

Predicting insurance purchase for Indian farmers

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Introduction

Background

Goal of the study

The data

Characteristics of the Data Set

Description of variables

Research approach

Analyses of dataset

```
data.main<- read.csv("insurance_dataset.csv", header = T)
```

```
str(data.main)
```

```
## 'data.frame':    46568 obs. of  87 variables:
## $ Customer.main.type      : int  8 8 8 3 10 5 9 8 8 3 ...
## $ Customer.Subtype        : int  33 37 37 9 40 23 39 33 33 11 ...
## $ Number.of.houses        : int  1 1 1 1 1 1 2 1 1 2 ...
## $ Avg.size.household       : int  3 2 2 3 4 2 3 2 2 3 ...
## $ Avg.age                  : int  2 2 2 3 2 1 2 3 4 3 ...
## $ Roman.catholic           : int  0 1 0 2 1 0 2 0 0 3 ...
## $ Protestant               : int  5 4 4 3 4 5 2 7 1 5 ...
## $ Other.religion           : int  1 1 2 2 1 0 0 0 3 0 ...
## $ No.religion              : int  3 4 4 4 4 5 5 2 6 2 ...
## $ Married                  : int  7 6 3 5 7 0 7 7 6 7 ...
## $ Living.together          : int  0 2 2 2 1 6 2 2 0 0 ...
## $ Other.relation           : int  2 2 4 2 2 3 0 0 3 2 ...
## $ Singles                  : int  1 0 4 2 2 3 0 0 3 2 ...
```

```

## $ Household.without.children      : int  2 4 4 3 4 5 3 5 3 2 ...
## $ Household.with.children         : int  6 5 2 4 4 2 6 4 3 6 ...
## $ High.level.education             : int  1 0 0 3 5 0 0 0 0 0 ...
## $ Medium.level.education           : int  2 5 5 4 4 5 4 3 1 4 ...
## $ Lower.level.education            : int  7 4 4 2 0 4 5 6 8 5 ...
## $ High.status                      : int  1 0 0 4 0 2 0 2 1 2 ...
## $ Entrepreneur                    : int  0 0 0 0 5 0 0 0 1 0 ...
## $ Farmer                          : int  1 0 0 0 4 0 0 0 0 0 ...
## $ Middle.management                : int  2 5 7 3 0 4 4 2 1 3 ...
## $ Skilled.labourers                : int  5 0 0 1 0 2 1 5 8 3 ...
## $ Unskilled.labourers              : int  2 4 2 2 0 2 5 2 1 3 ...
## $ Social.class.A                   : int  1 0 0 3 9 2 0 2 1 1 ...
## $ Social.class.B1                  : int  1 2 5 2 0 2 1 1 1 2 ...
## $ Social.class.B2                  : int  2 3 0 1 0 2 4 2 0 1 ...
## $ Social.class.C                   : int  6 5 4 4 0 4 5 5 8 4 ...
## $ Social.class.D                   : int  1 0 0 0 0 2 0 2 1 2 ...
## $ Rented.house                     : int  1 2 7 5 4 9 6 0 9 0 ...
## $ Home.owners                      : int  8 7 2 4 5 0 3 9 0 9 ...
## $ X1.car                           : int  8 7 7 9 6 5 8 4 5 6 ...
## $ X2.cars                           : int  0 1 0 0 2 3 0 4 2 1 ...
## $ No.car                           : int  1 2 2 0 1 3 1 2 3 2 ...
## $ National.Health.Service          : int  8 6 9 7 5 9 9 6 7 6 ...
## $ Private.health.insurance         : int  1 3 0 2 4 0 0 3 2 3 ...
## $ Income...30                      : int  0 2 4 1 0 5 4 2 7 2 ...
## $ Income.30.45.000                : int  4 0 5 5 0 2 3 5 2 3 ...
## $ Income.45.75.000                : int  5 5 0 3 9 3 3 3 1 3 ...
## $ Income.75.122.000               : int  0 2 0 0 0 0 0 0 0 1 ...
## $ Income..123.000                 : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Average.income                   : int  4 5 3 4 6 3 3 3 2 4 ...
## $ Purchasing.power.class           : int  3 4 4 4 3 3 5 3 3 7 ...
## $ pr_num                           : int  55446888 30947608 52223731 76547439 100719
## $ Contribution.private.third.party.insurance : int  0 2 2 0 0 0 0 0 0 2 ...
## $ Contribution.third.party.insurance..firms. : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.third.party.insurane..agriculture. : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.car.policies         : int  6 0 6 6 0 6 6 0 5 0 ...
## $ Contribution.delivery.van.policies : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.motorcycle.scooter.policies : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.lorry.policies       : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.trailer.policies     : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.tractor.policies     : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.agricultural.machines.policies : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.moped.policies       : int  0 0 0 0 0 0 0 3 0 0 ...
## $ Contribution.life.insurances      : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.private.accident.insurance.policies: int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.family.accidents.insurance.policies: int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.disability.insurance.policies : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.fire.policies        : int  5 2 2 2 6 0 0 0 0 3 ...
## $ Contribution.surfboard.policies   : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.boat.policies        : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.bicycle.policies     : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.property.insurance.policies : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.social.security.insurance.policies : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.private.3rd.party.insurance : int  0 2 1 0 0 0 0 0 0 1 ...
## $ No..of.3rd.party.insurance..firms. : int  0 0 0 0 0 0 0 0 0 0 ...

