Code:

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# MIS 545 Section 01
# Lab10Group07TummuruArora.R
# Description: In this lab we will import a dataset of Instacart grocery
# transactions and generate association rules among items in a transaction

# Environment Setup --------------------------------------------------------
# Installing "arules" package
# install.packages("arules")

# Loading tidyverse package
library(tidyverse)

# Loading arules package
library(arules)

# Set the working directory to your Lab10 Folder
setwd("C:/Users/ual-laptop/Desktop/Lab10")

# Read InstacartTransactions.csv into a tibble called InstacartTransactions
instacartTransactions <- read.transactions(file =
"InstacartTransactions.csv",
                                           format = "single",
                                           header = "TRUE",
                                           sep = ",",
                                           cols = c("OrderID", "ItemID"))
```

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# Displaying the summary of instacartTransactions tibble
print(summary(instacartTransactions))

# Displaying the first 3 transactions of instacartTransactions tibbel
inspect(instacartTransactions[1:3])

# Finding frequency of "24852" (bananas) in the instacartTransactions tibble
itemFrequency(instacartTransactions[,"24852"])

# Generating Frequency tibble frominstacartTransactions tibble
instacartTransactionsFrequency <-
  tibble(Items = names(itemFrequency(instacartTransactions)),
         Frequency = itemFrequency(instacartTransactions))

# Displaying the frequencies of items in the console
print(instacartTransactionsFrequency)

# Displaying top 10 items that are frequently purchased
instacartTransactionsFrequency %>%
  arrange(desc(Frequency)) %>%
  slice(1:10)

# Generating association rules model in an object
instacartTransactionRules <-
  apriori(instacartTransactions,
          parameter = list(
            support = 0.005,
            confidence = 0.2,
            minlen = 2)
          )
```

```
# Displaying summary of association rules model

summary(instacartTransactionRules)


# Displaying the top 10 rules of association rules model

inspect(instacartTransactionRules[1:10])


# Sorting the association rules model based on lift and printing top 10
records

instacartTransactionRules %>%

  sort(by = "lift") %>%

  head(n=10) %>%

  inspect()
```

Questions:

1. What are the 5 most frequently purchased items? Ensure you look up the names of the products so you can refer to them by name instead of by itemID.

   Ans:

1. 24852-Bananas
2. 13176-Bag of organic bananas
3. 21137-Organic Strawberries
4. 21903-Organic baby spinach
5. 47626-Large lemon

2. Interpret the association rule with the highest lift number. Do so assuming your reader has no knowledge of association rule methodology. Ensure you look up the names of the products so you can refer to them by name instead of by itemID?

   Ans:

   Organic garlic and organic yellow onion relation has the highest lift value of 6.312384. Therefore we can say that organic yellow onion is 6

times more likely to be sold in a transaction where organic garlic is present.

3. Interpret the association rule with the 5th highest lift number. Do so assuming your reader has no knowledge of association rule methodology. How can Instacart take advantage of this information to maximize their revenues? Ensure you look up the names of the products so you can refer to them by name instead of by itemID?

   Ans:

   5^{th} highest lift value is 4.28
   We can conclude that a person is 4.28 times more likely to purchase organic avocados if they had purchased organic bag of bananas and organic strawberries at the same time.
   Instacart can use this information to send targeted personalized advertisements of organic avocado if the customers cart contains organic banana bag and organic strawberries.

   4. Interpret the support, confidence, and lift values of the association rule with the 10th highest lift. Ensure you look up the names of the products so you can refer to them by name instead of by itemID?

   Ans:

   10^{th} highest lift has the following support lift and confidence:
   Support – 0.012 – means Organic strawberries and raspberries are sold together in 1.2% of all the transactions in Instacart
   Confidence – 0.300 – means that there is a 30% chance that organic strawberries will be sold when there are organic raspberries in the transaction
   Lift – 3.6 – means that organic strawberries are 3.6 times more likely to be sold if organic raspberries are purchased in the transaction