Assignment\_12\_MahaldarArti\_Exercise\_2\_Clustering

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Nov 15, 2021

## R Markdown

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##Clustering  
  
clusteringdata <- read.csv('C:/Users/Sandeep Raina/Documents/dsc520/data/clustering-data.csv')  
  
#here is the structure of the data  
  
summary(clusteringdata)

## x y   
## Min. : 0.0 Min. :134.0   
## 1st Qu.: 56.0 1st Qu.:141.0   
## Median : 82.0 Median :154.0   
## Mean :109.6 Mean :175.7   
## 3rd Qu.:180.0 3rd Qu.:218.0   
## Max. :249.0 Max. :236.0

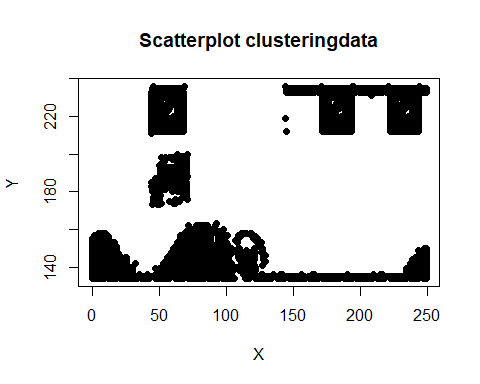
#PLot clusteringdata  
p <- clusteringdata$x  
q <- clusteringdata$y  
  
  
plot(p, q, main="Scatterplot clusteringdata",xlab="X", ylab="Y", pch=19)  
  
##Fitting  
  
kmeans(clusteringdata, 2)

## K-means clustering with 2 clusters of sizes 2714, 1308  
##   
## Cluster means:  
## x y  
## 1 62.2815 162.4090  
## 2 207.8005 203.2898  
##   
## Clustering vector:  
## [1] 1 1 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2  
## [38] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [75] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
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## [149] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
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## [3516] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3553] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3590] 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1  
## [3627] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
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## [3701] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3738] 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3775] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
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## [3923] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3960] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3997] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
##   
## Within cluster sum of squares by cluster:  
## [1] 5385717 3057964  
## (between\_SS / total\_SS = 70.5 %)  
##   
## Available components:  
##   
## [1] "cluster" "centers" "totss" "withinss" "tot.withinss"  
## [6] "betweenss" "size" "iter" "ifault"

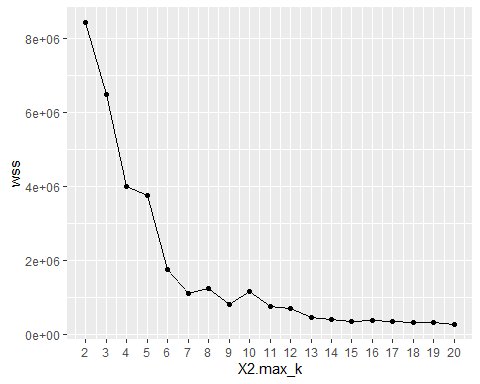
kmeans(clusteringdata, 12)

## K-means clustering with 12 clusters of sizes 204, 333, 441, 419, 192, 985, 405, 211, 341, 215, 172, 104  
##   
## Cluster means:  
## x y  
## 1 8.372549 150.8382  
## 2 62.444444 140.3874  
## 3 56.344671 223.0181  
## 4 78.002387 150.6897  
## 5 7.635417 139.4688  
## 6 203.985787 224.8406  
## 7 94.691358 143.4049  
## 8 120.857820 141.5403  
## 9 58.826979 186.9824  
## 10 239.423256 139.0791  
## 11 24.534884 138.5058  
## 12 180.798077 134.5673  
##   
## Clustering vector:  
## [1] 3 3 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [25] 3 3 3 3 3 3 3 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [49] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [73] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [97] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [121] 6 6 6 6 6 6 6 6 6 6 6 3 6 6 6 6 6 6 6 6 6 6 6 6  
## [145] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [169] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [193] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 6  
## [217] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [241] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [265] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [289] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3  
## [313] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 6 6 6 6 6 6 6 6  
## [337] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [361] 6 6 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3 3  
## [385] 3 3 3 3 3 3 3 3 3 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [409] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [433] 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [457] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [481] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3  
## [505] 3 3 3 3 3 3 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [529] 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3 6  
## [553] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 3 3  
## [577] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 6 6 6 6 6 6 6 6 6  
## [601] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 3 3 3 3  
## [625] 3 3 3 3 3 3 3 3 3 3 3 3 6 6 6 6 6 6 6 6 6 6 6 6  
## [649] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3 3  
## [673] 3 3 3 3 3 3 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
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## [769] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
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## [1033] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
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## [1081] 3 3 3 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
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## [1129] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 6 6 6 6 6 6 6 6 6 6  
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## [1345] 6 6 6 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3  
## [1369] 3 3 3 3 3 3 3 3 3 3 3 3 6 6 6 6 6 6 6 6 6 6 6 6  
## [1393] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [1417] 6 6 6 6 6 6 6 6 6 3 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [1441] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [1465] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [1489] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
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## [1537] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
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## [1585] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [1609] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
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## [1681] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
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## [2065] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 7 7 7 7 7 7 7  
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## [2425] 2 2 2 2 2 2 2 2 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [2449] 4 4 4 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 8 8 8  
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## [3169] 11 11 11 11 11 11 11 11 11 11 11 11 11 11 2 2 2 2 2 2 2 2 2 2  
## [3193] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 4 4 4 4 4 4 4 4  
## [3217] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [3241] 8 8 8 8 8 8 8 8 8 8 8 8 8 8 10 10 10 10 10 10 10 10 10 10  
## [3265] 10 10 10 10 10 10 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 11  
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## [3721] 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8  
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## [3769] 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12  
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## [3889] 2 2 2 4 4 4 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [3913] 7 7 7 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8  
## [3937] 8 8 8 8 8 8 8 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12  
## [3961] 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12  
## [3985] 12 12 12 12 12 12 12 12 12 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10  
## [4009] 10 10 10 10 10 10 10 10 10 10 10 10 10 10  
##   
## Within cluster sum of squares by cluster:  
## [1] 7663.348 23439.249 47345.465 33990.663 6522.292 831375.777  
## [7] 31168.010 30516.142 35774.686 21706.140 9265.785 32104.288  
## (between\_SS / total\_SS = 96.1 %)  
##   
## Available components:  
##   
## [1] "cluster" "centers" "totss" "withinss" "tot.withinss"  
## [6] "betweenss" "size" "iter" "ifault"

kmean\_withinss <- function(k)   
{cluster <- kmeans(clusteringdata, k)   
return (cluster$tot.withinss)   
}  
  
  
# Set maximum cluster   
max\_k <-20   
# Run algorithm over a range of k   
wss <- sapply(2:max\_k, kmean\_withinss)  
  
elbow <-data.frame(2:max\_k, wss)  
library("ggplot2")



ggplot(elbow, aes(x = X2.max\_k, y = wss)) + geom\_point() + geom\_line() +scale\_x\_continuous(breaks = seq(1, 20, by = 1))



Note that the echo = FALSE parameter was added to the code chunk to prevent printing of the R code that generated the plot.

## References

install.packages(“knitr”)