```

```
## $ No..of.3rd.party.insurane..agriculture. : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.car.policies : int 1 0 1 1 0 1 1 0 1 0 ...
## $ No..of.delivery.van.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.motorcycle.scooter.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.lorry.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.trailer.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.tractor.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.agricultural.machines.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.moped.policies : int 0 0 0 0 0 0 0 1 0 0 ...
## $ No..of.life.insurances : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.private.accident.insurance.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.family.accidents.insurance.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.disability.insurance.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.fire.policies : int 1 1 1 1 1 0 0 0 0 1 ...
## $ No..of.surfboard.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.boat.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.bicycle.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.property.insurance.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.social.security.insurance.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.mobile.home.policies : int 0 0 0 0 0 0 0 0 0 0 ...
```

```
#find out if dataset has missing values
```

```
sum(is.na(data.main))
```

```
## [1] 2891271
```

```
#analyze which columns,rows have missing values
```

```
#it seems there are empty rows at the bottom of the dataset, so these can simply be deleted
data <- na.omit(data.main) #there are empty rows in the dataset, to omit these data
str(data)
```

```
## 'data.frame': 13335 obs. of 87 variables:
## $ Customer.main.type : int 8 8 8 3 10 5 9 8 8 3 ...
## $ Customer.Subtype : int 33 37 37 9 40 23 39 33 33 11 ...
## $ Number.of.houses : int 1 1 1 1 1 1 2 1 1 2 ...
## $ Avg.size.household : int 3 2 2 3 4 2 3 2 2 3 ...
## $ Avg.age : int 2 2 2 3 2 1 2 3 4 3 ...
## $ Roman.catholic : int 0 1 0 2 1 0 2 0 0 3 ...
## $ Protestant : int 5 4 4 3 4 5 2 7 1 5 ...
## $ Other.religion : int 1 1 2 2 1 0 0 0 3 0 ...
## $ No.religion : int 3 4 4 4 4 5 5 2 6 2 ...
## $ Married : int 7 6 3 5 7 0 7 7 6 7 ...
## $ Living.together : int 0 2 2 2 1 6 2 2 0 0 ...
## $ Other.relation : int 2 2 4 2 2 3 0 0 3 2 ...
## $ Singles : int 1 0 4 2 2 3 0 0 3 2 ...
## $ Household.without.children : int 2 4 4 3 4 5 3 5 3 2 ...
## $ Household.with.children : int 6 5 2 4 4 2 6 4 3 6 ...
## $ High.level.education : int 1 0 0 3 5 0 0 0 0 0 ...
## $ Medium.level.education : int 2 5 5 4 4 5 4 3 1 4 ...
## $ Lower.level.education : int 7 4 4 2 0 4 5 6 8 5 ...
## $ High.status : int 1 0 0 4 0 2 0 2 1 2 ...
## $ Entrepreneur : int 0 0 0 0 5 0 0 0 1 0 ...
## $ Farmer : int 1 0 0 0 4 0 0 0 0 0 ...
## $ Middle.management : int 2 5 7 3 0 4 4 2 1 3 ...
```

```

## $ Skilled.labourers           : int  5 0 0 1 0 2 1 5 8 3 ...
## $ Unskilled.labourers         : int  2 4 2 2 0 2 5 2 1 3 ...
## $ Social.class.A              : int  1 0 0 3 9 2 0 2 1 1 ...
## $ Social.class.B1             : int  1 2 5 2 0 2 1 1 1 2 ...
## $ Social.class.B2             : int  2 3 0 1 0 2 4 2 0 1 ...
## $ Social.class.C              : int  6 5 4 4 0 4 5 5 8 4 ...
## $ Social.class.D              : int  1 0 0 0 0 2 0 2 1 2 ...
## $ Rented.house                : int  1 2 7 5 4 9 6 0 9 0 ...
## $ Home.owners                 : int  8 7 2 4 5 0 3 9 0 9 ...
## $ X1.car                      : int  8 7 7 9 6 5 8 4 5 6 ...
## $ X2.cars                     : int  0 1 0 0 2 3 0 4 2 1 ...
## $ No.car                      : int  1 2 2 0 1 3 1 2 3 2 ...
## $ National.Health.Service     : int  8 6 9 7 5 9 9 6 7 6 ...
## $ Private.health.insurance    : int  1 3 0 2 4 0 0 3 2 3 ...
## $ Income...30                 : int  0 2 4 1 0 5 4 2 7 2 ...
## $ Income.30.45.000           : int  4 0 5 5 0 2 3 5 2 3 ...
## $ Income.45.75.000           : int  5 5 0 3 9 3 3 3 1 3 ...
## $ Income.75.122.000          : int  0 2 0 0 0 0 0 0 0 1 ...
## $ Income..123.000            : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Average.income              : int  4 5 3 4 6 3 3 3 2 4 ...
## $ Purchasing.power.class      : int  3 4 4 4 3 3 5 3 3 7 ...
## $ pr_num                      : int  55446888 30947608 52223731 76547439 100719
## $ Contribution.private.third.party.insurance : int  0 2 2 0 0 0 0 0 0 2 ...
## $ Contribution.third.party.insurance..firms. : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.third.party.insurane..agriculture. : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.car.policies   : int  6 0 6 6 0 6 6 0 5 0 ...
## $ Contribution.delivery.van.policies : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.motorcycle.scooter.policies : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.lorry.policies : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.trailer.policies : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.tractor.policies : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.agricultural.machines.policies : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.moped.policies : int  0 0 0 0 0 0 0 3 0 0 ...
## $ Contribution.life.insurances : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.private.accident.insurance.policies: int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.family.accidents.insurance.policies: int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.disability.insurance.policies : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.fire.policies : int  5 2 2 2 6 0 0 0 0 3 ...
## $ Contribution.surfboard.policies : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.boat.policies : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.bicycle.policies : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.property.insurance.policies : int  0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.social.security.insurance.policies : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.private.3rd.party.insurance : int  0 2 1 0 0 0 0 0 0 1 ...
## $ No..of.3rd.party.insurance..firms. : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.3rd.party.insurane..agriculture. : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.car.policies         : int  1 0 1 1 0 1 1 0 1 0 ...
## $ No..of.delivery.van.policies : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.motorcycle.scooter.policies : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.lorry.policies       : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.trailer.policies     : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.tractor.policies     : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.agricultural.machines.policies : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.moped.policies       : int  0 0 0 0 0 0 0 1 0 0 ...

```

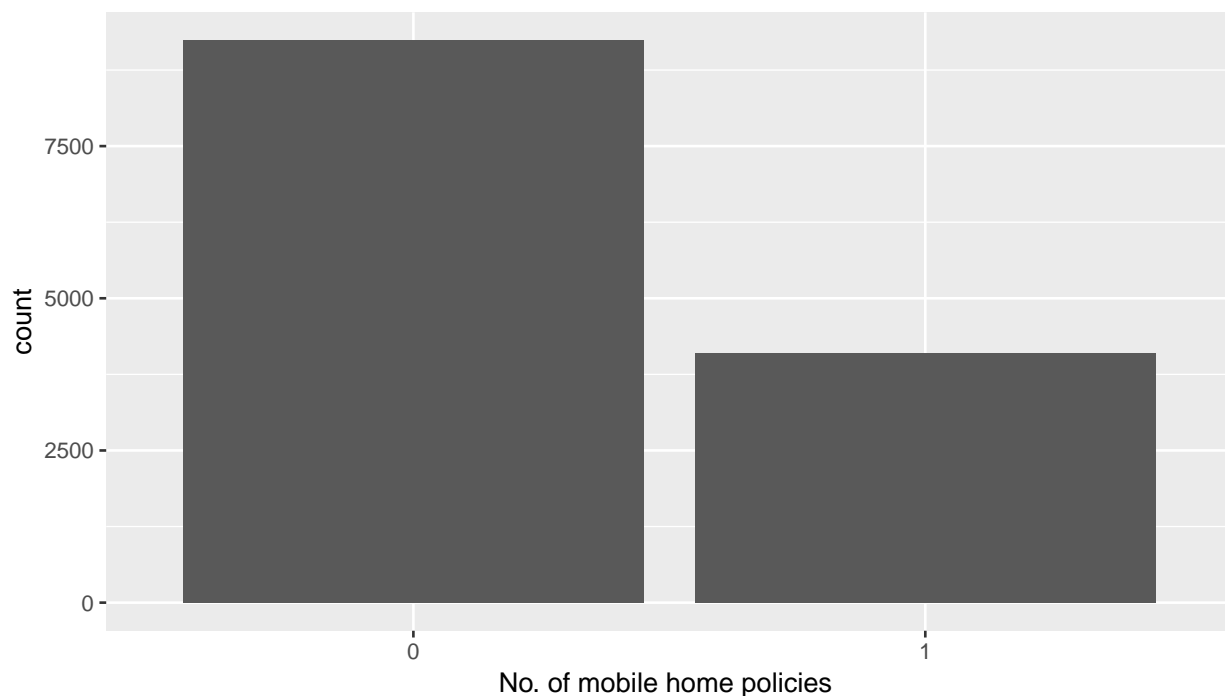
```
## $ No..of.life.insurances           : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.private.accident.insurance.policies : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.family.accidents.insurance.policies : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.disability.insurance.policies       : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.fire.policies                 : int  1 1 1 1 1 0 0 0 0 1 ...
## $ No..of.surfboard.policies             : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.boat.policies                 : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.bicycle.policies              : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.property.insurance.policies      : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.social.security.insurance.policies : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.mobile.home.policies           : int  0 0 0 0 0 0 0 0 0 0 ...
## - attr(*, "na.action")= 'omit' Named int   13336 13337 13338 13339 13340 13341 13342 13343 13344 13345 ...
## ..- attr(*, "names")= chr   "13336" "13337" "13338" "13339" ...
```

[View \(data\)](#)

EDA on variables in the dataset

#RESPONSE VARIABLE - convert the response variable to a factor and rename it to "policy.output" for convenience

```
data <- na.omit(data.main)
data <- data %>% rename(policy.output = No..of.mobile.home.policies )
data <- data %>% mutate(policy.output = as.factor(policy.output))
ggplot(data,aes(x=policy.output)) + geom_bar() + labs(x="No. of mobile home policies ")
```



#There is about a 2/3rd split in response variable i.e. 1/3rd of the data population has a mobile policy

