Kirthan\_Shaker\_Iyangar\_V01108265\_A4b.R

kirthanshaker

2024-07-08

# Function to auto-install and load packages  
install\_and\_load <- function(packages) {  
 for (package in packages) {  
 if (!require(package, character.only = TRUE)) {  
 install.packages(package, dependencies = TRUE)  
 }  
 library(package, character.only = TRUE)  
 }  
}  
  
# List of packages to install and load  
packages <- c("cluster", "FactoMineR", "factoextra", "pheatmap")  
  
install\_and\_load(packages)

## Loading required package: cluster

## Loading required package: FactoMineR

## Loading required package: factoextra

## Loading required package: ggplot2

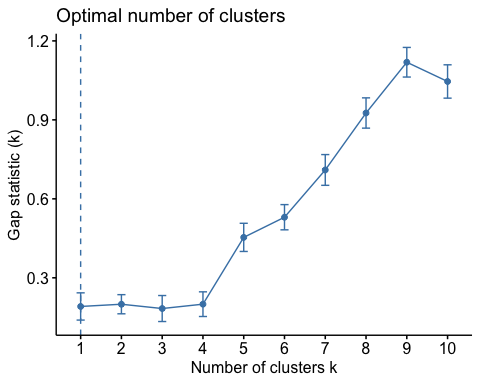
## Welcome! Want to learn more? See two factoextra-related books at https://goo.gl/ve3WBa

## Loading required package: pheatmap

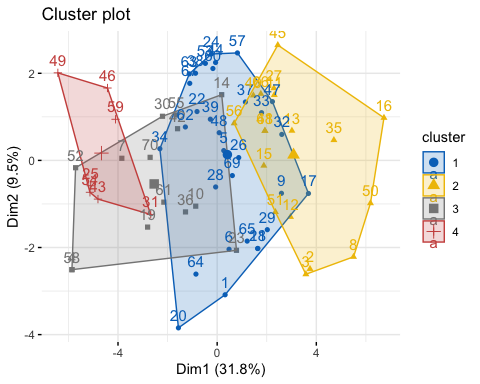
setwd('/Users/kirthanshaker/Desktop/SCMA 631 Data Files ')  
survey\_df<-read.csv('/Users/kirthanshaker/Desktop/SCMA 631 Data Files /Survey.csv',header=TRUE)   
sur\_int=survey\_df[,20:46]   
  
  
#B) Carry our cluster analysis and characterize the respondents based on their background variables.   
library(cluster)   
library(factoextra)   
show(sur\_int)

