hw2_shuangyu_zhao

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1.

```
library(sqldf)
```

```
## Loading required package: gsubfn
```

```
## Loading required package: proto
```

```
## Warning in system2("/usr/bin/otool", c("-L", shQuote(DSO)), stdout = TRUE):
## running command ''/usr/bin/otool' -L '/Library/Frameworks/R.framework/Resources/
## library/tcltk/libs//tcltk.so'' had status 1
```

```
## Loading required package: RSQLite
```

```
customer_his <- read.csv("/Users/apple/Desktop/STT811 appl_stat_model/data/Customer_History.csv")
head(customer_his)
```

```
##   Customer First_Year Last_Year Year_Born Male_Female
## 1        1       2007      2017      1961           F
## 2        2       2007      2016      1953           F
## 3        3       2011      2020      1957           F
## 4        4       2006      2014      1988           M
## 5        5       2005      2018      1965           F
## 6        6       2009      2019      1979           F
```

a.

```
year_df <- data.frame(year = c(2005:2022))
customer_history_model <- sqldf("SELECT customer_his.*, year_df.*
                                 FROM customer_his
                                 INNER JOIN year_df
                                 WHERE year_df.year >= customer_his.First_year
                                 AND year_df.year <= customer_his.Last_year")
head(customer_history_model)
```

```
##   Customer First_Year Last_Year Year_Born Male_Female year
## 1        1       2007      2017      1961           F 2007
## 2        1       2007      2017      1961           F 2008
## 3        1       2007      2017      1961           F 2009
## 4        1       2007      2017      1961           F 2010
## 5        1       2007      2017      1961           F 2011
## 6        1       2007      2017      1961           F 2012
```

```
customer_churn_target <- sqldf("SELECT Customer, year, Year_Born, Male_Female, (year = Last_year) AS ta
                               FROM customer_history_model")
head(customer_churn_target, 11)
```

```
##    Customer year Year_Born Male_Female target
## 1         1 2007      1961           F      0
## 2         1 2008      1961           F      0
## 3         1 2009      1961           F      0
## 4         1 2010      1961           F      0
## 5         1 2011      1961           F      0
## 6         1 2012      1961           F      0
## 7         1 2013      1961           F      0
## 8         1 2014      1961           F      0
## 9         1 2015      1961           F      0
## 10        1 2016      1961           F      0
## 11        1 2017      1961           F      1
```

```
# yes--1;  no--0
```

b.
c.

```
customer_churn_target_age <- sqldf("SELECT customer_churn_target.*, (year-Year_Born) AS customer_age
                                   FROM customer_churn_target")
head(customer_churn_target_age)
```

```
##   Customer year Year_Born Male_Female target customer_age
## 1        1 2007      1961           F      0           46
## 2        1 2008      1961           F      0           47
## 3        1 2009      1961           F      0           48
## 4        1 2010      1961           F      0           49
## 5        1 2011      1961           F      0           50
## 6        1 2012      1961           F      0           51
```

ii.

```
customer_churn_target_age_num_year <- sqldf("SELECT customer_churn_target_age.*,
                                            (customer_history_model.year-customer_history_model.First_Year+
                                            FROM customer_churn_target_age
                                            INNER JOIN customer_history_model
                                            ON customer_history_model.Customer = customer_churn_target_age.
                                            AND customer_history_model.year = customer_churn_target_age.yea
head(customer_churn_target_age_num_year, 12)
```

```
##    Customer year Year_Born Male_Female target customer_age num_year_cus
## 1         1 2007      1961           F      0           46            1
## 2         1 2008      1961           F      0           47            2
## 3         1 2009      1961           F      0           48            3
## 4         1 2010      1961           F      0           49            4
## 5         1 2011      1961           F      0           50            5
```

```
## 6         1 2012      1961           F      0           51            6
## 7         1 2013      1961           F      0           52            7
## 8         1 2014      1961           F      0           53            8
## 9         1 2015      1961           F      0           54            9
## 10        1 2016      1961           F      0           55           10
## 11        1 2017      1961           F      1           56           11
## 12        2 2007      1953           F      0           54            1
```

