Brief Intro To Clustering in R (And Also R Markdown)

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2023-02-21

Before working with R markdown, we need a few packages

```
# The rmarkdown package
#install.packages('rmarkdown')
```

If you want to generate pdf files, you will need to install LaTeX

If you don't plan on using LaTeX anywhere outside of R markdown, I suggest TinyTex

```
#install.packages('tinytex')
#tinytex::install_tinytex()
```

Note that you can and should run these above commands in the RStudio console

Let's Explore Clustering

```
library(cluster)
library(NbClust)
library(factoextra)
library(dplyr)
library(kmed)
```

First, we need some data

Data description

The data I chose is my own Spotify streaming history for the past year.

Misc data processing:

Read in the data

```
spotify = read.csv("final.csv")
```

The data had almost 60,000 observations, out of those, only the numeric data will be considered.

```
numericData = spotify %>% #Add data
  dplyr::select(where(is.numeric)) #finds where is.numeric is true
#numericData <- head(numericData, 10000) # gets only 10000 observations
numericData <- subset(numericData, select=-c(1,2,5,7,14,15))
```

Time To Create Some Clusters

One last data processing step

Scale the data, and use that to create our clusters.

```
clusterData <- scale(numericData)
```

K means

For this clustering method, the kmeans() function from the stats package is used. Let's start with 2 clusters. Normally, there are ways to determine an optimal number of clusters, but for the sake of simplicity, let's stick to 2, maybe we can change it later.

```
kmean <- kmeans(clusterData,2, nstart=10)
```

Clusters Analysis

First, let's see the size of the clusters

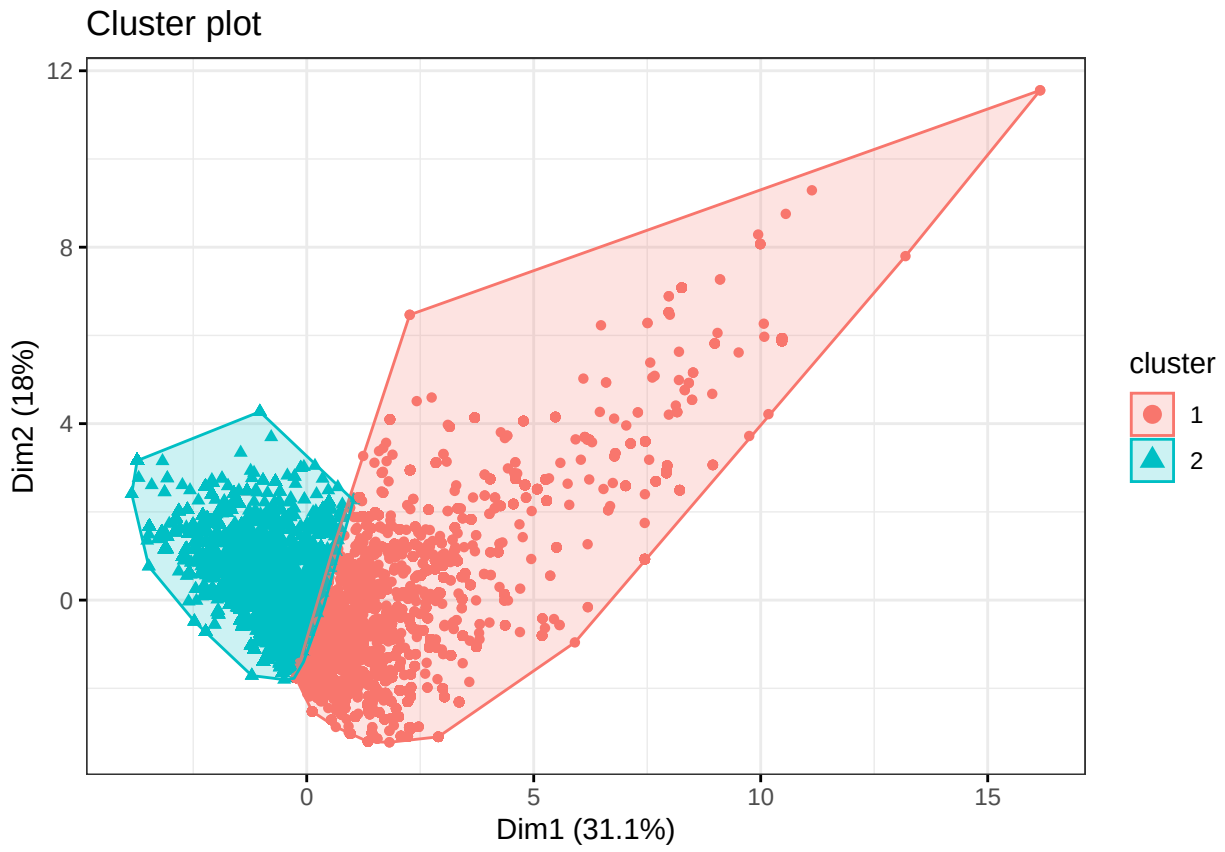
```
kmeansize <- kmean$size
kmeansize
```

```
## [1] 20702 35508
```

We have 2 clusters, with size 36053 and 20157.

