

Best Subset

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```
library(RSQLite)

## Warning: package 'RSQLite' was built under R version 3.4.4
library(sqldf)

## Warning: package 'sqldf' was built under R version 3.4.4
## Loading required package: gsubfn
## Warning: package 'gsubfn' was built under R version 3.4.4
## Loading required package: proto
library(RODBC)
library(dplyr)

##
## Attaching package: 'dplyr'
## The following objects are masked from 'package:stats':
##
##   filter, lag
## The following objects are masked from 'package:base':
##
##   intersect, setdiff, setequal, union
library(ggplot2)
library(stringr)
library(lubridate)

##
## Attaching package: 'lubridate'
## The following object is masked from 'package:base':
##
##   date
library(tidyr)
library(dplyr)
library(tidyr)
library(caret)

## Warning: package 'caret' was built under R version 3.4.4
## Loading required package: lattice
library(DMwR)

## Warning: package 'DMwR' was built under R version 3.4.4
## Loading required package: grid
```

```

library(ROCR)

## Warning: package 'ROCR' was built under R version 3.4.4
## Loading required package: gplots
## Warning: package 'gplots' was built under R version 3.4.4
##
## Attaching package: 'gplots'
## The following object is masked from 'package:stats':
##
##      lowess
require(caTools)

## Loading required package: caTools
library(ISLR)
library(ggplot2)
library(MASS)

##
## Attaching package: 'MASS'
## The following object is masked from 'package:dplyr':
##
##      select
library(leaps)

## Warning: package 'leaps' was built under R version 3.4.4
library(bestglm)
library(glmnet)

## Loading required package: Matrix
##
## Attaching package: 'Matrix'
## The following object is masked from 'package:tidyr':
##
##      expand
## Loading required package: foreach
## Loaded glmnet 2.0-13
library(Matrix)

#Create three names for same dataset

a <- read.csv("card transactions.csv")

a <- a %>% filter(Transtype == 'P')

```

```
a[is.na(a)] <- 0
```

```
a$zip = a$Merchant.Zip
a$Description=a$Merch.Description
a$State=a$Merchant.State
```

```
summary(a)
```

```
##      Recordnum      Cardnum      Date
##  Min.      : 1  Min.      :5.142e+09  2/28/2010: 684
##  1st Qu.:24143  1st Qu.:5.142e+09  8/10/2010: 606
##  Median :48344  Median :5.142e+09  3/15/2010: 593
##  Mean   :48343  Mean   :5.142e+09  9/13/2010: 564
##  3rd Qu.:72544  3rd Qu.:5.142e+09  8/9/2010 : 534
##  Max.   :96708  Max.   :5.142e+09  9/14/2010: 531
##                                     (Other) :92841
##      Merchantnum      Merch.Description Merchant.State
##  930090121224 : 9310  GSA-FSS-ADV      : 1688  TN      :11990
##                                     : 3199  SIGMA-ALDRICH      : 1635  VA      : 7872
##  5509006296254: 2131  STAPLES #941      : 1174  CA      : 6817
##  9900020006406: 1714  FISHER SCI ATL    : 1093  IL      : 6508
##  602608969534 : 1092  MWI*MICRO WAREHOUSE: 958  MD      : 5398
##  4353000719908: 1020  CDW*GOVERNMENT INC : 872  GA      : 5025
##  (Other)      :77887  (Other)           :88933  (Other):52743
##  Merchant.Zip  Transtype      Amount      Fraud      X
##  Min.      : 0  A: 0      $3.62 : 4283  Min.      :0.00000  Min.      :0
##  1st Qu.:20639  D: 0      $3.67 : 1620  1st Qu.:0.00000  1st Qu.:0
##  Median :38118  P:96353   $3.74 : 913   Median :0.00000  Median :0
##  Mean   :42714  Y: 0      $3.80 : 827   Mean   :0.01052  Mean   :0
##  3rd Qu.:63103      $4.37 : 378   3rd Qu.:0.00000  3rd Qu.:0
##  Max.   :99999      $30.00 : 315   Max.   :1.00000  Max.   :0
##                                     (Other) :88017
##      zip      Description      State
##  Min.      : 0  GSA-FSS-ADV      : 1688  TN      :11990
##  1st Qu.:20639  SIGMA-ALDRICH      : 1635  VA      : 7872
##  Median :38118  STAPLES #941      : 1174  CA      : 6817
##  Mean   :42714  FISHER SCI ATL    : 1093  IL      : 6508
##  3rd Qu.:63103  MWI*MICRO WAREHOUSE: 958  MD      : 5398
##  Max.   :99999  CDW*GOVERNMENT INC : 872  GA      : 5025
##                                     (Other) :88933  (Other):52743
```