iii.

```
complaint_his <- read.csv("/Users/apple/Desktop/STT811 appl_stat_model/data/Complaint_History.csv")
sum_complain <- sqldf("SELECT CustomerID, ComplaintYear, COUNT(*) AS complaint_times
                      FROM complaint_his
                      GROUP BY CustomerID, ComplaintYear")
head(sum_complain)
```

```
##   CustomerID ComplaintYear complaint_times
## 1          1          2007               1
## 2          1          2011               1
## 3          2          2009               1
## 4          3          2011               1
## 5          3          2016               1
## 6          3          2018               1
```

```
customer_complain <- sqldf("SELECT customer_churn_target_age_num_year.*, sum_complain.complaint_times
                           FROM customer_churn_target_age_num_year
                           LEFT JOIN sum_complain
                           ON sum_complain.ComplaintYear = customer_churn_target_age_num_year.year
                           AND sum_complain.CustomerID = customer_churn_target_age_num_year.Customer")
head(customer_complain)
```

```
##   Customer year Year_Born Male_Female target customer_age num_year_cus
## 1        1 2007      1961           F      0           46            1
## 2        1 2008      1961           F      0           47            2
## 3        1 2009      1961           F      0           48            3
## 4        1 2010      1961           F      0           49            4
## 5        1 2011      1961           F      0           50            5
## 6        1 2012      1961           F      0           51            6
##   complaint_times
## 1               1
## 2              NA
## 3              NA
## 4              NA
## 5               1
## 6              NA
```

```
customer_complain[is.na(customer_complain)]<-0
head(customer_complain, 11)
```

```
##    Customer year Year_Born Male_Female target customer_age num_year_cus
## 1         1 2007      1961           F      0           46            1
```

```
## 2         1 2008      1961           F      0           47            2
## 3         1 2009      1961           F      0           48            3
## 4         1 2010      1961           F      0           49            4
## 5         1 2011      1961           F      0           50            5
## 6         1 2012      1961           F      0           51            6
## 7         1 2013      1961           F      0           52            7
## 8         1 2014      1961           F      0           53            8
## 9         1 2015      1961           F      0           54            9
## 10        1 2016      1961           F      0           55           10
## 11        1 2017      1961           F      1           56           11
##    complaint_times
## 1                1
## 2                0
## 3                0
## 4                0
## 5                1
## 6                0
## 7                0
## 8                0
## 9                0
## 10               0
## 11               0
```

2.

```
order_history <- read.csv("/Users/apple/Desktop/STT811 appl_stat_model/data/Order_History.csv")
head(order_history)
```

```
##   CustomerID Product_ID Year Month Quantity
## 1         24          3 2010     5       93
## 2         41          3 2015     9       10
## 3         23          3 2010     6       17
## 4         17          2 2010     5       52
## 5          5          1 2015     5       36
## 6         44          2 2016     1       38
```

```
dim(order_history)
```

```
## [1] 3775    5
```

a.

```
order_his <- sqldf("SELECT CustomerID, Product_ID AS ProductID, Year, Month, SUM(Quantity) AS Quantity_s
                   FROM order_history
                   GROUP BY CustomerID, Product_ID, Month, Year")
head(order_his)
```

```
##   CustomerID ProductID Year Month Quantity_sum
## 1          1         1 2015     1           34
## 2          1         1 2008     2           69
## 3          1         1 2010     2           80
```

```
## 4          1         1 2010     3           63
## 5          1         1 2011     3           75
## 6          1         1 2013     3           75
```

```
library(tidyverse)
```

```
## -- Attaching packages --------------------------------------- tidyverse 1.3.2 --
## v ggplot2 3.3.6     v purrr   0.3.4
## v tibble  3.1.7     v dplyr   1.0.9
## v tidyr   1.2.0     v stringr 1.4.0
## v readr   2.1.2     v forcats 0.5.1
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
order_wide <- pivot_wider(order_his, names_from = Year, values_from = Quantity_sum)
order_long <- pivot_longer(order_wide, cols = c('2008','2009','2010', '2011', '2012', '2013', '2014', '
order_wide2 <- pivot_wider(order_long, names_from = Month, values_from = Quantity_sum)
order_long2 <- pivot_longer(order_wide2, cols = c('1','2','3', '4', '5', '6', '7', '8', '9','10', '11',
head(order_long2, 12)
```

```
## # A tibble: 12 x 5
##    CustomerID ProductID year  month Quantity_sum
##         <int>     <int> <chr> <chr>        <int>
##  1          1         1 2008  1               NA
##  2          1         1 2008  2               69
##  3          1         1 2008  3               NA
##  4          1         1 2008  4               NA
##  5          1         1 2008  5               NA
##  6          1         1 2008  6               NA
##  7          1         1 2008  7               NA
##  8          1         1 2008  8               NA
##  9          1         1 2008  9              149
## 10          1         1 2008  10              67
## 11          1         1 2008  11              NA
## 12          1         1 2008  12              NA
```

```
target <- sqldf("SELECT *,
                CASE
                WHEN Quantity_sum != 'NA' THEN 'YES'
                ELSE 'NO' END target
                FROM order_long2
                ORDER BY ProductID, CustomerID, year")
target <- transform(target, year = as.integer(year), month = as.integer(month))
head(target)
```

```
##   CustomerID ProductID year month Quantity_sum target
## 1          1         1 2008     1           NA     NO
## 2          1         1 2008     2           69    YES
## 3          1         1 2008     3           NA     NO
## 4          1         1 2008     4           NA     NO
## 5          1         1 2008     5           NA     NO
## 6          1         1 2008     6           NA     NO
```

```
dim(target)
```

```
## [1] 18000     6
```

b.
c.

```
diff_month <- sqldf("SELECT ta1.CustomerID, ta1.ProductID, ta1.month, ta1.year, ta1.target,
                    ta2.month AS new_month, ta2.year AS new_year
                    FROM target AS ta1
                    INNER JOIN target AS ta2
                    ON ta1.ProductID = ta2.ProductID AND ta2.CustomerID = ta1.CustomerID
                    WHERE ta2.target = 'YES'")
diff_month <- sqldf("SELECT *
                    FROM diff_month
                    WHERE (year = new_year AND diff_month.month > diff_month.new_month)
                    OR year > new_year
                    ORDER BY CustomerID, ProductID, year, month")
head(diff_month)
```

```
##   CustomerID ProductID month year target new_month new_year
## 1          1         1     3 2008     NO         2     2008
## 2          1         1     4 2008     NO         2     2008
## 3          1         1     5 2008     NO         2     2008
## 4          1         1     6 2008     NO         2     2008
## 5          1         1     7 2008     NO         2     2008
## 6          1         1     8 2008     NO         2     2008
```

```
diff_month_final <- sqldf("SELECT *, (year-new_year)*12+(month-new_month) AS diff
                          FROM diff_month
                          ORDER BY CustomerID, ProductID, year")
head(diff_month_final, 12)
```

```
##    CustomerID ProductID month year target new_month new_year diff
## 1           1         1     3 2008     NO         2     2008    1
## 2           1         1     4 2008     NO         2     2008    2
## 3           1         1     5 2008     NO         2     2008    3
## 4           1         1     6 2008     NO         2     2008    4
## 5           1         1     7 2008     NO         2     2008    5
## 6           1         1     8 2008     NO         2     2008    6
## 7           1         1     9 2008    YES         2     2008    7
## 8           1         1    10 2008    YES         2     2008    8
## 9           1         1    10 2008    YES         9     2008    1
## 10          1         1    11 2008     NO         2     2008    9
## 11          1         1    11 2008     NO         9     2008    2
## 12          1         1    11 2008     NO        10     2008    1
```

```
diff_month_final <- sqldf("SELECT CustomerID, ProductID, Month, year, target, MIN(diff) AS diff_since_la
                          FROM diff_month_final
                          GROUP BY CustomerID, ProductID, Month, year
                          ORDER BY CustomerID, ProductID, year, Month")
head(diff_month_final)
```

```
##   CustomerID ProductID month year target diff_since_last_month
## 1          1         1     3 2008     NO                     1
## 2          1         1     4 2008     NO                     2
## 3          1         1     5 2008     NO                     3
## 4          1         1     6 2008     NO                     4
## 5          1         1     7 2008     NO                     5
## 6          1         1     8 2008     NO                     6
```

```
diff_month_final1 <- sqldf("SELECT target.CustomerID, target.ProductID, target.Month, target.year, targ
                           diff_month_final.diff_since_last_month
                           FROM target
                           LEFT JOIN diff_month_final
                           ON diff_month_final.CustomerID = target.CustomerID
                           AND diff_month_final.ProductID = target.ProductID
                           AND diff_month_final.year = target.year
                           AND diff_month_Final.Month = target.Month")
head(diff_month_final1, 10)
```

```
##    CustomerID ProductID month year target diff_since_last_month
## 1           1         1     1 2008     NO                    NA
## 2           1         1     2 2008    YES                    NA
## 3           1         1     3 2008     NO                     1
## 4           1         1     4 2008     NO                     2
## 5           1         1     5 2008     NO                     3
## 6           1         1     6 2008     NO                     4
## 7           1         1     7 2008     NO                     5
## 8           1         1     8 2008     NO                     6
## 9           1         1     9 2008    YES                     7
## 10          1         1    10 2008    YES                     1
```

```
dim(diff_month_final1)
```

```
## [1] 18000     6
```

ii.

```
out12 <- diff_month_final1[diff_month_final1$diff_since_last_month>12, ]
out12 <- sqldf("SELECT *
      FROM out12
      WHERE target = 'YES' ")
dim(out12)
```

```
## [1] 239   6
```

```
head(out12)
```

```
##   CustomerID ProductID month year target diff_since_last_month
## 1          1         1     6 2016    YES                    14
## 2          1         1    12 2017    YES                    18
## 3          2         1     6 2010    YES                    16
## 4          2         1    12 2013    YES                    22
## 5          3         1     7 2016    YES                    13
## 6          4         1     5 2013    YES                    33
```

iii.

```
ave_quan<- sqldf("SELECT CustomerID, Product_ID AS ProductID, AVG(Quantity) AS Quantity_ave
                         FROM order_history
                         GROUP BY CustomerID, Product_ID")
head(ave_quan)
```

```
##   CustomerID ProductID Quantity_ave
## 1          1         1     48.33333
## 2          1         2     47.04348
## 3          1         3     51.32258
## 4          2         1     53.22222
## 5          2         2     48.78947
## 6          2         3     41.69231
```

3.

a.

```
library(ISLR2)
summary(OJ)
```

```
##  Purchase WeekofPurchase     StoreID        PriceCH         PriceMM
##  CH:653   Min.   :227.0   Min.   :1.00   Min.   :1.690   Min.   :1.690
##  MM:417   1st Qu.:240.0   1st Qu.:2.00   1st Qu.:1.790   1st Qu.:1.990
##           Median :257.0   Median :3.00   Median :1.860   Median :2.090
##           Mean   :254.4   Mean   :3.96   Mean   :1.867   Mean   :2.085
##           3rd Qu.:268.0   3rd Qu.:7.00   3rd Qu.:1.990   3rd Qu.:2.180
##           Max.   :278.0   Max.   :7.00   Max.   :2.090   Max.   :2.290
##      DiscCH            DiscMM         SpecialCH        SpecialMM
##  Min.   :0.00000   Min.   :0.0000   Min.   :0.0000   Min.   :0.0000
##  1st Qu.:0.00000   1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.0000
##  Median :0.00000   Median :0.0000   Median :0.0000   Median :0.0000
##  Mean   :0.05186   Mean   :0.1234   Mean   :0.1477   Mean   :0.1617
##  3rd Qu.:0.00000   3rd Qu.:0.2300   3rd Qu.:0.0000   3rd Qu.:0.0000
##  Max.   :0.50000   Max.   :0.8000   Max.   :1.0000   Max.   :1.0000
##     LoyalCH          SalePriceMM     SalePriceCH      PriceDiff       Store7
##  Min.   :0.000011   Min.   :1.190   Min.   :1.390   Min.   :-0.6700   No :714
##  1st Qu.:0.325257   1st Qu.:1.690   1st Qu.:1.750   1st Qu.: 0.0000   Yes:356
##  Median :0.600000   Median :2.090   Median :1.860   Median : 0.2300
##  Mean   :0.565782   Mean   :1.962   Mean   :1.816   Mean   : 0.1465
##  3rd Qu.:0.850873   3rd Qu.:2.130   3rd Qu.:1.890   3rd Qu.: 0.3200
##  Max.   :0.999947   Max.   :2.290   Max.   :2.090   Max.   : 0.6400
##    PctDiscMM        PctDiscCH       ListPriceDiff       STORE
##  Min.   :0.0000   Min.   :0.00000   Min.   :0.000   Min.   :0.000
##  1st Qu.:0.0000   1st Qu.:0.00000   1st Qu.:0.140   1st Qu.:0.000
##  Median :0.0000   Median :0.00000   Median :0.240   Median :2.000
##  Mean   :0.0593   Mean   :0.02731   Mean   :0.218   Mean   :1.631
##  3rd Qu.:0.1127   3rd Qu.:0.00000   3rd Qu.:0.300   3rd Qu.:3.000
##  Max.   :0.4020   Max.   :0.25269   Max.   :0.440   Max.   :4.000
```

```
head(OJ)
```

```
##   Purchase WeekofPurchase StoreID PriceCH PriceMM DiscCH DiscMM SpecialCH
## 1       CH            237       1    1.75    1.99   0.00    0.0         0
## 2       CH            239       1    1.75    1.99   0.00    0.3         0
## 3       CH            245       1    1.86    2.09   0.17    0.0         0
## 4       MM            227       1    1.69    1.69   0.00    0.0         0
## 5       CH            228       7    1.69    1.69   0.00    0.0         0
## 6       CH            230       7    1.69    1.99   0.00    0.0         0
##   SpecialMM  LoyalCH SalePriceMM SalePriceCH PriceDiff Store7 PctDiscMM
## 1         0 0.500000        1.99        1.75      0.24     No  0.000000
## 2         1 0.600000        1.69        1.75     -0.06     No  0.150754
## 3         0 0.680000        2.09        1.69      0.40     No  0.000000
## 4         0 0.400000        1.69        1.69      0.00     No  0.000000
## 5         0 0.956535        1.69        1.69      0.00    Yes  0.000000
## 6         1 0.965228        1.99        1.69      0.30    Yes  0.000000
##   PctDiscCH ListPriceDiff STORE
## 1  0.000000          0.24     1
## 2  0.000000          0.24     1
## 3  0.091398          0.23     1
## 4  0.000000          0.00     1
## 5  0.000000          0.00     0
## 6  0.000000          0.30     0
```

```
oj <- OJ
```

```
ave_price <- sqldf("SELECT Purchase, StoreID,
                   CASE
                   WHEN Purchase = 'CH' THEN AVG(SalePriceCH)
                   ELSE AVG(SalePriceMM)
                   END ave_price
                   FROM oj
                   GROUP BY Purchase, StoreID
                   ORDER BY Purchase, StoreID")
ave_price
```

```
##    Purchase StoreID ave_price
## 1        CH       1  1.780471
## 2        CH       2  1.834860
## 3        CH       3  1.907333
## 4        CH       4  1.922143
## 5        CH       7  1.714161
## 6        MM       1  1.723194
## 7        MM       2  1.849391
## 8        MM       3  2.045702
## 9        MM       4  2.023333
## 10       MM       7  1.831585
```

```
oj_aveprice <- sqldf("SELECT oj.*, ave_price.ave_price
                     FROM oj
                     INNER JOIN ave_price
                     ON ave_price.Purchase = oj.Purchase
```

```
                    AND ave_price.StoreID = oj.StoreID")
head(oj_aveprice)
```

```
##   Purchase WeekofPurchase StoreID PriceCH PriceMM DiscCH DiscMM SpecialCH
## 1       CH            237       1    1.75    1.99   0.00    0.0         0
## 2       CH            239       1    1.75    1.99   0.00    0.3         0
## 3       CH            245       1    1.86    2.09   0.17    0.0         0
## 4       MM            227       1    1.69    1.69   0.00    0.0         0
## 5       CH            228       7    1.69    1.69   0.00    0.0         0
## 6       CH            230       7    1.69    1.99   0.00    0.0         0
##   SpecialMM  LoyalCH SalePriceMM SalePriceCH PriceDiff Store7 PctDiscMM
## 1         0 0.500000        1.99        1.75      0.24     No  0.000000
## 2         1 0.600000        1.69        1.75     -0.06     No  0.150754
## 3         0 0.680000        2.09        1.69      0.40     No  0.000000
## 4         0 0.400000        1.69        1.69      0.00     No  0.000000
## 5         0 0.956535        1.69        1.69      0.00    Yes  0.000000
## 6         1 0.965228        1.99        1.69      0.30    Yes  0.000000
##   PctDiscCH ListPriceDiff STORE ave_price
## 1  0.000000          0.24     1  1.780471
## 2  0.000000          0.24     1  1.780471
## 3  0.091398          0.23     1  1.780471
## 4  0.000000          0.00     1  1.723194
## 5  0.000000          0.00     0  1.714161
## 6  0.000000          0.30     0  1.714161
```