Visually, the clusters look like so

```
fviz_cluster(kmean, data = clusterData, geom = "point", ellipse.type = "convex",
             ggtheme = theme_bw())
```



Cluster Intepretation

```
kmeaninfo <- data.frame(kmean$centers, kmean$size)
kmeaninfo
```

```
##   danceability     energy   loudness speechiness acousticness instrumentalness
## 1    0.7219741 -0.7392529 -0.5464510  -0.6329388     0.429137       0.07646846
## 2   -0.4209279  0.4310019  0.3185938   0.3690182    -0.250197      -0.04458292
##     liveness    valence      tempo kmean.size
## 1 -0.3635405  0.6408118 -0.4443888      20702
## 2  0.2119527 -0.3736084  0.2590891      35508
```

Here are the explanation of the traits.

acousticness — how acoustic

danceability — self-explanatory

energy — how 'fast, loud an noisy'

instrumentalness — the less vocals, the higher

liveness — whether there is audience in the recording

loudness — self-explanatory

speechiness — the more spoken words, the higher

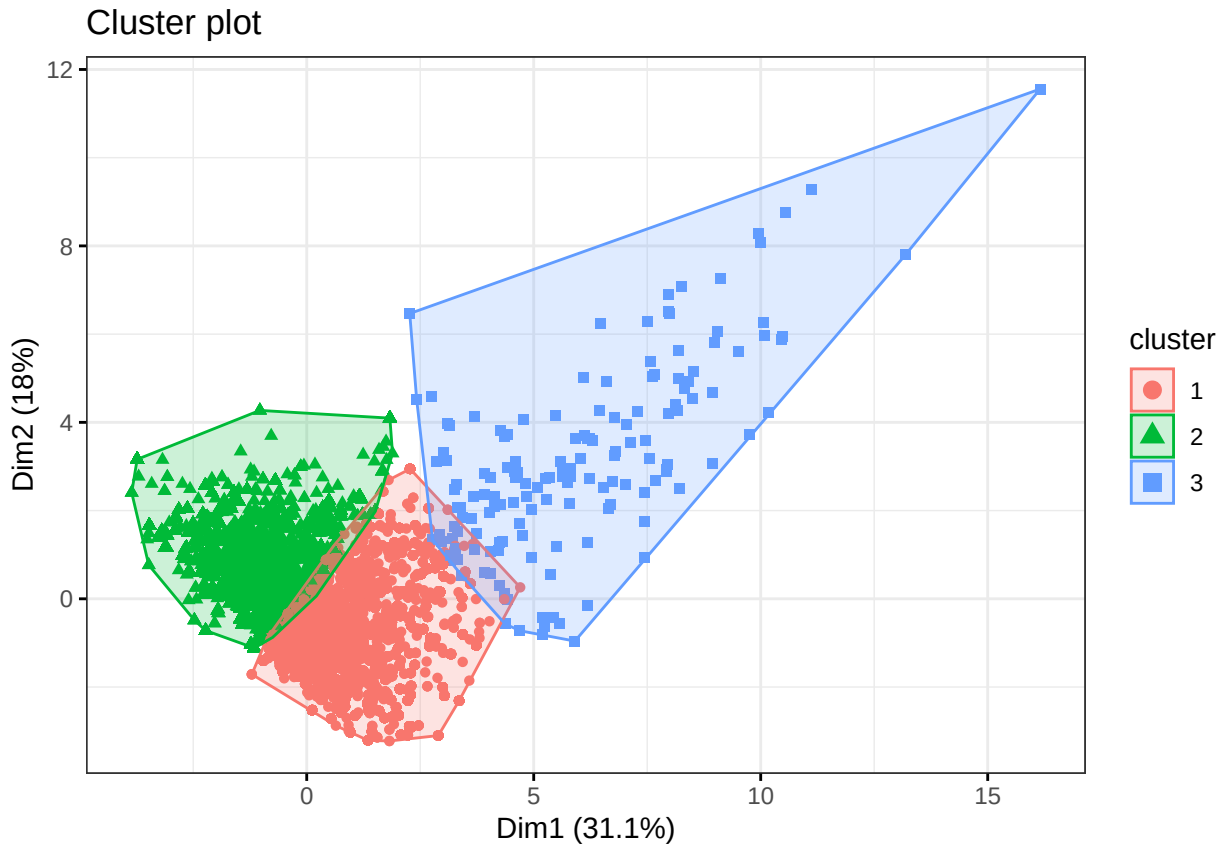
valence — whether the track sounds happy or sad

tempo — the bpm

Let's increase the number of clusters, to see if we get any more clear separation.

```
kmean2 <- kmeans(clusterData,3, nstart=10)
```

```
fviz_cluster(kmean2, data = clusterData, geom = "point", ellipse.type = "convex",
             ggtheme = theme_bw())
```




```
kmeaninfo2 <- data.frame(kmean2$centers, kmean2$size)
kmeaninfo2
```

```
##   danceability     energy    loudness speechiness acousticness instrumentalness
## 1    0.5825141 -0.1484980 -0.05771523  -0.4862819  -0.06122882      -0.08447799
## 2   -0.6305388  0.4235014  0.26672088   0.5692154  -0.24421672       0.05079510
## 3    0.2863125 -3.7874760 -2.91568780  -0.8446513   4.35916164       0.53308803
##     liveness    valence      tempo kmean2.size
## 1 -0.2612448  0.5737209 -0.3979591       27799
## 2  0.3005374 -0.5807230  0.4546128       26534
## 3 -0.3793901 -0.2876731 -0.5326758        1877
```