 0.4626

11 356.9464 1.3075 0.2748 127.3459 0.4349 -0.1083 1.5427 0.0044 3e-04 4.3367 0.4798 0.4260

12 641.5641 0.4935 0.2652 107.7137 0.4367 2.3670 1.5319 0.0058 3e-04 5.5693 0.4732 0.4464

13 359.1052 0.5594 0.2565 92.0684 0.3687 0.2772 2.2394 0.0058 4e-04 7.0510 0.4486 0.4399

14 575.4163 0.8376 0.2487 79.1931 0.3624 0.3663 2.3322 0.0058 4e-04 7.1806 0.4299 0.4010

15 187.1673 0.8829 0.2413 69.7817 0.3544 0.0838 2.4430 0.0058 4e-04 7.1968 0.4162 0.3780

$All.CriticalValues

CritValue\_Duda CritValue\_PseudoT2 Fvalue\_Beale

2 0.6110 775.3291 0.3905

3 0.6360 1669.3758 0.5197

4 0.6012 621.6597 0.4189

5 0.6259 1168.4713 0.4602

6 0.6021 634.3506 0.6160

7 0.5345 243.0072 0.4654

8 0.5383 252.2106 0.6171

9 0.5853 463.2995 0.4727

10 0.5312 235.6094 0.4699

11 0.5326 238.6958 0.2713

12 0.6133 819.1438 0.6105

13 0.5844 455.9063 0.5717

14 0.5876 481.4464 0.4330

15 0.5126 200.6259 0.4144

$Best.nc

KL CH Hartigan CCC Scott Marriot TrCovW TraceW Friedman Rubin Cindex DB Silhouette

Number\_clusters 3.0000 6.000 6.0000 2.0000 4.000 6 3 3.0000 4.0000 6.0000 7.0000 12.0000 3.0000

Value\_Index 5.2031 2436.193 531.0433 -22.9149 2317.486 5251004 6793296 563.5026 1.3315 -0.3629 0.1106 1.0017 0.4075

Duda PseudoT2 Beale Ratkowsky Ball PtBiserial Frey McClain Dunn Hubert SDindex Dindex SDbw

Number\_clusters 6.0000 6.0000 2.0000 3.0000 3.000 3.0000 1 2.0000 3.0000 0 5.0000 0 15.000

Value\_Index 0.6733 465.7589 0.9407 0.4087 1455.225 0.5423 NA 0.3803 0.0072 0 4.0522 0 0.378

$Best.partition TOO MANY TO PRINT