## X3..Proximity.to.transport X4..Proximity.to.work.place  
## 1 5 2  
## 2 5 3  
## 3 5 2  
## 4 3 5  
## 5 3 4  
## 6 4 4  
## 7 4 4  
## 8 4 3  
## 9 5 5  
## 10 4 2  
## 11 4 3  
## 12 4 5  
## 13 4 4  
## 14 3 4  
## 15 4 4  
## 16 4 4  
## 17 4 5  
## 18 4 5  
## 19 5 4  
## 20 5 4  
## 21 4 5  
## 22 4 5  
## 23 4 5  
## 24 5 4  
## 25 3 4  
## 26 4 5  
## 27 4 4  
## 28 4 5  
## 29 5 5  
## 30 3 3  
## 31 4 4  
## 32 4 3  
## 33 4 3  
## 34 5 4  
## 35 4 4  
## 36 5 3  
## 37 5 4  
## 38 3 4  
## 39 4 5  
## 40 4 3  
## 41 3 4  
## 42 4 2  
## 43 4 4  
## 44 5 3  
## 45 3 2  
## 46 4 3  
## 47 4 4  
## 48 5 3  
## 49 4 5  
## 50 3 3  
## 51 5 2  
## 52 5 5  
## 53 5 4  
## 54 4 4  
## 55 4 5  
## 56 3 4  
## 57 4 5  
## 58 3 5  
## 59 4 4  
## 60 5 4  
## 61 5 3  
## 62 3 3  
## 63 3 4  
## 64 5 4  
## 65 4 5  
## 66 5 3  
## 67 3 2  
## 68 3 4  
## 69 3 5  
## 70 5 3  
## X5..Proximity.to.shopping X1..Gym.Pool.Sports.facility X2..Parking.space  
## 1 1 2 5  
## 2 1 1 4  
## 3 1 4 3  
## 4 4 5 5  
## 5 3 2 4  
## 6 2 3 4  
## 7 3 4 5  
## 8 1 1 2  
## 9 1 3 3  
## 10 2 4 4  
## 11 3 3 4  
## 12 2 3 3  
## 13 3 4 4  
## 14 3 1 4  
## 15 2 2 3  
## 16 1 4 3  
## 17 2 2 3  
## 18 2 4 3  
## 19 2 4 3  
## 20 2 4 4  
## 21 2 4 3  
## 22 3 3 4  
## 23 2 4 3  
## 24 4 4 4  
## 25 4 5 4  
## 26 2 3 4  
## 27 3 5 4  
## 28 2 3 3  
## 29 3 2 3  
## 30 3 4 4  
## 31 2 3 4  
## 32 2 1 4  
## 33 3 2 3  
## 34 3 4 4  
## 35 2 1 2  
## 36 3 4 3  
## 37 3 3 3  
## 38 3 4 4  
## 39 3 4 4  
## 40 2 2 3  
## 41 3 3 3  
## 42 3 3 3  
## 43 3 4 4  
## 44 3 3 3  
## 45 2 2 3  
## 46 3 1 4  
## 47 3 1 3  
## 48 3 2 4  
## 49 3 5 4  
## 50 2 3 2  
## 51 3 4 3  
## 52 4 5 5  
## 53 4 4 3  
## 54 4 5 4  
## 55 3 3 3  
## 56 3 3 3  
## 57 3 2 3  
## 58 4 5 5  
## 59 3 4 3  
## 60 3 3 4  
## 61 3 4 3  
## 62 3 4 4  
## 63 3 4 4  
## 64 2 4 4  
## 65 2 4 3  
## 66 3 3 3  
## 67 3 4 4  
## 68 3 3 3  
## 69 2 3 4  
## 70 3 4 3  
## X3.Power.back.up X4.Water.supply X5.Security X1..Exterior.look X2..Unit.size  
## 1 3 5 3 2 4  
## 2 2 4 3 1 4  
## 3 2 4 5 1 4  
## 4 4 5 5 4 4  
## 5 3 4 4 4 3  
## 6 4 4 3 3 2  
## 7 5 5 4 4 3  
## 8 3 4 1 1 3  
## 9 3 4 3 3 3  
## 10 3 3 3 4 3  
## 11 3 4 4 4 4  
## 12 3 3 4 3 4  
## 13 4 4 5 1 2  
## 14 3 4 4 2 3  
## 15 3 4 4 3 3  
## 16 4 3 2 1 1  
## 17 3 3 2 1 4  
## 18 3 4 3 1 4  
## 19 4 4 4 2 3  
## 20 4 4 5 2 3  
## 21 3 4 3 1 4  
## 22 4 4 3 3 4  
## 23 3 4 3 1 4  
## 24 4 4 3 4 3  
## 25 4 5 5 4 3  
## 26 4 4 4 3 3  
## 27 3 3 4 3 2  
## 28 4 4 4 3 4  
## 29 4 4 3 1 3  
## 30 4 4 4 4 3  
## 31 4 4 3 4 3  
## 32 4 3 3 3 4  
## 33 3 4 3 3 3  
## 34 4 4 5 4 4  
## 35 3 4 3 2 5  
## 36 3 5 4 4 3  
## 37 4 4 4 4 3  
## 38 3 3 3 5 4  
## 39 4 4 3 3 3  
## 40 3 3 4 4 3  
## 41 4 3 3 3 4  
## 42 3 4 4 4 4  
## 43 4 4 4 5 4  
## 44 3 4 4 3 3  
## 45 3 3 4 4 4  
## 46 4 4 4 5 3  
## 47 4 3 3 4 3  
## 48 3 3 3 4 3  
## 49 5 5 5 5 4  
## 50 3 2 3 2 3  
## 51 3 4 5 1 4  
## 52 4 5 5 4 4  
## 53 4 5 4 4 3  
## 54 4 5 5 4 3  
## 55 4 4 4 4 3  
## 56 4 3 3 4 4  
## 57 3 4 3 3 3  
## 58 4 5 5 4 4  
## 59 3 4 4 5 4  
## 60 3 4 4 3 3  
## 61 3 5 4 4 4  
## 62 4 4 4 4 3  
## 63 3 3 3 5 4  
## 64 4 4 5 2 3  
## 65 3 4 3 3 4  
## 66 4 4 4 4 3  
## 67 3 3 4 5 4  
## 68 4 3 3 3 4  
## 69 4 4 3 3 3  
## 70 3 5 4 4 4  
## X3..Interior.design.and.branded.components X4..Layout.plan..Integrated.etc..  