```
b <- a
df<- a
```

#Create expert variables with SQL

```
Merchantnumstate = sqldf("SELECT a.Recordnum,
COUNT(CASE WHEN a.Date = b.Date THEN a.Recordnum ELSE NULL END) AS same_Merchantnum,
COUNT(CASE WHEN a.Date - b.Date BETWEEN 0 AND 2 AND a.Recordnum> b.Recordnum THEN a.Recordnum ELSE NULL END) AS diff_2,
COUNT(DISTINCT CASE WHEN a.Date - b.Date BETWEEN 0 AND 4 AND a.Recordnum> b.Recordnum THEN a.Recordnum ELSE NULL END) AS diff_4,
COUNT(CASE WHEN a.Date - b.Date BETWEEN 0 AND 6 AND a.Recordnum> b.Recordnum THEN a.Recordnum ELSE NULL END) AS diff_6")
```



```
WHERE a.Merchantnum=b.Merchantnum
GROUP BY 1")
```

```
Cardnum = sqldf("SELECT a.Recordnum,
COUNT(CASE WHEN a.Date = b.Date THEN a.Recordnum ELSE NULL END) AS same_Cardnum_1,
COUNT(CASE WHEN a.Date - b.Date BETWEEN 0 AND 2 AND a.Recordnum> b.Recordnum THEN a.Reco
COUNT(DISTINCT CASE WHEN a.Date - b.Date BETWEEN 0 AND 4 AND a.Recordnum> b.Recordnum TH
COUNT(CASE WHEN a.Date - b.Date BETWEEN 0 AND 6 AND a.Recordnum> b.Recordnum THEN a.Reco
COUNT(CASE WHEN a.Date - b.Date BETWEEN 0 AND 13 AND a.Recordnum> b.Recordnum THEN a.Re
COUNT(CASE WHEN a.Date - b.Date BETWEEN 0 AND 29 AND a.Recordnum> b.Recordnum THEN a.Re
COUNT(DISTINCT CASE WHEN a.Date = b.Date AND a.Recordnum> b.Recordnum THEN b.Zip ELSE NU
COUNT(DISTINCT CASE WHEN a.Date - b.Date BETWEEN 0 AND 2 AND a.Recordnum> b.Recordnum TH
COUNT(DISTINCT CASE WHEN a.Date - b.Date BETWEEN 0 AND 4 AND a.Recordnum> b.Recordnum TH
COUNT(DISTINCT CASE WHEN a.Date - b.Date BETWEEN 0 AND 6 AND a.Recordnum> b.Recordnum TH
COUNT(DISTINCT CASE WHEN a.Date - b.Date BETWEEN 0 AND 13 AND a.Recordnum> b.Recordnum '
COUNT(DISTINCT CASE WHEN a.Date - b.Date BETWEEN 0 AND 29 AND a.Recordnum> b.Recordnum '
COUNT(DISTINCT CASE WHEN a.Date = b.Date AND a.Recordnum> b.Recordnum THEN b.Amount ELSI
COUNT(DISTINCT CASE WHEN a.Date - b.Date BETWEEN 0 AND 2 AND a.Recordnum> b.Recordnum TH
COUNT(DISTINCT CASE WHEN a.Date - b.Date BETWEEN 0 AND 4 AND a.Recordnum> b.Recordnum TH
COUNT(DISTINCT CASE WHEN a.Date - b.Date BETWEEN 0 AND 6 AND a.Recordnum> b.Recordnum TH
COUNT(DISTINCT CASE WHEN a.Date - b.Date BETWEEN 0 AND 13 AND a.Recordnum> b.Recordnum '
COUNT(DISTINCT CASE WHEN a.Date - b.Date BETWEEN 0 AND 29 AND a.Recordnum> b.Recordnum '
COUNT(DISTINCT CASE WHEN a.Date = b.Date AND a.Recordnum> b.Recordnum THEN b.Cardnum EL
COUNT(DISTINCT CASE WHEN a.Date - b.Date BETWEEN 0 AND 2 AND a.Recordnum> b.Recordnum TH
COUNT(DISTINCT CASE WHEN a.Date - b.Date BETWEEN 0 AND 6 AND a.Recordnum> b.Recordnum TH
COUNT(DISTINCT CASE WHEN a.Date - b.Date BETWEEN 0 AND 4 AND a.Recordnum> b.Recordnum TH
COUNT(DISTINCT CASE WHEN a.Date - b.Date BETWEEN 0 AND 13 AND a.Recordnum> b.Recordnum '
COUNT(DISTINCT CASE WHEN a.Date - b.Date BETWEEN 0 AND 29 AND a.Recordnum> b.Recordnum '

from a, b
WHERE a.Cardnum=b.Cardnum
GROUP BY 1")
```

```
#join datasets
```

```
df = inner_join(df, Cardnum, by="Recordnum")
```

```
df = inner_join(a, Merchantnum, by="Recordnum")
```

```
df = inner_join(df, Merchantnumstate, by="Recordnum")
```

```
#feature selection
```

```
library(bestglm)
```

```
subset = regsubsets(x = df[60:30000,15:62], a[60:30000,10], nvmax=20)
```

```
## Warning in leaps.setup(x, y, wt = weights, nbest = nbest, nvmax = nvmax, :
## 22 linear dependencies found

## Reordering variables and trying again:
```

```
summary(subset)
```

```
## Subset selection object
## 48 Variables (and intercept)
##
```

	Forced in	Forced out
## same_Merchantnum_1.x	FALSE	FALSE
## same_Merchantnum_3.x	FALSE	FALSE
## same_Merchantnum_5.x	FALSE	FALSE
## same_Merchantnum_7.x	FALSE	FALSE
## same_Merchantnum_diff_Zip_1.x	FALSE	FALSE
## same_Merchantnum_diff_Zip_3.x	FALSE	FALSE
## same_Merchantnum_diff_Zip_5.x	FALSE	FALSE
## same_Merchantnum_diff_amount_1.x	FALSE	FALSE
## same_Merchantnum_diff_amount_3.x	FALSE	FALSE
## same_Merchantnum_diff_amount_5.x	FALSE	FALSE
## same_Merchantnum_diff_Cardnum_1.x	FALSE	FALSE
## same_Merchantnum_diff_Cardnum_3.x	FALSE	FALSE
## same_Merchantnum_diff_Cardnum_7.x	FALSE	FALSE
## same_Merchantnum_1.y	FALSE	FALSE
## same_Merchantnum_3.y	FALSE	FALSE
## same_Merchantnum_5.y	FALSE	FALSE
## same_Merchantnum_7.y	FALSE	FALSE
## same_Merchantnum_diff_Zip_1.y	FALSE	FALSE
## same_Merchantnum_diff_Zip_3.y	FALSE	FALSE
## same_Merchantnum_diff_Zip_5.y	FALSE	FALSE
## same_Merchantnum_diff_amount_1.y	FALSE	FALSE
## same_Merchantnum_diff_amount_3.y	FALSE	FALSE
## same_Merchantnum_diff_amount_5.y	FALSE	FALSE
## same_Merchantnum_diff_Cardnum_1.y	FALSE	FALSE
## same_Merchantnum_diff_Cardnum_3.y	FALSE	FALSE
## same_Merchantnum_diff_Cardnum_7.y	FALSE	FALSE
## same_Merchantnum_14.x	FALSE	FALSE
## same_Merchantnum_30.x	FALSE	FALSE
## same_Merchantnum_diff_Zip_7.x	FALSE	FALSE
## same_Merchantnum_diff_Zip_14.x	FALSE	FALSE
## same_Merchantnum_diff_Zip_30.x	FALSE	FALSE
## same_Merchantnum_diff_amount_7.x	FALSE	FALSE
## same_Merchantnum_diff_amount_14.x	FALSE	FALSE
## same_Merchantnum_diff_amount_30.x	FALSE	FALSE
## same_Cardnum_diff_Cardnum_5.x	FALSE	FALSE
## same_Merchantnum_diff_Cardnum_14.x	FALSE	FALSE
## same_Merchantnum_diff_Cardnum_30.x	FALSE	FALSE
## same_Merchantnum_14.y	FALSE	FALSE
## same_Merchantnum_30.y	FALSE	FALSE
## same_Merchantnum_diff_Zip_7.y	FALSE	FALSE
## same_Merchantnum_diff_Zip_14.y	FALSE	FALSE
## same_Merchantnum_diff_Zip_30.y	FALSE	FALSE
## same_Merchantnum_diff_amount_7.y	FALSE	FALSE
## same_Merchantnum_diff_amount_14.y	FALSE	FALSE
## same_Merchantnum_diff_amount_30.y	FALSE	FALSE

```

## same_Cardnum_diff_Cardnum_5.y      FALSE      FALSE
## same_Merchantnum_diff_Cardnum_14.y  FALSE      FALSE
## same_Merchantnum_diff_Cardnum_30.y  FALSE      FALSE
## 1 subsets of each size up to 21
## Selection Algorithm: exhaustive
##      same_Merchantnum_1.x same_Merchantnum_3.x same_Merchantnum_5.x
## 1 ( 1 ) " " " " " "
## 2 ( 1 ) " " " " " "
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## 21 ( 1 ) " " " " "*"
##      same_Merchantnum_7.x same_Merchantnum_14.x same_Merchantnum_30.x
## 1 ( 1 ) " " " " " "
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## 20 ( 1 ) " " " " "*"
## 21 ( 1 ) " " " " "*"
##      same_Merchantnum_diff_Zip_1.x same_Merchantnum_diff_Zip_3.x
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## 5	(1)	" "	" "
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## 12	(1)	" "	" "
## 13	(1)	" "	" "
## 14	(1)	" "	"*"
## 15	(1)	" "	"*"
## 16	(1)	" "	" "
## 17	(1)	" "	"*"
## 18	(1)	"*"	" "
## 19	(1)	"*"	" "
## 20	(1)	"*"	"*"
## 21	(1)	"*"	"*"
##		same_Merchantnum_diff_Zip_5.x	same_Merchantnum_diff_Zip_7.x
## 1	(1)	" "	" "
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## 12	(1)	" "	" "
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## 17	(1)	" "	" "
## 18	(1)	" "	"*"
## 19	(1)	" "	"*"
## 20	(1)	"*"	" "
## 21	(1)	" "	" "
##		same_Merchantnum_diff_Zip_14.x	same_Merchantnum_diff_Zip_30.x
## 1	(1)	" "	" "
## 2	(1)	" "	" "
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## 15 ( 1 ) " " " "
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##
## same_Merchantnum_diff_amount_1.x
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##
## same_Merchantnum_diff_amount_3.x
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## 16 ( 1 ) " "
## 17 ( 1 ) " "
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## 19 ( 1 ) " "
## 20 ( 1 ) " "
## 21 ( 1 ) "*"
##
## same_Merchantnum_diff_amount_5.x
## 1 ( 1 ) " "
## 2 ( 1 ) " "

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## 3 ( 1 ) " "
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##
##      same_Merchantnum_diff_amount_7.x
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##
##      same_Merchantnum_diff_amount_14.x
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##      same_Merchantnum_diff_amount_30.x
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## 21 ( 1 ) "*"
##      same_Merchantnum_diff_Cardnum_1.x
## 1 ( 1 ) " "
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## 16 ( 1 ) "*"
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## 18 ( 1 ) "*"
## 19 ( 1 ) "*"
## 20 ( 1 ) "*"
## 21 ( 1 ) "*"
##      same_Merchantnum_diff_Cardnum_3.x

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## 1 ( 1 ) " "
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## 21 ( 1 ) "*"
##
##      same_Merchantnum_diff_Cardnum_7.x same_Cardnum_diff_Cardnum_5.x
## 1 ( 1 ) " " " "
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## 21 ( 1 ) " " " "
##
##      same_Merchantnum_diff_Cardnum_14.x
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## 21 ( 1 ) "*"
##
##      same_Merchantnum_diff_Cardnum_30.x same_Merchantnum_1.y
## 1 ( 1 ) " " " "
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## 17 ( 1 ) "*" " "
## 18 ( 1 ) " " " "
## 19 ( 1 ) " " "*"
## 20 ( 1 ) " " "*"
## 21 ( 1 ) " " "*"
##
##      same_Merchantnum_3.y same_Merchantnum_5.y same_Merchantnum_7.y
## 1 ( 1 ) " " " " " "
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## 18 ( 1 ) "*" "*" " "
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## 20 ( 1 ) " " "*" " "

```

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## 21 ( 1 ) "*" "*" " "
##      same_Merchantnum_14.y same_Merchantnum_30.y
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## 8 ( 1 ) " " " "
## 9 ( 1 ) " " " "
## 10 ( 1 ) " " " "
## 11 ( 1 ) " " " "
## 12 ( 1 ) "*" " "
## 13 ( 1 ) "*" " "
## 14 ( 1 ) "*" " "
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## 16 ( 1 ) " " " "
## 17 ( 1 ) " " " "
## 18 ( 1 ) "*" " "
## 19 ( 1 ) "*" " "
## 20 ( 1 ) "*" " "
## 21 ( 1 ) "*" " "
##      same_Merchantnum_diff_Zip_1.y same_Merchantnum_diff_Zip_3.y
## 1 ( 1 ) "*" " "
## 2 ( 1 ) "*" " "
## 3 ( 1 ) "*" "*"
## 4 ( 1 ) "*" "*"
## 5 ( 1 ) "*" "*"
## 6 ( 1 ) "*" "*"
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## 8 ( 1 ) "*" "*"
## 9 ( 1 ) "*" "*"
## 10 ( 1 ) "*" "*"
## 11 ( 1 ) "*" "*"
## 12 ( 1 ) "*" " "
## 13 ( 1 ) "*" " "
## 14 ( 1 ) "*" " "
## 15 ( 1 ) "*" " "
## 16 ( 1 ) "*" "*"
## 17 ( 1 ) "*" "*"
## 18 ( 1 ) "*" " "
## 19 ( 1 ) "*" " "
## 20 ( 1 ) "*" " "
## 21 ( 1 ) "*" " "
##      same_Merchantnum_diff_Zip_5.y same_Merchantnum_diff_Zip_7.y
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## 2 ( 1 ) " " " "
## 3 ( 1 ) " " " "
## 4 ( 1 ) " " " "
## 5 ( 1 ) "*" " "
## 6 ( 1 ) " " " "
## 7 ( 1 ) " " " "
## 8 ( 1 ) "*" " "

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## 9 ( 1 ) " " " "
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## 11 ( 1 ) "*" " "
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## 13 ( 1 ) " " " "
## 14 ( 1 ) " " " "
## 15 ( 1 ) " " " "
## 16 ( 1 ) " " " "
## 17 ( 1 ) " " "*"
## 18 ( 1 ) " " " "
## 19 ( 1 ) " " " "
## 20 ( 1 ) " " " "
## 21 ( 1 ) " " " "
##
## same_Merchantnum_diff_Zip_14.y same_Merchantnum_diff_Zip_30.y
## 1 ( 1 ) " " " "
## 2 ( 1 ) " " " "
## 3 ( 1 ) " " " "
## 4 ( 1 ) " " " "
## 5 ( 1 ) " " " "
## 6 ( 1 ) " " "*"
## 7 ( 1 ) " " " "
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## 9 ( 1 ) " " "*"
## 10 ( 1 ) " " " "
## 11 ( 1 ) " " " "
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## 13 ( 1 ) " " "*"
## 14 ( 1 ) " " "*"
## 15 ( 1 ) " " "*"
## 16 ( 1 ) "*" " "
## 17 ( 1 ) " " " "
## 18 ( 1 ) " " "*"
## 19 ( 1 ) " " "*"
## 20 ( 1 ) " " "*"
## 21 ( 1 ) " " "*"
##
## same_Merchantnum_diff_amount_1.y
## 1 ( 1 ) " "
## 2 ( 1 ) " "
## 3 ( 1 ) " "
## 4 ( 1 ) " "
## 5 ( 1 ) " "
## 6 ( 1 ) " "
## 7 ( 1 ) " "
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## 9 ( 1 ) " "
## 10 ( 1 ) " "
## 11 ( 1 ) "*"
## 12 ( 1 ) "*"
## 13 ( 1 ) "*"
## 14 ( 1 ) "*"
## 15 ( 1 ) "*"
## 16 ( 1 ) "*"
## 17 ( 1 ) "*"
## 18 ( 1 ) " "

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## 19 ( 1 ) " "
## 20 ( 1 ) " "
## 21 ( 1 ) " "
##      same_Merchantnum_diff_amount_3.y
## 1 ( 1 ) " "
## 2 ( 1 ) " "
## 3 ( 1 ) " "
## 4 ( 1 ) " "
## 5 ( 1 ) " "
## 6 ( 1 ) " "
## 7 ( 1 ) "*"
## 8 ( 1 ) " "
## 9 ( 1 ) "*"
## 10 ( 1 ) "*"
## 11 ( 1 ) "*"
## 12 ( 1 ) "*"
## 13 ( 1 ) "*"
## 14 ( 1 ) "*"
## 15 ( 1 ) "*"
## 16 ( 1 ) "*"
## 17 ( 1 ) "*"
## 18 ( 1 ) "*"
## 19 ( 1 ) "*"
## 20 ( 1 ) "*"
## 21 ( 1 ) "*"
##      same_Merchantnum_diff_amount_5.y
## 1 ( 1 ) " "
## 2 ( 1 ) " "
## 3 ( 1 ) " "
## 4 ( 1 ) " "
## 5 ( 1 ) " "
## 6 ( 1 ) " "
## 7 ( 1 ) " "
## 8 ( 1 ) " "
## 9 ( 1 ) " "
## 10 ( 1 ) " "
## 11 ( 1 ) " "
## 12 ( 1 ) " "
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## 14 ( 1 ) " "
## 15 ( 1 ) "*"
## 16 ( 1 ) " "
## 17 ( 1 ) " "
## 18 ( 1 ) " "
## 19 ( 1 ) " "
## 20 ( 1 ) " "
## 21 ( 1 ) " "
##      same_Merchantnum_diff_amount_7.y
## 1 ( 1 ) " "
## 2 ( 1 ) " "
## 3 ( 1 ) " "
## 4 ( 1 ) " "
## 5 ( 1 ) " "
## 6 ( 1 ) " "

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## 7 ( 1 ) " "
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## 9 ( 1 ) " "
## 10 ( 1 ) " "
## 11 ( 1 ) " "
## 12 ( 1 ) " "
## 13 ( 1 ) " "
## 14 ( 1 ) " "
## 15 ( 1 ) " "
## 16 ( 1 ) " "
## 17 ( 1 ) " "
## 18 ( 1 ) "*"
## 19 ( 1 ) "*"
## 20 ( 1 ) " "
## 21 ( 1 ) "*"
##      same_Merchantnum_diff_amount_14.y
## 1 ( 1 ) " "
## 2 ( 1 ) " "
## 3 ( 1 ) " "
## 4 ( 1 ) " "
## 5 ( 1 ) " "
## 6 ( 1 ) " "
## 7 ( 1 ) " "
## 8 ( 1 ) " "
## 9 ( 1 ) " "
## 10 ( 1 ) " "
## 11 ( 1 ) " "
## 12 ( 1 ) " "
## 13 ( 1 ) " "
## 14 ( 1 ) " "
## 15 ( 1 ) " "
## 16 ( 1 ) " "
## 17 ( 1 ) " "
## 18 ( 1 ) " "
## 19 ( 1 ) " "
## 20 ( 1 ) " "
## 21 ( 1 ) " "
##      same_Merchantnum_diff_amount_30.y
## 1 ( 1 ) " "
## 2 ( 1 ) " "
## 3 ( 1 ) " "
## 4 ( 1 ) " "
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## 6 ( 1 ) " "
## 7 ( 1 ) " "
## 8 ( 1 ) " "
## 9 ( 1 ) " "
## 10 ( 1 ) " "
## 11 ( 1 ) " "
## 12 ( 1 ) " "
## 13 ( 1 ) " "
## 14 ( 1 ) " "
## 15 ( 1 ) " "
## 16 ( 1 ) " "

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## 17 ( 1 ) " "
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## 19 ( 1 ) " "
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## 21 ( 1 ) " "
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## 2 ( 1 ) " "
## 3 ( 1 ) " "
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## 6 ( 1 ) " "
## 7 ( 1 ) " "
## 8 ( 1 ) " "
## 9 ( 1 ) " "
## 10 ( 1 ) " "
## 11 ( 1 ) " "
## 12 ( 1 ) " "
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## 14 ( 1 ) " "
## 15 ( 1 ) " "
## 16 ( 1 ) "*"
## 17 ( 1 ) "*"
## 18 ( 1 ) " "
## 19 ( 1 ) " "
## 20 ( 1 ) " "
## 21 ( 1 ) " "
##      same_Merchantnum_diff_Cardnum_3.y
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## 3 ( 1 ) "*"
## 4 ( 1 ) " "
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## 6 ( 1 ) " "
## 7 ( 1 ) " "
## 8 ( 1 ) " "
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## 10 ( 1 ) "*"
## 11 ( 1 ) "*"
## 12 ( 1 ) " "
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## 17 ( 1 ) "*"
## 18 ( 1 ) " "
## 19 ( 1 ) " "
## 20 ( 1 ) "*"
## 21 ( 1 ) " "
##      same_Merchantnum_diff_Cardnum_7.y same_Cardnum_diff_Cardnum_5.y
## 1 ( 1 ) " " " "
## 2 ( 1 ) " " " "
## 3 ( 1 ) " " " "
## 4 ( 1 ) " " " "

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## 5 ( 1 ) " " " "
## 6 ( 1 ) " " " "
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## 8 ( 1 ) " " " "
## 9 ( 1 ) " " " "
## 10 ( 1 ) " " " "
## 11 ( 1 ) " " " "
## 12 ( 1 ) " " "*"
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## 16 ( 1 ) "*" " "
## 17 ( 1 ) " " " "
## 18 ( 1 ) " " "*"
## 19 ( 1 ) " " "*"
## 20 ( 1 ) " " "*"
## 21 ( 1 ) " " "*"
##
## same_Merchantnum_diff_Cardnum_14.y
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## 2 ( 1 ) " "
## 3 ( 1 ) " "
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## 11 ( 1 ) " "
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## 13 ( 1 ) "*"
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## 15 ( 1 ) "*"
## 16 ( 1 ) " "
## 17 ( 1 ) " "
## 18 ( 1 ) "*"
## 19 ( 1 ) "*"
## 20 ( 1 ) "*"
## 21 ( 1 ) "*"
##
## same_Merchantnum_diff_Cardnum_30.y
## 1 ( 1 ) " "
## 2 ( 1 ) " "
## 3 ( 1 ) " "
## 4 ( 1 ) " "
## 5 ( 1 ) " "
## 6 ( 1 ) " "
## 7 ( 1 ) " "
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## 10 ( 1 ) " "
## 11 ( 1 ) " "
## 12 ( 1 ) " "
## 13 ( 1 ) " "
## 14 ( 1 ) " "

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## 15 ( 1 ) " "  
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## 20 ( 1 ) " "  
## 21 ( 1 ) " "
```