HarshAgrawal_HW8.R

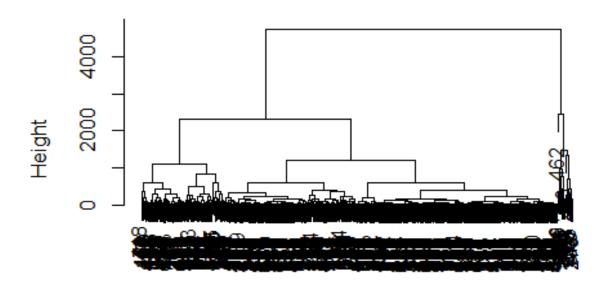
Asus

2021-11-19

```
: CS 513
# Course
# First Name
             : Harsh
# Last Name
              : Agrawal
# CWID
              : 10475285
rm(list=ls())
setwd("C:/Users/Asus/Desktop/Github/MSCS/CS-513/HW8")
db = read.csv('wisc bc ContinuousVar.csv', header=TRUE, sep=",")
db = db[,-1]
db<-na.omit(db)</pre>
summary(db)
##
     diagnosis
                        radius mean
                                                         perimeter mean
                                          texture mean
##
    Length: 569
                       Min.
                             : 6.981
                                        Min.
                                              : 9.71
                                                         Min.
                                                                : 43.79
                       1st Qu.:11.700
##
   Class :character
                                         1st Qu.:16.17
                                                         1st Qu.: 75.17
##
  Mode :character
                       Median :13.370
                                        Median :18.84
                                                         Median : 86.24
                                                :19.29
##
                              :14.127
                                        Mean
                                                         Mean
                                                                : 91.97
                       Mean
##
                       3rd Qu.:15.780
                                         3rd Qu.:21.80
                                                         3rd Qu.:104.10
##
                       Max.
                               :28.110
                                         Max.
                                                :39.28
                                                         Max.
                                                                :188.50
##
                                        compactness mean concavity mean
      area mean
                     smoothness mean
##
           : 143.5
                            :0.05263
   Min.
                     Min.
                                        Min.
                                               :0.01938
                                                          Min.
                                                                 :0.00000
   1st Qu.: 420.3
##
                     1st Qu.:0.08637
                                        1st Qu.:0.06492
                                                          1st Qu.:0.02956
## Median : 551.1
                     Median :0.09587
                                       Median :0.09263
                                                          Median :0.06154
##
   Mean
           : 654.9
                     Mean
                            :0.09636
                                       Mean
                                               :0.10434
                                                          Mean
                                                                 :0.08880
                     3rd Qu.:0.10530
                                                          3rd Qu.:0.13070
##
   3rd Qu.: 782.7
                                        3rd Qu.:0.13040
##
   Max.
           :2501.0
                     Max.
                             :0.16340
                                               :0.34540
                                                          Max.
                                                                  :0.42680
                                        Max.
                                          fractal_dimension mean
   concave.points mean symmetry mean
                                                                   radius se
                               :0.1060
## Min.
           :0.00000
                        Min.
                                          Min.
                                                 :0.04996
                                                                 Min.
:0.1115
## 1st Qu.:0.02031
                        1st Qu.:0.1619
                                          1st Qu.:0.05770
                                                                 1st
Qu.:0.2324
                        Median :0.1792
                                         Median :0.06154
                                                                 Median
## Median :0.03350
:0.3242
## Mean
           :0.04892
                        Mean
                                :0.1812
                                         Mean
                                                 :0.06280
                                                                 Mean
:0.4052
                        3rd Qu.:0.1957
                                         3rd Qu.:0.06612
## 3rd Qu.:0.07400
                                                                 3rd
Qu.:0.4789
## Max.
           :0.20120
                        Max.
                               :0.3040
                                                 :0.09744
                                         Max.
                                                                 Max.
:2.8730
## texture_se
                      perimeter_se
                                         area_se smoothness_se
```

```
##
    Min. :0.3602
                      Min. : 0.757
                                        Min. : 6.802
                                                           Min. :0.001713
##
                      1st Qu.: 1.606
    1st Qu.:0.8339
                                        1st Qu.: 17.850
                                                           1st Qu.:0.005169
##
    Median :1.1080
                      Median : 2.287
                                        Median : 24.530
                                                           Median :0.006380
##
    Mean
                                               : 40.337
                                                           Mean
           :1.2169
                      Mean
                             : 2.866
                                        Mean
                                                                   :0.007041
##
    3rd Qu.:1.4740
                      3rd Qu.: 3.357
                                        3rd Qu.: 45.190
                                                           3rd Qu.:0.008146
##
    Max.
           :4.8850
                      Max.
                             :21.980
                                        Max.
                                                :542.200
                                                           Max.
                                                                   :0.031130
##
    compactness se
                         concavity se
                                           concave.points se
                                                                symmetry se
##
    Min.
           :0.002252
                        Min.
                                :0.00000
                                           Min.
                                                   :0.000000
                                                               Min.
                                                                       :0.007882
##
    1st Qu.:0.013080
                        1st Qu.:0.01509
                                           1st Qu.:0.007638
                                                               1st Qu.:0.015160
##
    Median :0.020450
                        Median :0.02589
                                           Median :0.010930
                                                               Median :0.018730
##
    Mean
           :0.025478
                        Mean
                                :0.03189
                                           Mean
                                                  :0.011796
                                                               Mean
                                                                       :0.020542
##
    3rd Qu.:0.032450
                                           3rd Qu.:0.014710
                        3rd Qu.:0.04205
                                                               3rd Qu.:0.023480
                                                                       :0.078950
##
    Max.
           :0.135400
                        Max.
                                :0.39600
                                           Max.
                                                   :0.052790
                                                               Max.
    fractal_dimension_se radius_worst
                                                            perimeter_worst
##
                                           texture worst
##
    Min.
           :0.0008948
                          Min.
                                  : 7.93
                                           Min.
                                                   :12.02
                                                            Min.
                                                                   : 50.41
##
    1st Qu.:0.0022480
                          1st Qu.:13.01
                                           1st Qu.:21.08
                                                            1st Qu.: 84.11
##
    Median :0.0031870
                          Median :14.97
                                           Median :25.41
                                                            Median : 97.66
##
    Mean
                          Mean
                                  :16.27
                                           Mean
                                                            Mean
                                                                    :107.26
           :0.0037949
                                                  :25.68
##
    3rd Qu.:0.0045580
                          3rd Qu.:18.79
                                           3rd Qu.:29.72
                                                            3rd Qu.:125.40
##
    Max.
           :0.0298400
                          Max.
                                  :36.04
                                           Max.
                                                   :49.54
                                                            Max.
                                                                    :251.20
##
                      smoothness worst
                                         compactness worst concavity worst
      area worst
##
    Min.
           : 185.2
                      Min.
                             :0.07117
                                         Min.
                                                 :0.02729
                                                            Min.
                                                                    :0.0000
##
    1st Qu.: 515.3
                                         1st Qu.:0.14720
                      1st Qu.:0.11660
                                                            1st Qu.:0.1145
##
    Median : 686.5
                      Median :0.13130
                                         Median :0.21190
                                                            Median :0.2267
##
    Mean
           : 880.6
                      Mean
                             :0.13237
                                         Mean
                                                :0.25427
                                                            Mean
                                                                   :0.2722
##
    3rd Qu.:1084.0
                      3rd Qu.:0.14600
                                         3rd Qu.:0.33910
                                                            3rd Qu.:0.3829
##
    Max.
                                                :1.05800
           :4254.0
                      Max.
                             :0.22260
                                         Max.
                                                            Max.
                                                                   :1.2520
    concave.points_worst symmetry_worst
##
                                            fractal dimension worst
##
    Min.
           :0.00000
                          Min.
                                  :0.1565
                                            Min.
                                                    :0.05504
##
    1st Qu.:0.06493
                          1st Qu.:0.2504
                                            1st Qu.:0.07146
##
    Median :0.09993
                          Median :0.2822
                                            Median :0.08004
                          Mean
##
    Mean
           :0.11461
                                 :0.2901
                                            Mean
                                                    :0.08395
##
    3rd Qu.:0.16140
                          3rd Qu.:0.3179
                                            3rd Qu.:0.09208
##
    Max.
           :0.29100
                          Max.
                                  :0.6638
                                            Max.
                                                   :0.20750
View(db)
db2 < -dist(db[,-1])
final<-hclust(db2)
plot(final)
```

Cluster Dendrogram



db2 hclust (*, "complete")

```
db3<-cutree(final,2)</pre>
table(db3,db[,1])
##
## db3
         В
             Μ
     1 357 192
##
     2
        0 20
rm(list=ls())
# KNN
setwd("C:/Users/Asus/Desktop/Github/MSCS/CS-513/HW8")
db = read.csv('wisc_bc_ContinuousVar.csv',header=TRUE, sep=",")
db = db[,-1]
db<-na.omit(db)</pre>
summary(db)
     diagnosis
##
                        radius_mean
                                       texture_mean
                                                        perimeter_mean
                       Min. : 6.981 Min. : 9.71 Min. : 43.79
## Length:569
```

```
Class :character
                        1st Ou.:11.700
                                          1st Ou.:16.17
                                                           1st Qu.: 75.17
    Mode :character
##
                        Median :13.370
                                          Median :18.84
                                                           Median : 86.24
##
                        Mean
                               :14.127
                                          Mean
                                                 :19.29
                                                           Mean
                                                                  : 91.97
##
                        3rd Qu.:15.780
                                          3rd Qu.:21.80
                                                           3rd Qu.:104.10
##
                        Max.
                               :28.110
                                          Max.
                                                 :39.28
                                                           Max.
                                                                  :188.50
##
                      smoothness mean
                                         compactness mean
                                                           concavity_mean
      area_mean
##
          : 143.5
                             :0.05263
                                         Min.
                                                :0.01938
                                                                   :0.00000
    Min.
                      Min.
                                                            Min.
    1st Qu.: 420.3
##
                      1st Qu.:0.08637
                                         1st Qu.:0.06492
                                                            1st Qu.:0.02956
##
    Median : 551.1
                                                            Median :0.06154
                      Median :0.09587
                                         Median :0.09263
##
    Mean
           : 654.9
                      Mean
                             :0.09636
                                         Mean
                                                :0.10434
                                                            Mean
                                                                   :0.08880
##
    3rd Qu.: 782.7
                      3rd Qu.:0.10530
                                         3rd Qu.:0.13040
                                                            3rd Qu.:0.13070
##
  Max.
           :2501.0
                      Max.
                             :0.16340
                                         Max.
                                                :0.34540
                                                            Max.
                                                                   :0.42680
##
    concave.points mean symmetry mean
                                           fractal dimension mean
                                                                     radius se
##
   Min.
           :0.00000
                         Min.
                                :0.1060
                                           Min.
                                                  :0.04996
                                                                   Min.
:0.1115
   1st Qu.:0.02031
                         1st Qu.:0.1619
                                           1st Qu.:0.05770
                                                                   1st
Qu.:0.2324
## Median :0.03350
                         Median :0.1792
                                           Median :0.06154
                                                                   Median
:0.3242
## Mean
           :0.04892
                         Mean
                                :0.1812
                                           Mean
                                                  :0.06280
                                                                   Mean
:0.4052
                         3rd Qu.:0.1957
                                                                   3rd
    3rd Qu.:0.07400
                                           3rd Qu.:0.06612
Qu.:0.4789
## Max.
           :0.20120
                         Max.
                                :0.3040
                                                  :0.09744
                                                                   Max.
                                           Max.
:2.8730
##
      texture_se
                       perimeter se
                                           area_se
                                                           smoothness se
##
                           : 0.757
                                             : 6.802
           :0.3602
                      Min.
                                                           Min.
                                                                  :0.001713
    Min.
                                       Min.
                                        1st Qu.: 17.850
                      1st Qu.: 1.606
##
    1st Qu.:0.8339
                                                           1st Qu.:0.005169
##
                      Median : 2.287
                                       Median : 24.530
                                                           Median :0.006380
    Median :1.1080
##
    Mean
           :1.2169
                             : 2.866
                                       Mean
                                             : 40.337
                                                           Mean
                                                                  :0.007041
                      Mean
##
    3rd Qu.:1.4740
                      3rd Qu.: 3.357
                                        3rd Qu.: 45.190
                                                           3rd Qu.:0.008146
##
    Max.
           :4.8850
                      Max.
                             :21.980
                                        Max.
                                               :542.200
                                                                  :0.031130
                                                           Max.
##
    compactness se
                         concavity se
                                           concave.points se
                                                                symmetry se
##
    Min.
           :0.002252
                        Min.
                               :0.00000
                                           Min.
                                                  :0.000000
                                                               Min.
                                                                      :0.007882
##
    1st Qu.:0.013080
                        1st Qu.:0.01509
                                           1st Qu.:0.007638
                                                               1st Qu.:0.015160
    Median :0.020450
                        Median :0.02589
##
                                           Median :0.010930
                                                               Median :0.018730
##
    Mean
           :0.025478
                        Mean
                               :0.03189
                                           Mean
                                                  :0.011796
                                                               Mean
                                                                      :0.020542
##
    3rd Qu.:0.032450
                        3rd Qu.:0.04205
                                           3rd Qu.:0.014710
                                                               3rd Qu.:0.023480
##
    Max.
           :0.135400
                        Max.
                               :0.39600
                                           Max.
                                                  :0.052790
                                                               Max.
                                                                      :0.078950
##
    fractal dimension se radius worst
                                                            perimeter worst
                                           texture worst
##
    Min.
           :0.0008948
                          Min.
                                 : 7.93
                                           Min.
                                                  :12.02
                                                            Min.
                                                                   : 50.41
##
    1st Ou.:0.0022480
                          1st Qu.:13.01
                                           1st Qu.:21.08
                                                            1st Qu.: 84.11
##
    Median :0.0031870
                          Median :14.97
                                           Median :25.41
                                                            Median : 97.66
##
    Mean
           :0.0037949
                          Mean
                                 :16.27
                                           Mean
                                                  :25.68
                                                            Mean
                                                                   :107.26
                                                            3rd Qu.:125.40
##
    3rd Ou.:0.0045580
                          3rd Qu.:18.79
                                           3rd Qu.:29.72
           :0.0298400
##
    Max.
                          Max.
                                 :36.04
                                           Max.
                                                  :49.54
                                                            Max.
                                                                   :251.20
##
      area_worst
                      smoothness_worst
                                         compactness_worst concavity_worst
##
    Min.
          : 185.2
                      Min.
                             :0.07117
                                        Min.
                                                :0.02729
                                                            Min.
                                                                   :0.0000
##
    1st Qu.: 515.3
                      1st Qu.:0.11660
                                         1st Qu.:0.14720
                                                            1st Qu.:0.1145
    Median : 686.5
                      Median :0.13130
                                        Median :0.21190
                                                            Median :0.2267
```

```
Mean : 880.6
                     Mean :0.13237
                                       Mean :0.25427
                                                         Mean
                                                                :0.2722
##
    3rd Qu.:1084.0
                                       3rd Qu.:0.33910
                                                         3rd Qu.:0.3829
                     3rd Qu.:0.14600
## Max.
           :4254.0
                     Max.
                            :0.22260
                                       Max.
                                              :1.05800
                                                         Max.
                                                                :1.2520
   concave.points_worst symmetry_worst
##
                                          fractal_dimension_worst
##
   Min.
           :0.00000
                         Min.
                               :0.1565
                                          Min.
                                                 :0.05504
##
    1st Qu.:0.06493
                         1st Qu.:0.2504
                                          1st Qu.:0.07146
                                          Median :0.08004
## Median :0.09993
                         Median :0.2822
##
   Mean
           :0.11461
                         Mean
                                :0.2901
                                          Mean
                                                 :0.08395
##
    3rd Qu.:0.16140
                         3rd Qu.:0.3179
                                          3rd Qu.:0.09208
##
   Max.
           :0.29100
                         Max.
                                :0.6638
                                          Max.
                                                 :0.20750
View(db)
kmodel \leftarrow kmeans(db[,-1],2,nstart = 10)
table(kmodel$cluster,db[,1])
##
##
         В
             Μ
         1 130
##
     1
##
     2 356 82
```