Pitch Clustering Example

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Import Libraries

```
# library needed to unscale clustering centers
library(DMwR)
```

```
## Loading required package: lattice
```

```
## Loading required package: grid
```

```
## Registered S3 method overwritten by 'quantmod':
##   method            from
##   as.zoo.data.frame zoo
```

```
# library needed for clustering plots
library(factoextra)
```

```
## Warning: package 'factoextra' was built under R version 3.6.2
```

```
## Loading required package: ggplot2
```

```
## Welcome! Want to learn more? See two factoextra-related books at https://goo.gl/ve3WBa
```

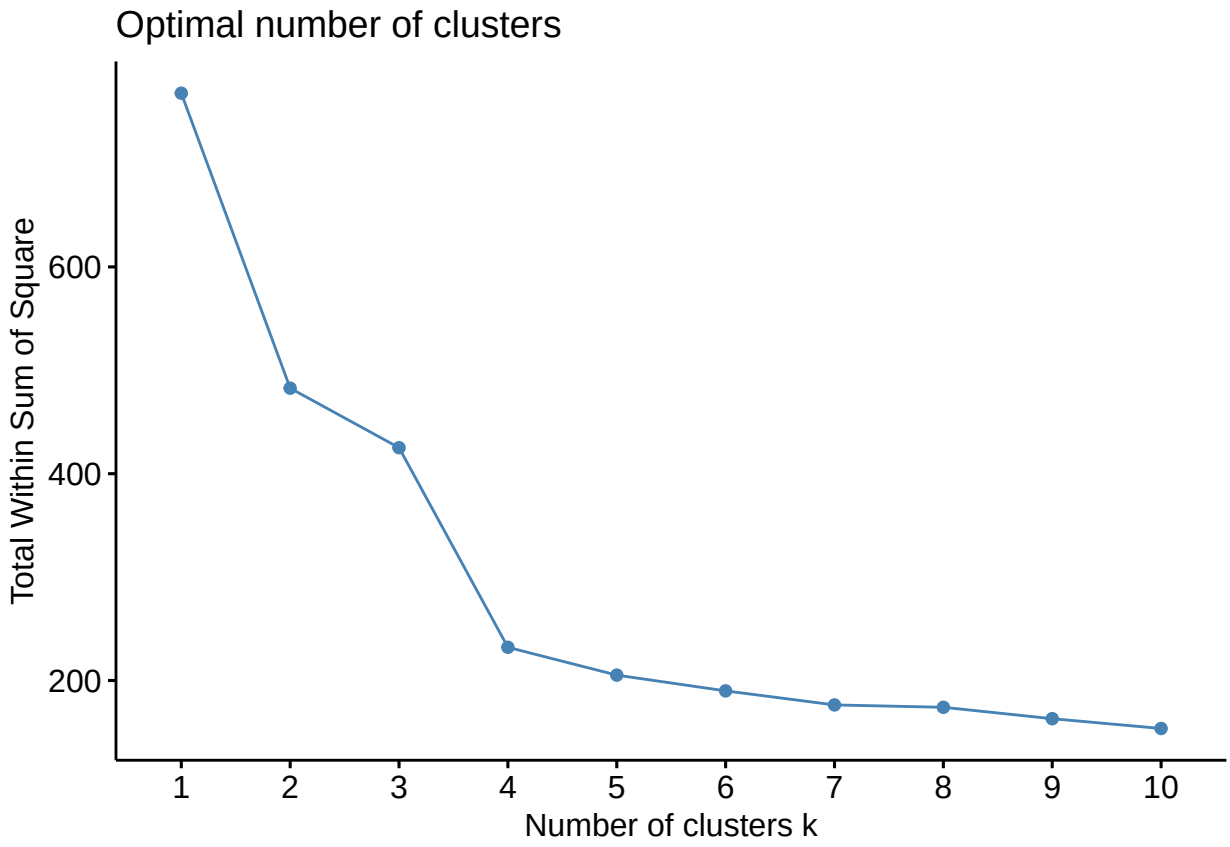
Load Dataset

```
# read in csv file
pitch_data =
  read.csv("Pitch_Clustering_Practice.csv")
# scale values for clustering
pitch_data_scale = scale(pitch_data[,2:9])
# create dataframe
pitch_data_df = as.data.frame(pitch_data_scale)
# alter row title for clustering
row.names(pitch_data_df) = pitch_data[,1]
# display head of scaled dataframe
head(pitch_data_df)
```

```
##    Velocity Total_Spin  True_Spin Spin_Efficiency Horizontal_Break
## 1 -2.810594 -0.1071962 -0.1350068      -0.1169504        2.9316266
## 2 -2.586367 -2.1811084 -2.6821448      -1.4693711        1.7934810
## 3 -1.689460  0.1693255 -1.2513732      -3.4677242        1.3719456
## 4 -1.497266  0.5231105 -0.2717047      -1.9134496        2.2571699
## 5  1.577842  0.8524966  0.6669543      -0.5408434        0.3181071
## 6  1.449713  0.9704249  0.7945391      -0.5206581        0.1073394
##   Vertical_Break Release_Height Release_Horizontal_Extension
## 1    -1.84853921     -2.9329945                    3.4826437
## 2    -3.26399804     -2.9329945                    3.7682028
## 3    -2.20240392     -4.1672698                    4.3393211
## 4    -2.40461232     -1.6987191                    3.4826437
## 5     0.02188854      0.1526939                   -0.2296249
## 6     0.32520115      0.1526939                   -0.2296249
```