## 1 4 4  
## 2 4 2  
## 3 3 2  
## 4 5 5  
## 5 4 4  
## 6 4 3  
## 7 5 5  
## 8 3 4  
## 9 3 3  
## 10 4 4  
## 11 3 3  
## 12 4 3  
## 13 3 3  
## 14 3 4  
## 15 3 4  
## 16 1 1  
## 17 3 4  
## 18 3 4  
## 19 5 5  
## 20 4 4  
## 21 3 4  
## 22 4 5  
## 23 3 4  
## 24 4 4  
## 25 4 4  
## 26 5 4  
## 27 4 4  
## 28 5 4  
## 29 3 4  
## 30 4 4  
## 31 4 4  
## 32 3 3  
## 33 4 3  
## 34 4 3  
## 35 2 3  
## 36 4 3  
## 37 4 3  
## 38 4 4  
## 39 4 4  
## 40 4 4  
## 41 4 3  
## 42 4 3  
## 43 5 5  
## 44 4 4  
## 45 4 3  
## 46 4 5  
## 47 4 4  
## 48 4 5  
## 49 5 4  
## 50 2 3  
## 51 3 3  
## 52 5 5  
## 53 4 4  
## 54 5 4  
## 55 4 4  
## 56 4 4  
## 57 4 3  
## 58 5 5  
## 59 5 5  
## 60 4 4  
## 61 4 4  
## 62 4 4  
## 63 4 4  
## 64 4 4  
## 65 3 4  
## 66 3 3  
## 67 4 4  
## 68 4 3  
## 69 5 4  
## 70 4 4  
## X5..View.from.apartment X1..Price X2..Booking.amount  
## 1 4 5 1  
## 2 2 5 1  
## 3 2 4 2  
## 4 5 5 2  
## 5 4 4 2  
## 6 3 5 2  
## 7 4 5 2  
## 8 1 5 3  
## 9 2 4 2  
## 10 4 5 1  
## 11 3 4 4  
## 12 1 4 2  
## 13 1 5 3  
## 14 2 4 3  
## 15 2 5 3  
## 16 1 4 4  
## 17 2 4 3  
## 18 2 5 3  
## 19 4 5 2  
## 20 5 5 1  
## 21 2 5 3  
## 22 4 5 4  
## 23 2 5 3  
## 24 4 4 3  
## 25 5 5 2  
## 26 3 4 3  
## 27 4 5 4  
## 28 4 4 2  
## 29 3 5 3  
## 30 4 4 3  
## 31 4 5 3  
## 32 3 4 3  
## 33 3 4 3  
## 34 4 5 4  
## 35 2 5 5  
## 36 3 5 4  
## 37 3 5 4  
## 38 4 4 4  
## 39 3 4 5  
## 40 4 5 5  
## 41 3 5 4  
## 42 4 5 4  
## 43 5 5 3  
## 44 4 5 5  
## 45 3 4 4  
## 46 4 5 5  
## 47 4 3 3  
## 48 4 4 4  
## 49 4 5 4  
## 50 2 3 2  
## 51 3 4 2  
## 52 5 5 3  
## 53 4 4 3  
## 54 4 5 3  
## 55 4 5 5  
## 56 3 5 4  
## 57 4 4 3  
## 58 5 5 2  
## 59 5 5 4  
## 60 4 4 4  
## 61 4 5 4  
## 62 4 4 3  
## 63 4 4 4  
## 64 5 5 4  
## 65 2 5 3  
## 66 3 5 4  
## 67 4 4 4  
## 68 3 5 4  
## 69 3 4 3  
## 70 4 5 4  
## X3..Equated.Monthly.Instalment..EMI. X4..Maintenance.charges  
## 1 4 3  
## 2 4 4  
## 3 5 4  
## 4 4 2  
## 5 3 4  
## 6 4 3  
## 7 5 4  
## 8 4 4  
## 9 4 3  
## 10 5 4  
## 11 5 4  
## 12 3 3  
## 13 5 5  
## 14 4 5  
## 15 5 4  
## 16 5 4  
## 17 4 4  
## 18 4 4  
## 19 5 4  
## 20 2 5  
## 21 4 4  
## 22 5 4  
## 23 4 4  
## 24 5 5  
## 25 4 4  
## 26 5 4  
## 27 5 4  
## 28 4 4  
## 29 4 3  
## 30 4 5  
## 31 4 4  
## 32 4 4  
## 33 5 5  
## 34 4 3  
## 35 5 5  
## 36 4 3  
## 37 4 4  
## 38 4 5  
## 39 4 4  
## 40 5 4  
## 41 4 4  
## 42 5 4  
## 43 3 3  
## 44 5 4  
## 45 4 4  
## 46 4 4  
## 47 4 3  
## 48 3 4  
## 49 5 4  
## 50 3 2  
## 51 5 4  
## 52 4 3  
## 53 5 5  
## 54 4 4  
## 55 5 4  
## 56 4 4  
## 57 5 5  
## 58 4 2  
## 59 4 3  
## 60 5 4  
## 61 4 3  
## 62 4 5  
## 63 4 5  
## 64 2 5  
## 65 4 3  
## 66 4 4  
## 67 4 5  
## 68 4 4  
## 69 3 4  
## 70 4 3  
## X5..Availability.of.loan X1..Builder.reputation X2..Appreciation.potential  
## 1 3 4 5  
## 2 4 5 4  
## 3 2 4 4  
## 4 2 5 4  
## 5 4 4 3  
## 6 3 5 4  
## 7 4 5 5  
## 8 3 4 3  
## 9 4 4 4  
## 10 4 5 4  
## 11 4 3 4  
## 12 4 3 4  
## 13 5 2 4  
## 14 5 4 5  
## 15 4 5 5  
## 16 4 3 4  
## 17 4 4 4  
## 18 4 5 4  
## 19 3 5 5  
## 20 2 5 4  
## 21 4 5 4  
## 22 5 5 5  
## 23 4 5 4  
## 24 5 4 5  
## 25 4 5 3  
## 26 4 4 4  
## 27 5 3 4  
## 28 4 5 4  
## 29 4 4 3  
## 30 3 4 5  
## 31 3 5 4  
## 32 4 4 4  
## 33 5 5 3  
## 34 4 4 5  
## 35 4 4 4  
## 36 3 5 4  
## 37 5 4 4  
## 38 4 5 5  
## 39 4 5 4  
## 40 4 4 4  
## 41 4 4 4  
## 42 4 5 5  
## 43 3 5 5  
## 44 5 4 4  
## 45 5 3 4  
## 46 4 5 5  
## 47 4 3 3  
## 48 4 4 4  
## 49 5 4 5  
## 50 3 2 3  