b. week: 227 ~ 278

```
pre_frac <- sqldf("SELECT Purchase, WeekofPurchase, StoreID, WeekofPurchase+1 AS presentweek
                  FROM oj
                  ORDER BY StoreID, presentweek")
head(pre_frac)
```

```
##   Purchase WeekofPurchase StoreID presentweek
## 1       MM            227       1         228
## 2       MM            227       1         228
## 3       CH            227       1         228
## 4       MM            227       1         228
## 5       MM            228       1         229
## 6       MM            228       1         229
```

```
pre_frac <- sqldf("SELECT WeekofPurchase, StoreID, presentweek,
CAST(SUM(Purchase = 'MM') AS FLOAT)/CAST(SUM(Purchase = 'MM')+SUM(Purchase = 'CH')AS FLOAT) AS frac_MM
                  FROM pre_frac
                  GROUP BY StoreID, presentweek")
head(pre_frac)
```

```
##   WeekofPurchase StoreID presentweek   frac_MM
## 1            227       1         228 0.7500000
## 2            228       1         229 1.0000000
## 3            229       1         230 1.0000000
## 4            230       1         231 1.0000000
## 5            231       1         232 0.0000000
## 6            232       1         233 0.3333333
```

```
oj_aveprice_fracMM <- sqldf("SELECT oj_aveprice.*, pre_frac.frac_MM AS pre_Frac_MM
                            FROM oj_aveprice
                            LEFT JOIN pre_frac
                            ON oj_aveprice.WeekofPurchase = pre_frac.presentweek
                            AND oj_aveprice.StoreID = pre_frac.StoreID
                            ORDER BY Purchase, StoreID, WeekofPurchase")
head(oj_aveprice_fracMM, 20)
```

```
##    Purchase WeekofPurchase StoreID PriceCH PriceMM DiscCH DiscMM SpecialCH
## 1        CH            227       1    1.69    1.69    0.0    0.0         0
## 2        CH            231       1    1.69    1.69    0.3    0.2         1
## 3        CH            231       1    1.69    1.69    0.3    0.2         1
## 4        CH            232       1    1.69    1.99    0.0    0.0         1
## 5        CH            232       1    1.69    1.99    0.0    0.0         1
## 6        CH            232       1    1.69    1.99    0.0    0.0         1
## 7        CH            232       1    1.69    1.99    0.0    0.0         1
## 8        CH            233       1    1.69    1.99    0.0    0.0         0
## 9        CH            233       1    1.69    1.99    0.0    0.0         0
## 10       CH            234       1    1.69    1.99    0.0    0.0         0
## 11       CH            234       1    1.69    1.99    0.0    0.0         0
## 12       CH            234       1    1.69    1.99    0.0    0.0         0
## 13       CH            235       1    1.69    1.99    0.0    0.0         0
## 14       CH            237       1    1.75    1.99    0.0    0.0         0
## 15       CH            237       1    1.75    1.99    0.0    0.0         0
## 16       CH            237       1    1.75    1.99    0.0    0.0         0
## 17       CH            238       1    1.75    1.99    0.0    0.0         0
## 18       CH            238       1    1.75    1.99    0.0    0.0         0
## 19       CH            238       1    1.75    1.99    0.0    0.0         0
## 20       CH            239       1    1.75    1.99    0.0    0.3         0
##    SpecialMM  LoyalCH SalePriceMM SalePriceCH PriceDiff Store7 PctDiscMM
## 1          0 0.600000        1.69        1.69      0.00     No  0.000000
## 2          0 0.320000        1.49        1.39      0.10     No  0.118343
## 3          0 0.500000        1.49        1.39      0.10     No  0.118343
## 4          0 0.586313        1.99        1.69      0.30     No  0.000000
## 5          0 0.795200        1.99        1.69      0.30     No  0.000000
## 6          0 0.836160        1.99        1.69      0.30     No  0.000000
## 7          0 0.404800        1.99        1.69      0.30     No  0.000000
## 8          0 0.916114        1.99        1.69      0.30     No  0.000000
## 9          0 0.435200        1.99        1.69      0.30     No  0.000000
## 10         0 0.256000        1.99        1.69      0.30     No  0.000000
## 11         0 0.868928        1.99        1.69      0.30     No  0.000000
## 12         0 0.857394        1.99        1.69      0.30     No  0.000000
## 13         0 0.619072        1.99        1.69      0.30     No  0.000000
## 14         0 0.500000        1.99        1.75      0.24     No  0.000000
## 15         0 0.520000        1.99        1.75      0.24     No  0.000000
## 16         0 0.895142        1.99        1.75      0.24     No  0.000000
## 17         0 0.163840        1.99        1.75      0.24     No  0.000000
## 18         0 0.456000        1.99        1.75      0.24     No  0.000000
## 19         0 0.564800        1.99        1.75      0.24     No  0.000000
## 20         1 0.600000        1.69        1.75     -0.06     No  0.150754
##    PctDiscCH ListPriceDiff STORE ave_price pre_Frac_MM
## 1   0.000000          0.00     1  1.780471          NA
## 2   0.177515          0.00     1  1.780471   1.0000000
```

```
## 3   0.177515          0.00     1  1.780471   1.0000000
## 4   0.000000          0.30     1  1.780471   0.0000000
## 5   0.000000          0.30     1  1.780471   0.0000000
## 6   0.000000          0.30     1  1.780471   0.0000000
## 7   0.000000          0.30     1  1.780471   0.0000000
## 8   0.000000          0.30     1  1.780471   0.3333333
## 9   0.000000          0.30     1  1.780471   0.3333333
## 10  0.000000          0.30     1  1.780471   0.3333333
## 11  0.000000          0.30     1  1.780471   0.3333333
## 12  0.000000          0.30     1  1.780471   0.3333333
## 13  0.000000          0.30     1  1.780471   0.0000000
## 14  0.000000          0.24     1  1.780471   1.0000000
## 15  0.000000          0.24     1  1.780471   1.0000000
## 16  0.000000          0.24     1  1.780471   1.0000000
## 17  0.000000          0.24     1  1.780471   0.4000000
## 18  0.000000          0.24     1  1.780471   0.4000000
## 19  0.000000          0.24     1  1.780471   0.4000000
## 20  0.000000          0.24     1  1.780471   0.2500000
```