Determine Optimal Number of Clusters

```r
# Use Elbow Method
fviz_nbclust(pitch_data_df, kmeans, method = "wss")
```

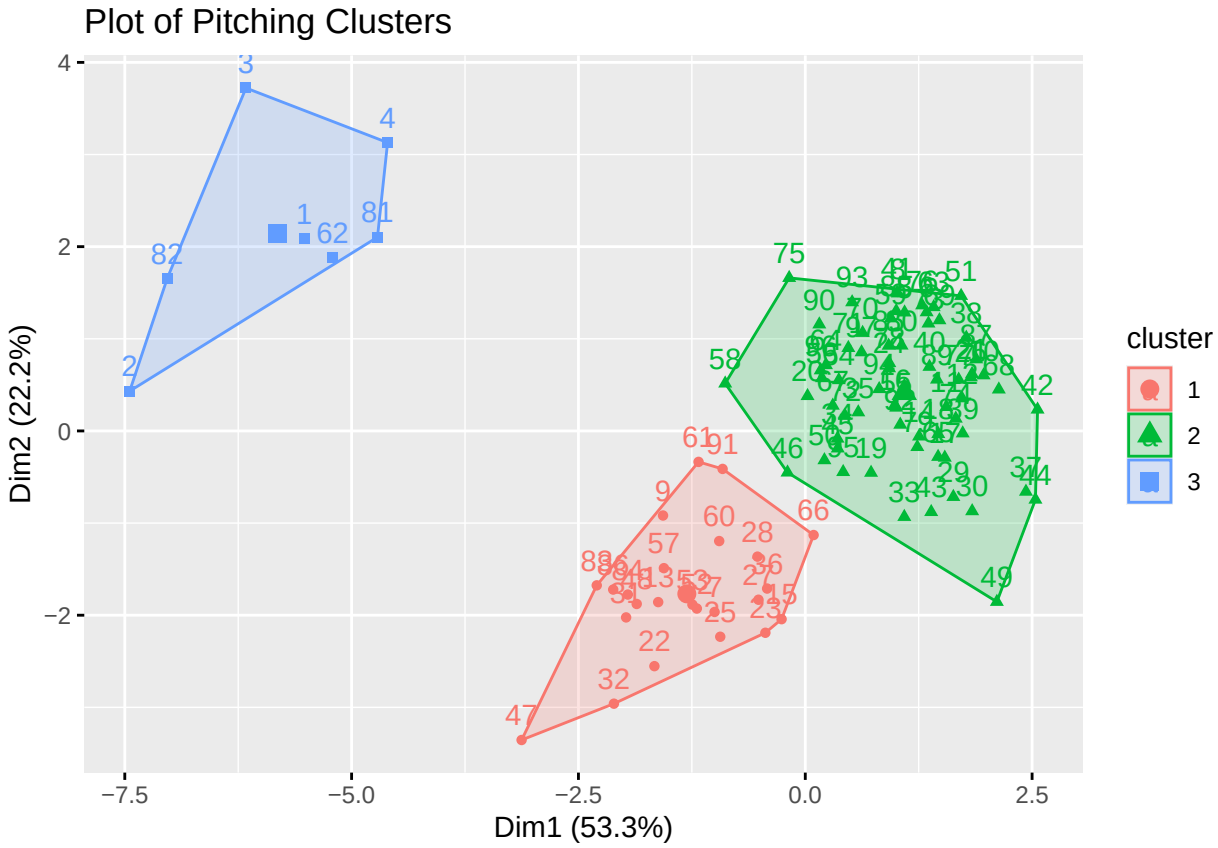


Perform Cluster Analysis With 3 Centers

```r
clustering = kmeans(pitch_data_df, centers = 3, nstart = 25)
# unscale centers to view pitch information
result = unscale(as.matrix(clustering$centers), as.matrix(pitch_data_scale))
# display centers
result
```

```
##   Velocity Total_Spin True_Spin Spin_Efficiency Horizontal_Break
## 1 79.37083   1464.333  1416.167        96.82500         6.970833
## 2 83.50152   1946.561  1802.303        92.60455         6.381818
## 3 75.11429   1712.571  1495.571        87.48571        13.557143
##   Vertical_Break Release_Height Release_Horizontal_Extension
## 1       14.62917       5.329167                    0.5375000
## 2       16.18030       5.436364                    0.4742424
## 3       10.08571       4.957143                    1.7285714
```

```r
# graph of clusters
fviz_cluster(clustering, data = pitch_data_df, main = "Plot of Pitching Clusters")
```



Assign Cluster Values as Final Column

```
# create final column
pitch_data$Pitch_Name = clustering$cluster
# change to character values
pitch_data$Pitch_Name = as.character(pitch_data$Pitch_Name)
# assign pitch name to cluster value
for (i in 1:nrow(pitch_data)) {
  if (pitch_data$Pitch_Name[i] == "1"){
    pitch_data$Pitch_Name[i][pitch_data$Pitch_Name[i] == "1"] = "Changeup"
  }
  else if (pitch_data$Pitch_Name[i] == "2"){
   pitch_data$Pitch_Name[i][pitch_data$Pitch_Name[i] == "2"] = "Fastball"
  }
  else if (pitch_data$Pitch_Name[i] == "3"){
    pitch_data$Pitch_Name[i][pitch_data$Pitch_Name[i] == "3"] = "Curveball"
  }
}
# view first 10 rows of dataset
head(pitch_data,10)
```

```