## 51 3 4 4  
## 52 4 5 4  
## 53 5 4 5  
## 54 4 5 3  
## 55 4 4 4  
## 56 4 4 4  
## 57 5 5 5  
## 58 2 5 4  
## 59 5 5 5  
## 60 5 4 4  
## 61 3 5 4  
## 62 3 4 5  
## 63 4 5 5  
## 64 2 5 4  
## 65 4 5 4  
## 66 5 4 4  
## 67 4 5 5  
## 68 4 4 4  
## 69 4 4 4  
## 70 4 5 4  
## X3..Profile.of.neighbourhood X4..Availability.of.domestic.help Time Size  
## 1 4 1 9 1200  
## 2 3 2 9 800  
## 3 4 4 3 400  
## 4 5 5 3 1600  
## 5 4 3 18 800  
## 6 4 3 3 800  
## 7 4 3 9 1600  
## 8 3 2 3 300  
## 9 3 3 18 800  
## 10 4 2 3 1600  
## 11 3 2 9 800  
## 12 3 2 3 800  
## 13 4 2 3 300  
## 14 4 4 9 1200  
## 15 4 2 9 800  
## 16 3 1 18 300  
## 17 3 2 3 800  
## 18 4 2 3 800  
## 19 5 3 9 1600  
## 20 5 3 3 1200  
## 21 4 2 3 800  
## 22 4 2 9 1200  
## 23 4 2 3 1200  
## 24 4 3 9 800  
## 25 5 4 9 2400  
## 26 3 2 3 800  
## 27 2 2 3 300  
## 28 4 3 9 1200  
## 29 3 2 3 800  
## 30 4 4 9 1600  
## 31 4 3 3 2000  
## 32 3 3 9 800  
## 33 3 3 3 1200  
## 34 5 4 9 1600  
## 35 3 2 3 300  
## 36 4 4 3 1600  
## 37 3 3 9 800  
## 38 4 4 9 1200  
## 39 4 4 9 800  
## 40 4 3 9 800  
## 41 3 3 3 800  
## 42 5 4 3 1600  
## 43 4 3 9 2000  
## 44 4 4 18 800  
## 45 4 4 18 800  
## 46 5 5 9 2400  
## 47 3 3 9 800  
## 48 4 4 3 1200  
## 49 4 5 9 4000  
## 50 2 3 3 300  
## 51 4 4 3 300  
## 52 5 5 18 1600  
## 53 4 3 9 800  
## 54 5 4 3 2400  
## 55 4 3 3 1200  
## 56 4 4 3 800  
## 57 3 3 18 1200  
## 58 5 5 3 1600  
## 59 4 3 9 2000  
## 60 4 4 18 800  
## 61 4 4 9 1600  
## 62 4 4 3 1200  
## 63 4 4 9 1200  
## 64 5 3 3 800  
## 65 4 2 3 800  
## 66 3 4 9 300  
## 67 4 4 3 1200  
## 68 3 3 3 800  
## 69 4 2 9 800  
## 70 4 4 18 1600  
## Budgets Maintainances EMI.1  
## 1 72.5 30000 42500  
## 2 32.5 120 27500  
## 3 12.5 10000 10000  
## 4 102.5 70000 80000  
## 5 52.5 30000 42500  
## 6 52.5 30000 42500  
## 7 87.5 50000 80000  
## 8 12.5 10000 10000  
## 9 52.5 30000 42500  
## 10 102.5 50000 80000  
## 11 32.5 10000 27500  
## 12 52.5 10000 42500  
## 13 12.5 10000 27500  
## 14 72.5 50000 80000  
## 15 32.5 10000 27500  
## 16 12.5 10000 10000  
## 17 32.5 30000 27500  
## 18 52.5 30000 42500  
## 19 102.5 70000 80000  
## 20 52.5 30000 57500  
## 21 52.5 30000 42500  
## 22 52.5 30000 42500  
## 23 87.5 50000 57500  
## 24 52.5 30000 27500  
## 25 150.0 90000 80000  
## 26 32.5 30000 42500  
## 27 12.5 10000 27500  
## 28 32.5 30000 27500  
## 29 52.5 30000 42500  
## 30 102.5 50000 80000  
## 31 150.0 90000 80000  
## 32 32.5 30000 27500  
## 33 52.5 30000 42500  
## 34 87.5 50000 42500  
## 35 12.5 10000 10000  
## 36 72.5 50000 57500  
## 37 32.5 30000 27500  
## 38 52.5 30000 57500  
## 39 52.5 30000 42500  
## 40 32.5 10000 27500  
## 41 32.5 10000 27500  
## 42 87.5 50000 57500  
## 43 150.0 90000 80000  
## 44 52.5 50000 42500  
## 45 32.5 10000 10000  
## 46 150.0 90000 80000  
## 47 32.5 30000 27500  
## 48 52.5 30000 42500  
## 49 150.0 120000 80000  
## 50 12.5 10000 10000  
## 51 12.5 10000 10000  
## 52 102.5 70000 80000  
## 53 52.5 30000 27500  
## 54 150.0 90000 80000  
## 55 102.5 70000 80000  
## 56 32.5 10000 42500  
## 57 72.5 30000 42500  
## 58 102.5 70000 80000  
## 59 150.0 90000 80000  
## 60 52.5 50000 42500  
## 61 102.5 50000 57500  
## 62 72.5 50000 42500  
## 63 87.5 30000 57500  
## 64 32.5 30000 27500  
## 65 52.5 30000 42500  
## 66 32.5 10000 27500  
## 67 72.5 30000 57500  
## 68 32.5 10000 27500  
## 69 32.5 30000 42500  
## 70 150.0 70000 57500