#to determine which variables should be considered in our model, we plot each variable and see if there is a correlation

```
# Var 44 (pr_num) is ignored for this analysis as it is an accounting or identification variable, and

# ANALYZING VARIABLE 1&2 - The Customer types
head(data$Customer.main.type)

## [1] 8 8 8 3 10 5

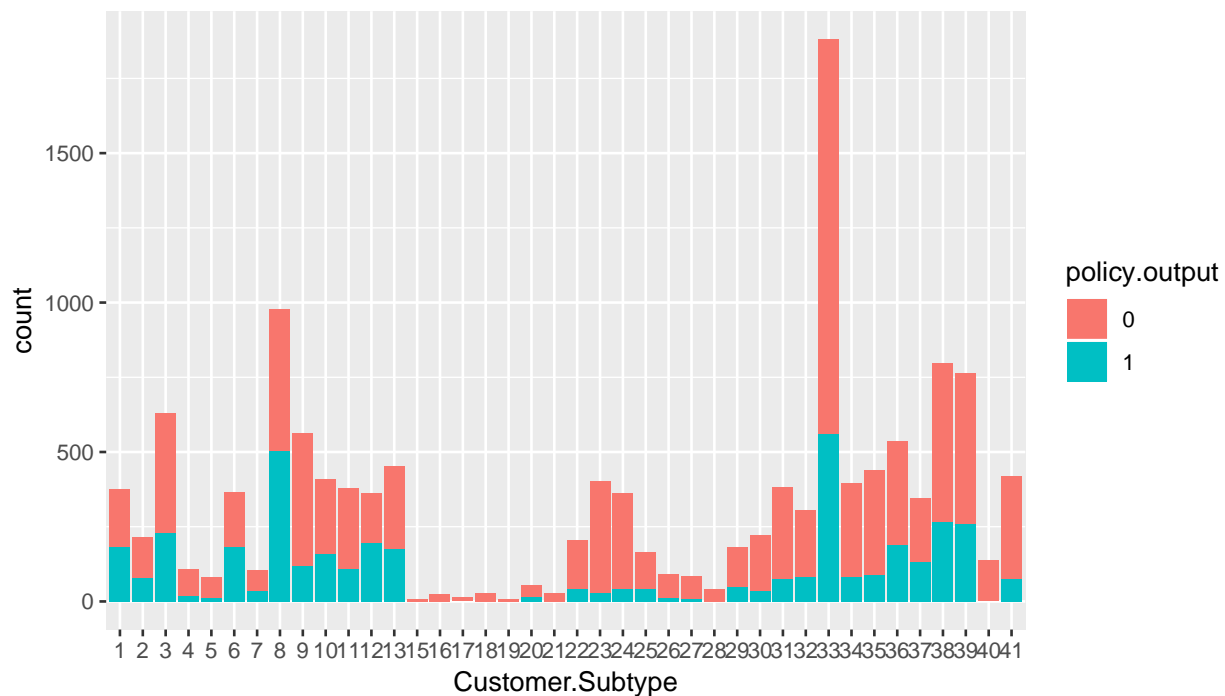
head(data$Customer.Subtype)

## [1] 33 37 37 9 40 23

#These variables are clearly factors, which have been found from previous demographic and psychographic
data$Customer.main.type <- as.factor(data$Customer.main.type)
data$Customer.Subtype <- as.factor(data$Customer.Subtype)
#Plot these variables, check if they have any correlation with the output variable, and check if there

plot<-ggplot(data,aes(x=Customer.main.type, fill= policy.output))
plot<-plot + geom_bar()
plot<-plot + labs(x="Customer Main Type")

#There is reasonable variation, all levels are represented. This variable should be left as is
plot<-ggplot(data,aes(x=Customer.Subtype, fill= policy.output))
plot<-plot + geom_bar()
plot
```

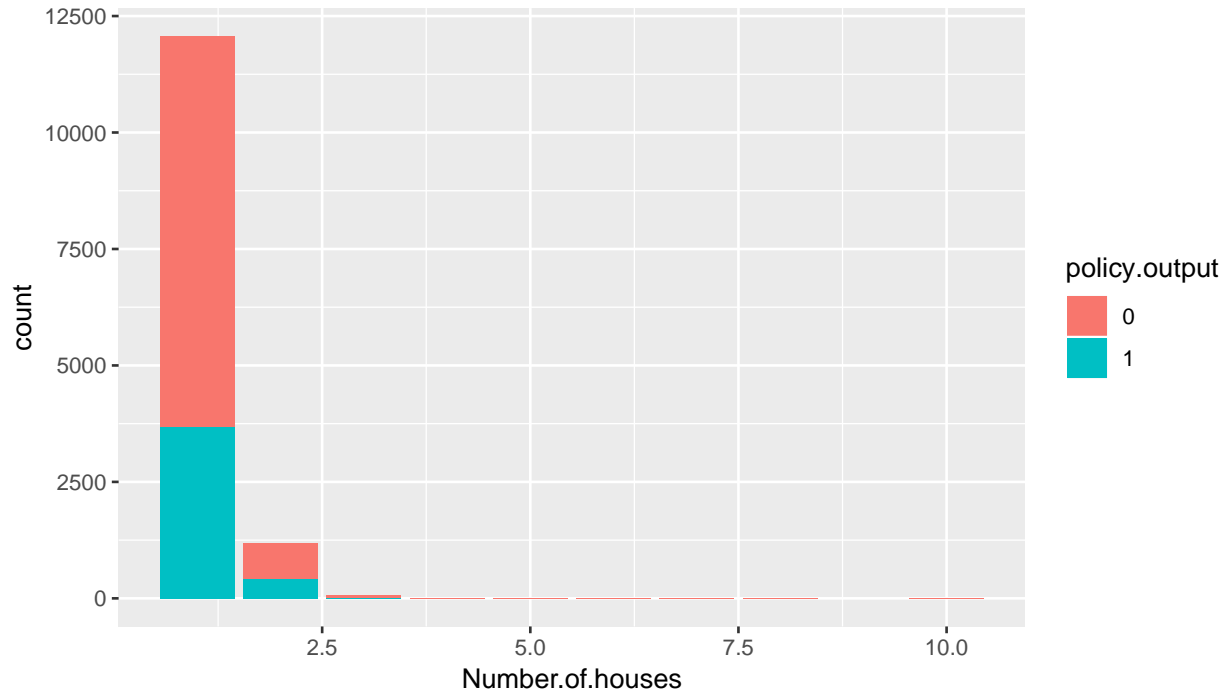


```
#There is reasonable variation, all levels are represented. This variable should be left as is

#Analyzing var 3- number of houses
head(data$Number.of.houses)

## [1] 1 1 1 1 1 1
```

```
#These are integer values
plot<-ggplot(data,aes(x=Number.of.houses, fill= policy.output))
plot<-plot + geom_bar()
plot
```