##    Pitch_ID Velocity Total_Spin True_Spin Spin_Efficiency Horizontal_Break
## 1         1     73.1       1784      1655            92.7             14.0
## 2         2     73.8       1274      1096            86.0             11.3
## 3         3     76.6       1852      1410            76.1             10.3
## 4         4     77.2       1939      1625            83.8             12.4
## 5         5     86.8       2020      1831            90.6              7.8
## 6         6     86.4       2049      1859            90.7              7.3
```

```
## 7         7     80.6       1441      1418            98.4             6.1
## 8         8     83.2       2114      1902            90.0             7.2
## 9         9     78.9       1547      1383            89.4             6.0
## 10       10     84.9       2032      1983            97.6             6.7
##    Vertical_Break Release_Height Release_Horizontal_Extension Pitch_Name
## 1            11.7            4.9                          1.8  Curveball
## 2             8.9            4.9                          1.9  Curveball
## 3            11.0            4.7                          2.1  Curveball
## 4            10.6            5.1                          1.8  Curveball
## 5            15.4            5.4                          0.5   Fastball
## 6            16.0            5.4                          0.5   Fastball
## 7            15.3            5.3                          0.6   Changeup
## 8            16.2            5.4                          0.6   Fastball
## 9            14.2            5.3                          0.6   Changeup
## 10           17.7            5.5                          0.7   Fastball
```

Export Dataset For Tableau Visualizations

```
# export as csv
write.csv(pitch_data,
          "Pitch_Clustering_Final_Data.csv",
          row.names = FALSE)
```