fviz\_nbclust(sur\_int,kmeans,method = "gap\_stat")

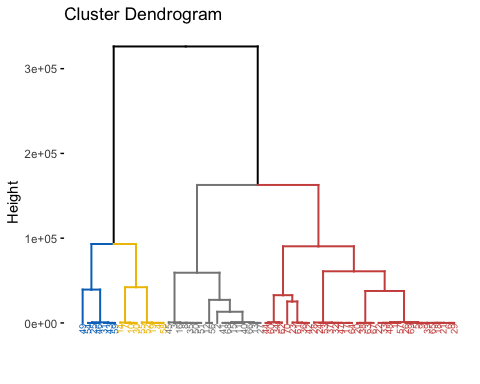


set.seed(123)   
km.res<-kmeans(sur\_int,4,nstart = 25)   
fviz\_cluster(km.res,data=sur\_int,palette="jco",   
 ggtheme = theme\_minimal())



res.hc <- hclust(dist(sur\_int), method = "ward.D2")   
fviz\_dend(res.hc,cex=0.5,k=4,palette = "jco")

## Warning: The `<scale>` argument of `guides()` cannot be `FALSE`. Use "none" instead as  
## of ggplot2 3.3.4.  
## ℹ The deprecated feature was likely used in the factoextra package.  
## Please report the issue at <https://github.com/kassambara/factoextra/issues>.  
## This warning is displayed once every 8 hours.  
## Call `lifecycle::last\_lifecycle\_warnings()` to see where this warning was  
## generated.



library(pheatmap)   
pheatmap(t(sur\_int),cutree\_cols = 4)