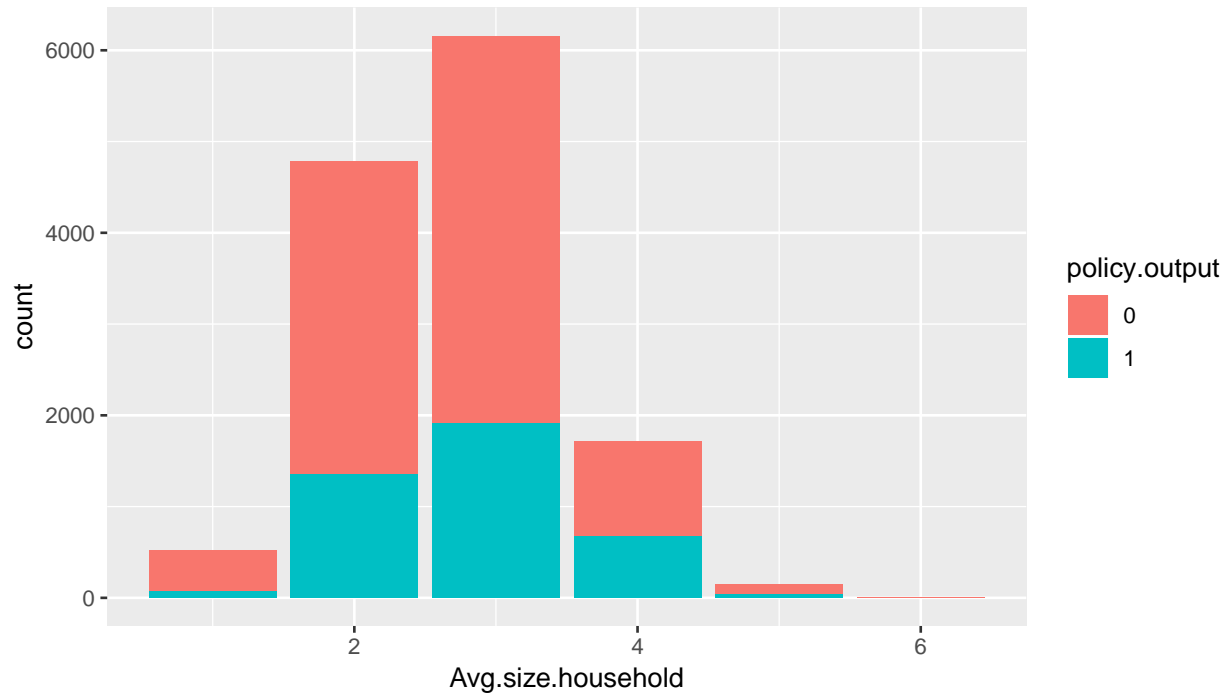
#Data is highly skewed, and could benefit from a log transformation, but since the number is so low (10

#Analyzing var 4- avg size household

```
head(data$Avg.size.household)
```

```
## [1] 3 2 2 3 4 2
```

```
#These are integer values
plot<-ggplot(data,aes(x=Avg.size.household, fill= policy.output))
plot<-plot + geom_bar()
plot
```



#Data is normal and has significant variation, leave the variable as is

#Analyzing var 5- avg age

```
head(data$Avg.age)
```

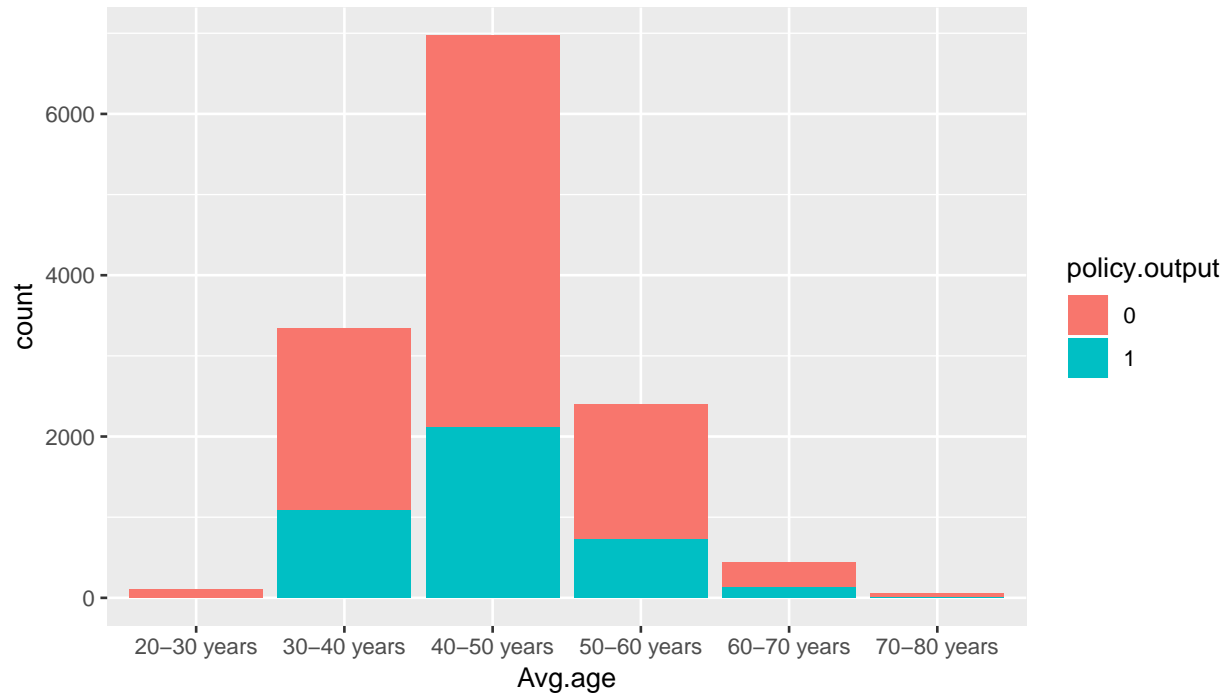
```
## [1] 2 2 2 3 2 1
```

#These are factors as per the table. It may help in interpretation to rename the variable's levels. It

```
data$Avg.age <- factor(data$Avg.age,
  levels=c(1:6),
  labels=c("20-30 years",
    "30-40 years",
    "40-50 years",
    "50-60 years",
    "60-70 years",
    "70-80 years"))
```

#PLOT data

```
plot<-ggplot(data,aes(x=Avg.age, fill= policy.output))
plot<-plot + geom_bar()
plot
```

#Data is normal and has significant variation, and is not interpretable. We can move on

data\$Roman.catholic

```
##      [1] 0 1 0 2 1 0 2 0 0 3 1 1 1 0 0 0 0 2 0 0 0 1 0 0 0 0 0 0 0 1 2 1 0
##      [35] 0 2 0 0 0 0 1 1 0 2 1 0 2 0 0 0 1 0 0 1 0 0 0 0 1 0 0 4 0 0 0 4 2 0
##      [69] 1 1 0 1 0 0 0 3 1 0 1 6 0 0 1 1 2 0 0 1 0 0 0 0 0 0 3 0 0 0 2 2 0 1
##     [103] 3 0 1 2 0 0 2 0 2 0 0 1 0 3 1 0 0 0 0 1 0 2 2 0 1 0 0 1 1 0 1 4 1 1
##     [137] 0 2 0 0 0 0 1 0 0 2 1 0 5 0 0 2 0 2 2 1 0 0 1 9 0 0 0 2 0 0 2 2 1 0
##     [171] 1 0 0 0 1 3 0 1 1 2 0 0 0 1 1 0 0 0 2 0 0 1 0 1 1 1 0 1 0 1 0 2 1 0 0
##     [205] 3 5 0 1 0 0 0 1 1 0 1 0 1 0 0 2 0 0 0 0 2 2 0 0 2 1 2 0 1 0 0 0 1 0
##     [239] 0 0 9 1 0 0 5 0 1 0 1 0 2 0 1 0 1 0 1 0 2 3 0 1 1 1 1 0 0 1 1 0 0 0
##     [273] 1 3 0 1 2 1 0 1 0 2 1 0 1 0 0 1 0 3 0 1 1 0 2 0 2 2 0 2 0 1 0 0 1 0
##     [307] 0 0 0 2 1 0 2 0 0 2 0 0 0 1 0 0 0 2 1 0 3 0 4 0 1 3 1 1 0 0 0 0 1 0
##     [341] 0 0 0 1 0 0 1 1 0 2 0 2 0 0 0 1 0 0 0 1 4 2 0 2 2 0 0 1 1 0 2 0 1 1
##     [375] 0 0 1 1 1 2 0 1 0 1 0 9 1 1 1 0 3 0 0 0 1 1 0 1 1 0 1 0 0 0 0 1 0 1
##     [409] 0 1 2 3 0 1 0 0 0 0 0 0 0 2 1 1 0 0 1 0 1 1 2 1 0 2 1 0 0 1 1 0 0 0
##     [443] 0 4 1 0 0 0 1 0 0 2 0 0 0 0 0 1 0 0 0 1 0 1 1 1 1 0 1 0 0 0 0 0 0 4
##     [477] 0 1 0 0 0 2 1 0 1 1 2 0 0 1 1 0 0 0 3 0 1 1 0 1 0 0 0 0 0 0 0 0 0 1
##     [511] 0 0 2 0 0 4 2 0 1 1 0 0 2 1 1 1 0 0 0 1 0 1 0 0 1 0 0 0 2 2 0 0 1 0
##     [545] 0 0 0 1 1 4 0 1 0 1 1 0 1 0 1 0 1 0 0 1 0 1 0 1 0 2 0 2 0 0 1 0 0 1 2
##     [579] 0 0 0 1 0 1 0 1 1 0 0 0 1 0 1 0 0 0 0 0 0 0 4 0 0 4 1 0 0 2 0 1 0 2
##     [613] 2 0 3 1 1 0 1 0 0 0 0 1 0 1 0 1 2 3 0 0 0 0 0 0 1 0 1 0 0 1 1 2 0 1 0
##     [647] 1 0 0 0 2 1 3 0 0 2 0 1 0 0 1 4 0 1 0 0 0 1 0 0 0 0 0 2 0 1 0 0 0 1
##     [681] 4 0 4 3 0 1 1 1 2 2 0 0 1 0 0 0 1 0 1 0 0 2 1 0 0 1 1 0 0 1 0 0 1 0
##     [715] 2 0 0 0 0 0 2 0 1 0 1 0 0 0 1 2 0 0 2 0 1 0 0 2 1 1 1 1 2 0 0 0 1 0
##     [749] 6 0 2 1 0 1 0 0 0 0 1 2 0 0 0 2 0 2 0 0 1 0 1 0 0 0 1 0 0 1 0 0 0 0
##     [783] 1 0 1 0 0 0 0 0 0 1 2 0 0 1 1 0 0 0 1 0 2 0 0 0 2 0 0 0 1 5 0 0 2 0
##     [817] 1 1 1 2 1 2 0 1 1 0 1 0 1 0 0 1 1 1 0 1 0 2 2 0 0 0 3 0 0 0 1 1 1 1
##     [851] 2 1 0 0 2 1 1 2 2 0 0 1 0 0 1 1 0 0 1 1 0 0 0 1 1 0 1 0 0 1 0 0 1 0
##     [885] 0 0 0 1 0 1 2 0 1 1 2 0 0 0 0 0 3 0 0 0 2 0 0 0 0 0 0 0 0 0 1 0 2 0 1 0
```

```

## [919] 0 0 1 0 2 1 0 0 0 0 0 2 1 0 1 0 0 0 2 0 1 0 0 1 2 0 1 0 0 0 0 0 0 1
## [953] 0 1 0 0 0 0 0 1 2 1 0 1 0 0 2 0 0 1 0 0 0 0 1 0 0 0 0 3 1 0 0 1 3 0
## [987] 2 1 0 1 0 1 2 2 2 6 1 0 2 2 0 0 1 0 0 0 0 4 0 0 1 1 0 1 1 0 1 2 1 2
## [1021] 0 4 0 0 1 0 1 0 1 0 0 2 0 1 0 2 1 0 0 0 0 0 0 1 0 0 2 2 2 2 2 0 1 0
## [1055] 1 0 0 0 1 0 1 0 0 2 0 1 6 0 1 3 0 0 0 1 4 0 3 0 0 0 0 2 0 1 0 0 0 2
## [1089] 0 0 0 0 1 1 0 0 1 1 0 0 2 2 0 0 0 0 2 0 2 0 0 1 0 1 0 0 3 0 5 0 4 2
## [1123] 0 0 1 0 1 1 0 0 0 1 0 1 0 0 3 0 2 1 0 0 1 0 1 3 1 0 0 0 2 0 1 1 1 2
## [1157] 0 2 1 2 0 1 2 0 0 0 0 0 0 1 1 1 0 0 0 2 3 3 1 1 0 0 0 2 1 0 1 1 0 2
## [1191] 0 2 0 1 1 0 1 0 0 1 2 1 1 0 0 0 1 0 0 0 1 0 2 0 0 0 1 1 0 0 0 0 0 0
## [1225] 1 0 1 1 0 0 0 1 1 0 0 1 0 1 1 0 2 1 1 0 0 0 0 0 0 0 0 0 2 0 1 0 0 0
## [1259] 1 1 0 0 1 0 0 1 0 2 0 1 1 1 0 0 0 2 1 0 0 0 2 2 1 2 0 0 0 1 0 2 2 1
## [1293] 0 1 2 0 0 1 2 2 0 1 1 0 0 3 1 1 0 0 2 1 0 0 1 0 1 0 1 0 0 0 1 0 0 0
## [1327] 0 0 2 0 0 0 1 3 0 0 0 0 0 0 0 0 2 0 3 0 0 1 2 1 0 4 0 2 0 3 0 1 3 3 0
## [1361] 0 1 0 0 0 1 0 2 0 1 4 1 1 1 0 0 0 1 1 0 2 2 1 1 0 2 1 1 2 0 0 0 0 0
## [1395] 1 0 2 2 0 0 3 1 0 0 1 2 0 0 0 0 2 0 0 2 0 0 0 2 0 0 0 0 0 2 0 2 0 1
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## [1497] 0 0 0 4 0 0 1 0 0 0 0 0 0 0 0 3 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0
## [1531] 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1 0 0 0 4 0 0 0 1 0
## [1565] 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1 0 0 0 0 0 0 1 0 0 1 1 0 1 0 0 2 0 0 0
## [1599] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1 0 4 0 0 0 0 0 0
## [1633] 0 0 0 0 0 0 0 0 0 2 0 0 4 0 0 0 1 0 0 0 1 1 0 0 0 0 0 0 1 0 0 0 0
## [1667] 0 0 0 0 0 0 0 0 0 3 0 0 0 1 1 0 1 0 0 0 0 1 0 0 0 0 0 0 0 2 0 2 0
## [1701] 0 2 0 0 2 0 0 0 0 0 0 0 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [1735] 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 1 0 1 0 0 1 2 0 1 0
## [1769] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 4 0 0 0 2 0 2 0 0 0 0 1 0 0
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## [1837] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
## [1871] 0 1 1 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 1 1 0 1 0 0 0 0 0 0 0 0
## [1905] 0 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 2 0 1 0 0 0 3 0 0 0 0 0 0
## [1939] 0 1 0 0 0 0 0 1 0 0 0 0 1 0 0 0 1 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 1
## [1973] 1 0 0 1 0 0 0 0 0 0 0 0 0 3 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0
## [2007] 1 2 0 0 0 0 0 1 0 0 0 0 0 1 1 0 0 0 0 0 3 0 0 0 1 0 0 0 0 4 0 0 0
## [2041] 0 1 0 0 2 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1 0 1 0 0 0 0
## [2075] 0 0 0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0
## [2109] 0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
## [2143] 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 2 0 0 0 0 0 3 0 0 0 1 0 0 1 0 2

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## [2177] 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1 1 0 0 0 0
## [2211] 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 1
## [2245] 0 0 0 1 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 0 0 0 0 0 0 0
## [2279] 3 0 0 0 0 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 1
## [2313] 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 1 0 3 0 0 0 0 0 0 0 0 0 1 0 0 7 0 0 0 0 0 0
## [2347] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0
## [2381] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 1 0 0 0 2 1 0 0 0 0 0 1 0 0 0 1 0 1 0 0 0
## [2415] 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
## [2449] 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 2 0 0 0 0 1 0 0
## [2483] 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0
## [2517] 1 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 2 1 0 0 1 0 0 0 0
## [2551] 0 0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 1 4 0 1 0 0 1
## [2585] 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 1 0 1 0 0 0 0 0 0 1 0 1 0 0 0 0 0 1 0
## [2619] 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 1 1 1 0 0
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## [2687] 0 0 0 1 1 0 0 0 1 0 1 0 0 1 0 0 0 0 0 0 1 0 0 0 0 1 0 0 0 0 0 0 1 0 1 0 0
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## [2755] 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 1 0 0 0 0 0 0 1 0 0 1 1 0 1 0
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## [2823] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0
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## [2891] 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0
## [2925] 1 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 1 0 0 0
## [2959] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 1 0 3 2 0 0 0 0 0 1 0 0 0 1 0
## [2993] 1 0 0 0 1 0 0 0 0 0 1 1 0 0 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1
## [3027] 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 1 0 0 0 0 0 1 0 0 0 1 0 0 0 0
## [3061] 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 1 0 0 0
## [3095] 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 3 0 1 1 0 0 1 0 0 0 0 0 0 0 1 0
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## [3163] 0 0 0 0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
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## [3299] 0 0 1 0 0 0 0 0 0 3 1 1 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [3333] 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 1
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## [3401] 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0
## [3435] 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0
## [3469] 1 3 0 0 0 1 0 0 1 0 2 0 1 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0 1 0 1 1 0 0 0 0
## [3503] 1 0 0 0 0 1 0 0 3 0 1 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 2 1 0 0 0
## [3537] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 1 0 0 4 0 0 0 0 0
## [3571] 0 1 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 3 0 1 1 0 0 0 0 1 0 0 0 0 0
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## [3707] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 1 0
## [3741] 0 0 0 0 0 0 0 0 0 0 2 1 0 0 0 0 0 0 0 0 0 0 0 4 0 0 0 1 0 0 0 0 0 0 1 0 0 0
## [3775] 0 0 0 1 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
## [3809] 2 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 2 0 0
## [3843] 1 0 0 1 0 0 0 0 1 0 1 0 0 0 0 0 0 0 1 0 0 0 0 1 0 0 1 0 0 1 0 0 1 0 0 0 0 0
## [3877] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
## [3911] 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 2 0 1 0 0 0 0 0 0 0 0 0 0
## [3945] 1 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [3979] 0 0 0 1 0 1 0 0 0 0 0 0 1 4 0 0 2 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 1 0 0 0 0 0

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## [4013] 0 0 0 0 0 0 0 0 0 0 0 1 2 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0
## [4047] 0 0 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1
## [4081] 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [4115] 0 0 1 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 3
## [4149] 0 0 0 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 4 0 0
## [4183] 0 1 0 1 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 1 0 1 0 1 0 1 0 0 0 4 0 0 0
## [4217] 0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 1 0
## [4251] 0 0 0 0 1 0 0 0 0 1 0 0 0 0 0 1 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
## [4285] 1 0 0 0 1 4 1 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 1 2
## [4319] 2 0 0 0 1 0 1 0 0 0 0 3 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 1
## [4353] 0 0 0 0 0 0 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 4 0 0 0 0 0 0 1 1 0 0 0
## [4387] 1 0 0 0 0 1 0 0 0 0 0 0 0 1 2 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [4421] 0 1 3 0 0 1 0 0 0 0 0 2 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1
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## [4523] 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 3 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
## [4557] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 1 0 0 0 0 2
## [4591] 0 1 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 2 0 0 0 0 1 0 0 1 0 0 1 0
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## [4659] 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0
## [4693] 0 0 0 0 0 0 1 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 4 0 0 0 0 1 0 0 0
## [4727] 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0
## [4761] 1 0 1 1 0 0 0 0 0 0 0 1 0 1 1 0 0 0 0 0 1 0 0 0 1 0 2 0 0 0 0 0 1
## [4795] 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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## [4863] 0 0 0 0 0 1 1 0 0 0 0 0 0 0 1 1 0 0 1 0 0 0 0 0 1 0 0 0 2 1 1 0 0
## [4897] 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 4 0 1 0 1 0 1 0 0 1 0 0 0 1 0 0 0 0
## [4931] 0 0 0 0 0 2 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
## [4965] 0 1 1 0 0 1 0 0 0 1 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 0
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## [5067] 3 2 1 1 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0
## [5101] 1 0 0 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 1 0 0 0
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## [5169] 0 0 0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 0 1 0
## [5203] 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 1 0
## [5237] 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 1 0 1 0 2 0 0 0 0 0 2 0 0 1 0
## [5271] 0 1 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0
## [5305] 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 3 0 0 0 1 0 1
## [5339] 1 0 1 1 0 0 0 1 0 0 1 0 0 0 0 0 0 0 1 0 1 1 0 0 0 2 0 0 0 2 1 1 0
## [5373] 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0
## [5407] 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 1 0
## [5441] 0 0 0 0 0 0 0 1 0 0 0 0 0 0 1 2 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [5475] 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 2 0 0 1 0
## [5509] 3 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 1 0
## [5543] 0 0 0 1 0 0 0 1 0 0 1 0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 1 0
## [5577] 1 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0
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## [5645] 0 0 0 0 0 3 0 2 0 1 0 0 0 0 1 2 0 0 3 1 0 0 1 0 0 0 0 0 0 1 0 0 0
## [5679] 0 0 0 0 0 3 1 0 0 0 0 0 0 1 1 0 0 1 0 1 0 0 0 0 0 1 1 0 0 1 0 0 1
## [5713] 0 1 0 0 1 0 2 0 0 0 1 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 2 0 0 0 0
## [5747] 0 0 0 1 0 0 0 0 1 0 0 0 1 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [5781] 0 0 0 0 0 0 0 0 0 1 0 0 0 0 6 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [5815] 0 0 0 0 0 0 1 0 0 1 0 0 1 0 1 0 0 0 0 0 1 0 0 0 0 0 3 0 0 0 0 0

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## [5849] 0 0 1 0 0 0 1 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0
## [5883] 0 0 0 0 0 0 0 1 0 0 0 1 0 0 2 0 3 0 0 0 0 3 0 1 0 0 0 0 0 0 0 0 2 0
## [5917] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0
## [5951] 0 0 0 0 0 0 2 0 0 0 0 0 1 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 1 0 0
## [5985] 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 1 0 1 0 1 3 0 1 0 0 0 0 0 0 0 0
## [6019] 1 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [6053] 0 0 2 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 1
## [6087] 0 0 1 0 0 0 1 2 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 0 0
## [6121] 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 1 0
## [6155] 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 1 0
## [6189] 2 0 0 0 0 0 1 1 0 0 2 0 0 0 0 0 0 0 1 0 1 0 0 0 0 1 1 1 0 0 0 0 0 1
## [6223] 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [6257] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 3 0 0 0 0 0 0 0 0
## [6291] 0 0 0 0 0 0 0 1 0 0 3 0 0 0 0 0 0 0 0 0 0 0 4 1 0 0 0 2 2 0 0 0 0 0 0
## [6325] 0 0 0 0 0 0 2 0 0 1 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2
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## [6563] 0 0 0 1 0 1 0 0 0 0 0 1 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 2
## [6597] 0 0 0 0 0 0 1 0 1 0 0 3 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
## [6631] 0 0 0 0 0 0 2 0 0 0 0 0 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0
## [6665] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0
## [6699] 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 1 3 0 1 0 0 0 0 0 0 0 1 0 0
## [6733] 0 1 0 0 0 0 0 0 0 0 0 0 0 1 1 0 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 2
## [6767] 0 1 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 3 0 0 0
## [6801] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 1 0 0 1 0 0 2 0 0 0 0 0 0 0
## [6835] 0 1 0 0 0 1 0 0 0 1 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0
## [6869] 0 0 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 1
## [6903] 1 1 0 0 0 0 0 0 0 1 0 0 2 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0
## [6937] 1 0 1 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 2 0 1 0 0 0 0 0 1 0 0
## [6971] 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 2 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
## [7005] 0 0 0 2 0 4 0 0 0 0 0 1 0 1 1 0 0 0 0 0 0 0 0 0 1 0 0 0 4 0 0 0 1 0 1 0
## [7039] 0 0 1 1 0 0 0 0 0 0 0 1 0 0 0 0 1 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 2 0 0 0
## [7073] 0 0 1 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 1 0 1 0 0 0 0 0 1 0 1 2 0
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## [7243] 0 0 0 0 0 0 0 2 0 0 1 0 0 0 0 1 0 0 0 0 1 2 0 0 0 0 0 0 0 0 0 0 0 1 0 0
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## [7413] 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 1 0 0 0 0 2 0 0 1 0 0 0 0 1 0 0 0 1 0 0
## [7447] 0 0 1 0 0 1 0 1 2 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1
## [7481] 0 1 0 0 0 1 1 0 0 0 0 0 0 1 0 0 0 2 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 2 0 0
## [7515] 1 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 3 0 1 0 0 0 0
## [7549] 0 0 0 0 2 0 0 2 1 0 0 0 2 0 0 0 0 0 0 5 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1
## [7583] 1 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 2 0 0 0 1 0 0 0 0 0 0 0 0 1 0 0
## [7617] 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 1 4 0 0 1 0 0 0 0
## [7651] 0 0 1 0 0 1 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 1

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## [7685] 0 0 0 0 0 0 0 0 0 1 2 0 0 0 0 1 0 0 0 1 0 0 1 4 0 0 0 0 0 0 1 0 0 0 0
## [7719] 0 0 0 0 1 0 1 0 1 4 1 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [7753] 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 2 0 0 1 0
## [7787] 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0
## [7821] 0 0 0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [7855] 0 0 1 0 0 0 0 0 1 1 0 0 0 0 0 0 0 1 0 0 3 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0
## [7889] 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [7923] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 3 0 0 0 0 0 0 0
## [7957] 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 1 0 0 0
## [7991] 0 0 0 0 3 0 0 0 1 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [8025] 2 0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 1 0 0 1 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0
## [8059] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0
## [8093] 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 3 0 0 0 0 0 0 1 0 0 1 1
## [8127] 0 1 0 0 0 0 1 0 0 1 0 1 0 1 0 0 0 0 0 0 0 0 0 1 0 0 2 0 1 2 0 1 0 0 0
## [8161] 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [8195] 0 0 1 0 0 0 0 0 0 0 0 0 2 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 2 0 0 0 0 3 0
## [8229] 0 0 0 0 0 3 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
## [8263] 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [8297] 0 0 0 0 0 0 1 0 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0
## [8331] 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 4 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0
## [8365] 0 0 0 0 1 0 3 2 0 0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 6 0 0 0 0 1 0 0 0 1
## [8399] 0 0 0 0 0 0 0 0 0 1 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1
## [8433] 0 0 0 0 0 1 0 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 1 1 0 0 0 0 1 0 0 0 1
## [8467] 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0
## [8501] 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 1 1 0
## [8535] 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 2 0 1 0 0 0 0 1 0 1 0 0 0
## [8569] 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0
## [8603] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 1
## [8637] 0 0 0 0 2 0 0 2 0 0 0 0 1 0 0 0 0 0 1 1 0 0 0 0 0 0 1 4 0 0 0 0 0 0
## [8671] 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0
## [8705] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 4 0 0 0 0 2 0
## [8739] 0 1 1 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 4 1 0 0 0 1 0 1 0 0 0 0 0
## [8773] 0 1 0 0 1 0 2 0 0 0 0 0 0 0 0 0 0 1 1 0 0 1 0 1 1 1 0 0 0 0 0 0 0
## [8807] 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0
## [8841] 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0 0 1 0 0 1 0 0 0
## [8875] 1 0 1 0 0 0 0 0 0 1 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
## [8909] 0 0 0 0 0 0 0 0 0 1 0 0 0 2 1 0 2 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1
## [8943] 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 2 0 0 0 0 0 0 2 0 1 0
## [8977] 1 0 0 0 0 2 1 2 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 3 0 0 0 0 0 0 1 0
## [9011] 0 0 0 0 1 0 0 2 0 3 1 0 0 0 1 0 0 2 0 0 0 0 0 2 0 0 0 1 0 0 0 0 0 1
## [9045] 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 1 0 0 0 0 0 0 1 2 0 1 0 0 1 0 0
## [9079] 0 0 1 0 0 0 1 2 0 0 1 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 1
## [9113] 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 1 0 0 1 1 0
## [9147] 0 0 1 1 0 0 0 0 1 0 5 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 2 0 0
## [9181] 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0
## [9215] 0 0 0 0 1 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 1 0 0 0 0
## [9249] 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0
## [9283] 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 2 0 0 1 0 1 0 1 0 0 3 0
## [9317] 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1 0 1 0 0 0 0 1
## [9351] 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0
## [9385] 0 0 0 0 0 2 0 0 0 0 0 0 0 0 1 0 0 1 0 1 0 0 1 0 0 1 0 0 0 0 0 0 0 0
## [9419] 1 1 0 1 0 0 0 0 0 0 0 0 0 0 0 2 1 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0
## [9453] 0 1 1 0 0 2 0 0 0 0 0 0 1 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0
## [9487] 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 1 0 1

```

```

## [9521] 0 1 0 0 0 0 0 1 0 0 0 1 1 0 0 0 1 1 0 1 0 0 0 0 2 0 0 0 0 0 0 0 2 0
## [9555] 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 2 0 0 0 1 0 0 0 1 0 0 0 0 0 1 1 1
## [9589] 0 0 0 0 0 0 0 0 0 0 2 1 0 0 1 1 0 0 1 0 0 1 0 1 0 2 1 0 0 0 0 0 0 0
## [9623] 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 2 1 1 0 0 1 0 1 1
## [9657] 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [9691] 0 0 0 0 4 0 0 0 0 0 0 0 0 0 1 0 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
## [9725] 0 0 1 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 2 0 1 0 0 0 0 1 0 0 2 0
## [9759] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
## [9793] 0 0 0 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0
## [9827] 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1
## [9861] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 2 0 0 1
## [9895] 0 1 0 1 0 0 3 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0
## [9929] 1 0 1 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
## [9963] 0 0 0 0 1 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 1 0 0 1 0 1 0 0 1 0 0 1
## [9997] 0 0 0 0 0 0 0 0 1 1 0 1 0 0 0 0 0 0 0 0 0 0 0 2 1 0 0 1 1 0 0 0 0 0
## [10031] 0 0 0 0 0 0 0 0 0 1 1 0 0 2 0 0 0 0 0 0 0 1 0 1 0 1 0 0 0 0 0 0 0 0 0
## [10065] 0 0 1 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [10099] 0 1 1 0 1 0 0 1 0 1 0 0 0 0 0 0 1 0 0 0 1 1 0 0 0 1 1 0 1 0 0 0 0 2 0
## [10133] 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 2 0 0 0 1 0 0 0 1
## [10167] 0 0 0 0 0 1 1 1 0 0 0 0 0 0 0 0 0 0 2 1 0 0 1 1 0 0 1 0 0 1 0 1 0 2
## [10201] 1 0 0 0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 2
## [10235] 1 1 0 0 1 0 1 1 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [10269] 0 0 0 0 0 0 0 0 0 0 0 0 4 0 0 0 0 0 0 0 0 1 0 1 1 0 0 0 1 0 0 0 0
## [10303] 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 2 0 1 0
## [10337] 0 0 0 1 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 1 0
## [10371] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0
## [10405] 0 0 0 0 1 1 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0
## [10439] 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
## [10473] 0 0 0 0 2 0 0 1 0 1 0 1 0 0 3 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [10507] 0 0 0 1 0 0 0 0 1 0 1 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0
## [10541] 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 1 0 0 1
## [10575] 0 1 0 0 1 0 0 1 0 0 0 0 0 0 0 0 1 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 2 1
## [10609] 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 2 0 0 0 0 0 0 0 1 0 1 0 1 0
## [10643] 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [10677] 0 0 0 0 0 0 0 0 0 1 1 0 1 0 0 1 0 1 0 0 0 0 0 1 0 0 0 1 1 0 0 0 1 1
## [10711] 0 1 0 0 0 0 2 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 2
## [10745] 0 0 0 1 0 0 0 1 0 0 0 0 0 0 1 1 1 0 0 0 0 0 0 0 0 0 0 2 1 0 0 1 1 0 0
## [10779] 1 0 0 1 0 1 0 2 1 0 0 0 0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0
## [10813] 0 0 0 0 0 2 0 2 1 1 0 0 1 0 1 1 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
## [10847] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 4 0 0 0 0 0 0 0 0 0 0 1 0 1 1
## [10881] 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0
## [10915] 0 0 0 0 2 0 1 0 0 0 0 1 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0
## [10949] 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0 0
## [10983] 2 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 1 0
## [11017] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [11051] 1 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 1 0 1 0 1 0 0 3 0 1 0 0 0 0 0 0 0 0
## [11085] 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1 0 1 0 0 0 0 1 0 1 0 0 0 0 0 0
## [11119] 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 2 0 0 0
## [11153] 0 0 0 0 1 0 0 1 0 1 0 0 1 0 0 1 0 0 0 0 0 0 0 1 1 0 1 0 0 0 0 0 0
## [11187] 0 0 0 0 0 0 2 1 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 2 0 0 0 0
## [11221] 0 0 1 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 2 0 0 0 0 0 0 0 0 0
## [11255] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 1 0 0 1 0 1 0 0 0 0 0 1 0 0
## [11289] 0 1 1 0 0 0 1 1 0 1 0 0 0 0 2 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0
## [11323] 0 0 0 1 1 0 0 2 0 0 0 1 0 0 0 1 0 0 0 0 1 1 1 0 0 0 0 0 0 0 0 0 0

```

```

## [11357] 2 1 0 0 1 1 0 0 1 0 0 1 0 1 0 2 1 0 0 0 0 0 0 0 0 0 1 0 1 0 0 0 0 0
## [11391] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 2 1 1 0 0 1 0 1 1 0 1 0 0 0 1 0 0 0 0
## [11425] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 4 0 0 0 0 0
## [11459] 0 0 0 0 1 0 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0
## [11493] 0 0 0 0 1 0 0 0 0 0 0 0 2 0 1 0 0 0 0 1 0 0 2 0 0 0 0 0 0 0 0 0 0 0
## [11527] 0 0 0 1 1 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 3 0
## [11561] 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0
## [11595] 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
## [11629] 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 2 0 0 1 0 1 0 1 0 0 3 0 1 0 0 0 0
## [11663] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1 0 1 0 0 0 0 1 0 1 0 0 0
## [11697] 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
## [11731] 2 0 0 0 0 0 0 0 0 1 0 0 1 0 1 0 0 1 0 0 1 0 0 0 0 0 0 0 0 1 1 0 1 0
## [11765] 0 0 0 0 0 0 0 0 0 0 2 1 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0
## [11799] 2 0 0 0 0 0 0 1 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 2 0 0 0
## [11833] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 1 0 0 1 0 1 0 0 0
## [11867] 0 0 1 0 0 0 1 1 0 0 0 1 1 0 1 0 0 0 2 0 0 0 0 0 0 0 2 0 0 0 0 0
## [11901] 0 0 0 0 0 0 0 0 1 1 0 0 2 0 0 0 1 0 0 0 1 0 0 0 0 0 1 1 1 0 0 0
## [11935] 0 0 0 0 0 2 1 0 0 1 1 0 0 1 0 0 1 0 1 0 2 1 0 0 0 0 0 0 0 0 1 0 1
## [11969] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 2 1 1 0 0 1 0 1 1 0 1 0 0 0
## [12003] 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 4
## [12037] 0 0 0 0 0 0 0 0 0 1 0 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
## [12071] 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 2 0 1 0 0 0 0 1 0 0 2 0 0 0 0 0
## [12105] 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0
## [12139] 0 0 0 3 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 1 0
## [12173] 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0
## [12207] 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 2 0 0 1 0 1 0 1 0
## [12241] 0 3 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1 0 1 0 0
## [12275] 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1
## [12309] 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 1 0 0 1 0 1 0 0 1 0 0 1 0 0 0 0
## [12343] 0 0 0 1 1 0 1 0 0 0 0 0 0 0 0 0 2 1 0 0 1 1 0 0 0 0 0 0 0 0 0
## [12377] 0 0 0 0 1 1 0 0 2 0 0 0 0 0 0 1 0 1 0 1 0 0 0 0 0 0 0 0 0 0 1 0
## [12411] 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0
## [12445] 0 0 1 0 1 0 0 0 0 0 1 0 0 0 1 1 0 0 0 1 1 0 1 0 0 0 2 0 0 0 0 0
## [12479] 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 2 0 0 0 1 0 0 0 1 0 0 0
## [12513] 1 1 1 0 0 0 0 0 0 0 0 0 2 1 0 0 1 1 0 0 1 0 0 1 0 1 0 2 1 0 0 0
## [12547] 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 2 1 1 0 0 1
## [12581] 0 1 1 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [12615] 0 0 0 0 0 0 4 0 0 0 0 0 0 0 0 0 1 0 1 1 0 0 0 1 0 0 0 0 0 0 0
## [12649] 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 2 0 1 0 0 0 0 1 0
## [12683] 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 1 0 0 0 0
## [12717] 0 0 0 0 0 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 1
## [12751] 1 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
## [12785] 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 2
## [12819] 0 0 1 0 1 0 1 0 0 3 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0
## [12853] 0 0 0 1 0 1 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
## [12887] 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 1 0 0 1 0 1 0 0 1
## [12921] 0 0 1 0 0 0 0 0 0 0 0 1 1 0 1 0 0 0 0 0 0 0 0 0 0 0 2 1 0 0 1 1 0
## [12955] 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 2 0 0 0 0 0 0 1 0 1 0 1 0 0 0 0
## [12989] 0 0 0 0 0 1 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [13023] 0 0 0 0 1 1 0 1 0 0 1 0 1 0 0 0 0 1 0 0 0 1 1 0 0 0 1 1 0 1 0 0
## [13057] 0 2 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 2 0 0 0 1
## [13091] 0 0 1 0 0 0 0 0 1 1 1 0 0 0 0 0 0 0 0 0 2 1 0 0 1 1 0 0 1 0 0 1
## [13125] 1 0 2 1 0 0 0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [13159] 2 0 2 1 1 0 0 1 0 1 1 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0

```

```
## [13193] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 4 0 0 0 0 0 0 0 0 0 1 0 1 1 0 0 0 1 0
## [13227] 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 2
## [13261] 0 1 0 0 0 0 1 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0
## [13295] 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0 2 0 0 0 0
## [13329] 0 0 0 0 0 0 0
```

#Variable 6-41 are variables with similar factor values (% of society). All of them are clearly factors

```
for (i in which(colnames(data)=="Roman.catholic"):which(colnames(data)=="Income..123.000")){
  data[,i] <- factor(data[,i],
    levels=c(0:9),
    labels=c("0%",
      "1-10%",
      "11-23%",
      "24-36%",
      "37-49%",
      "50-62%",
      "63-75%",
      "76-88%",
      "89-99%",
      "100%"))
}
str(data)
```

```
## 'data.frame': 13335 obs. of 87 variables:
```

```
## $ Customer.main.type : Factor w/ 10 levels "1","2","3","4",...: 8 8 8 3
## $ Customer.Subtype : Factor w/ 40 levels "1","2","3","4",...: 32 36 3
## $ Number.of.houses : int 1 1 1 1 1 1 2 1 1 2 ...
## $ Avg.size.household : int 3 2 2 3 4 2 3 2 2 3 ...
## $ Avg.age : Factor w/ 6 levels "20-30 years",...: 2 2 2 3 2
## $ Roman.catholic : Factor w/ 10 levels "0%","1-10%","11-23%",...: 1
## $ Protestant : Factor w/ 10 levels "0%","1-10%","11-23%",...: 6
## $ Other.religion : