hw8_Utsav_Italiya_10475248

Comments: reading the files and loading the data

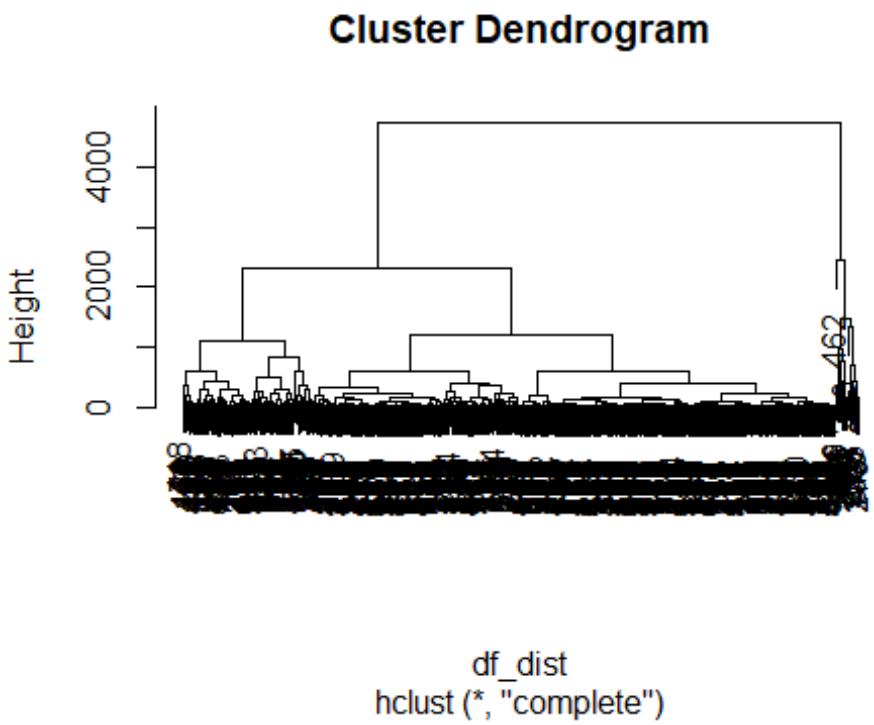
```
rm(list=ls())
#load data from csv file
df<-read.csv("F:/Sem1/CS513/lecture7/wisc_bc_ContinuousVar.csv",na.strings =
'?')#Change the path accordingly.
summary(df)
```

```
##        id              diagnosis          radius_mean      texture_mean
##  Min.   :     8670   Length:569         Min.   : 6.981   Min.   : 9.71
##  1st Qu.:   869218   Class :character   1st Qu.:11.700   1st Qu.:16.17
##  Median :   906024   Mode  :character   Median :13.370   Median :18.84
##  Mean   : 30371831                      Mean   :14.127   Mean   :19.29
##  3rd Qu.:  8813129                      3rd Qu.:15.780   3rd Qu.:21.80
##  Max.   :911320502                      Max.   :28.110   Max.   :39.28
##  perimeter_mean     area_mean      smoothness_mean   compactness_mean
##  Min.   : 43.79   Min.   : 143.5   Min.   :0.05263   Min.   :0.01938
##  1st Qu.: 75.17   1st Qu.: 420.3   1st Qu.:0.08637   1st Qu.:0.06492
##  Median : 86.24   Median : 551.1   Median :0.09587   Median :0.09263
##  Mean   : 91.97   Mean   : 654.9   Mean   :0.09636   Mean   :0.10434
##  3rd Qu.:104.10   3rd Qu.: 782.7   3rd Qu.:0.10530   3rd Qu.:0.13040
##  Max.   :188.50   Max.   :2501.0   Max.   :0.16340   Max.   :0.34540
##  concavity_mean    concave.points_mean symmetry_mean
fractal_dimension_mean
##  Min.   :0.00000   Min.   :0.00000     Min.   :0.1060   Min.   :0.04996
##  1st Qu.:0.02956   1st Qu.:0.02031     1st Qu.:0.1619   1st Qu.:0.05770
##  Median :0.06154   Median :0.03350     Median :0.1792   Median :0.06154
##  Mean   :0.08880   Mean   :0.04892     Mean   :0.1812   Mean   :0.06280
##  3rd Qu.:0.13070   3rd Qu.:0.07400     3rd Qu.:0.1957   3rd Qu.:0.06612
##  Max.   :0.42680   Max.   :0.20120     Max.   :0.3040   Max.   :0.09744
##    radius_se        texture_se      perimeter_se       area_se
##  Min.   :0.1115   Min.   :0.3602   Min.   : 0.757   Min.   :  6.802
##  1st Qu.:0.2324   1st Qu.:0.8339   1st Qu.: 1.606   1st Qu.: 17.850
##  Median :0.3242   Median :1.1080   Median : 2.287   Median : 24.530
##  Mean   :0.4052   Mean   :1.2169   Mean   : 2.866   Mean   : 40.337
##  3rd Qu.:0.4789   3rd Qu.:1.4740   3rd Qu.: 3.357   3rd Qu.: 45.190
##  Max.   :2.8730   Max.   :4.8850   Max.   :21.980   Max.   :542.200
##  smoothness_se      compactness_se      concavity_se     concave.points_se
##  Min.   :0.001713   Min.   :0.002252   Min.   :0.00000   Min.   :0.000000
##  1st Qu.:0.005169   1st Qu.:0.013080   1st Qu.:0.01509   1st Qu.:0.007638
##  Median :0.006380   Median :0.020450   Median :0.02589   Median :0.010930
##  Mean   :0.007041   Mean   :0.025478   Mean   :0.03189   Mean   :0.011796
##  3rd Qu.:0.008146   3rd Qu.:0.032450   3rd Qu.:0.04205   3rd Qu.:0.014710
##  Max.   :0.031130   Max.   :0.135400   Max.   :0.39600   Max.   :0.052790
##   symmetry_se       fractal_dimension_se  radius_worst   texture_worst
##  Min.   :0.007882   Min.   :0.0008948    Min.   : 7.93   Min.   :12.02
```

```
##  1st Qu.:0.015160   1st Qu.:0.0022480    1st Qu.:13.01   1st Qu.:21.08
##  Median :0.018730   Median :0.0031870    Median :14.97   Median :25.41
##  Mean   :0.020542   Mean   :0.0037949    Mean   :16.27   Mean   :25.68
##  3rd Qu.:0.023480   3rd Qu.:0.0045580    3rd Qu.:18.79   3rd Qu.:29.72
##  Max.   :0.078950   Max.   :0.0298400    Max.   :36.04   Max.   :49.54
##  perimeter_worst    area_worst     smoothness_worst  compactness_worst
##  Min.   : 50.41   Min.   : 185.2   Min.   :0.07117   Min.   :0.02729
##  1st Qu.: 84.11   1st Qu.: 515.3   1st Qu.:0.11660   1st Qu.:0.14720
##  Median : 97.66   Median : 686.5   Median :0.13130   Median :0.21190
##  Mean   :107.26   Mean   : 880.6   Mean   :0.13237   Mean   :0.25427
##  3rd Qu.:125.40   3rd Qu.:1084.0   3rd Qu.:0.14600   3rd Qu.:0.33910
##  Max.   :251.20   Max.   :4254.0   Max.   :0.22260   Max.   :1.05800
##  concavity_worst  concave.points_worst symmetry_worst
fractal_dimension_worst
##  Min.   :0.0000   Min.   :0.00000      Min.   :0.1565   Min.   :0.05504
##  1st Qu.:0.1145   1st Qu.:0.06493      1st Qu.:0.2504   1st Qu.:0.07146
##  Median :0.2267   Median :0.09993      Median :0.2822   Median :0.08004
##  Mean   :0.2722   Mean   :0.11461      Mean   :0.2901   Mean   :0.08395
##  3rd Qu.:0.3829   3rd Qu.:0.16140      3rd Qu.:0.3179   3rd Qu.:0.09208
##  Max.   :1.2520   Max.   :0.29100      Max.   :0.6638   Max.   :0.20750

#table for categories of daignosis
table(df$diagnosis)

##
##   B   M
## 357 212

#factor the data set
df<-na.omit(df)
df<-df[-1]
```

Comments: performing clustering using hclust

```
#clustered rows against the "diagnosis" column
df_dist<-dist(df[,c(-1,-2)])
hclust_results<-hclust(df_dist)
plot(hclust_results)
```




```
hclust_2<-cutree(hclust_results,2)
table(hclust_2,df[,1])

##
## hclust_2   B   M
##        1 357 192
##        2   0  20
```

Comments: #performing clustering using kmeans

```
kmeans_2<- kmeans(df[,-1],2,nstart = 10)
kmeans_2$cluster

##   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15  16  17  18
19  20
##   1   1   1   2   1   2   1   2   2   2   2   1   1   2   2   2   2   1
1   2
##  21  22  23  24  25  26  27  28  29  30  31  32  33  34  35  36  37  38
39  40
##   2   2   2   1   1   1   2   1   1   1   1   2   1   1   1   1   2   2
2   2
##  41  42  43  44  45  46  47  48  49  50  51  52  53  54  55  56  57  58
59  60
##   2   2   1   2   2   1   2   2   2   2   2   2   2   1   2   2   1   2
2   2
##  61  62  63  64  65  66  67  68  69  70  71  72  73  74  75  76  77  78
79  80
```

```
##   2   2   2   2   2   2   2   2   2   2   1   2   1   2   2   1   2   1
1   2
##  81  82  83  84  85  86  87  88  89  90  91  92  93  94  95  96  97  98
99 100
##   2   2   1   1   2   1   2   1   2   2   2   2   2   2   2   1   2   2
2   2
## 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118
119 120
##   2   2   2   2   2   2   2   2   1   2   2   2   2   2   2   2   2   2
1   1
## 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138
139 140
##   2   1   1   2   2   2   2   1   2   1   2   2   2   2   1   2   2   2
2   2
## 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158
159 160
##   2   1   2   2   2   2   2   2   2   2   2   2   2   2   2   2   1   2
2   2
## 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178
179 180
##   2   1   1   2   1   2   2   1   1   2   2   2   2   2   2   2   2   2
2   2
## 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198
199 200
##   1   1   1   2   2   2   1   2   2   2   2   2   2   2   2   2   2   1
1   2
## 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218
219 220
##   2   1   1   2   2   2   2   1   2   2   1   2   1   2   2   2   2   2
1   1
## 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238
239 240
##   2   2   2   2   2   2   2   2   2   2   1   2   2   1   2   2   1   1
2   1
## 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258
259 260
##   2   2   2   2   1   2   2   2   2   2   1   2   1   1   1   2   1   2
1   2
## 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278
279 280
##   1   1   1   2   1   1   2   2   2   2   2   2   1   2   1   2   2   1
2   2
## 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298
299 300
##   1   2   1   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
2   2
## 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318
319 320
##   1   2   1   2   2   2   2   2   2   2   2   2   2   2   2   2   2   1
2   2
```

```
## 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338
339 340
##   2   1   2   1   2   2   2   2   2   2   2   2   2   2   2   1   2   1
2   1
## 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358
359 360
##   2   2   2   1   2   2   2   2   2   2   2   2   1   2   2   2   2   2
2   2
## 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378
379 380
##   2   2   2   2   2   1   1   2   1   1   2   2   1   1   2   2   2   2
2   2
## 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398
399 400
##   2   2   2   2   2   2   2   2   2   1   2   2   1   1   2   2   2   2
2   2
## 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418
419 420
##   1   2   2   2   2   2   2   2   1   2   2   2   2   2   2   2   2   1
2   2
## 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438
439 440
##   2   2   2   2   2   2   2   2   2   2   2   2   1   1   2   2   2   2
2   2
## 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458
459 460
##   2   1   2   2   1   2   1   2   2   1   2   1   2   2   2   2   2   2
2   2
## 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478
479 480
##   1   1   2   2   2   2   2   2   1   2   2   2   2   2   2   2   2   2
2   2
## 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498
499 500
##   2   2   2   2   2   2   2   1   2   2   2   1   1   2   2   2   2   2
1   1
## 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518
519 520
##   2   2   2   1   2   2   2   2   2   2   2   2   2   2   2   2   1   1
2   2
## 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538
539 540
##   2   1   2   2   2   2   2   2   2   2   2   2   2   1   2   1   2   2
2   2
## 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558
559 560
##   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2   2
2   2
## 561 562 563 564 565 566 567 568 569
##   2   2   2   1   1   1   2   1   2
```

```
table(kmeans_2$cluster,df[,1])

##
##       B   M
##   1   1 130
##   2 356  82
```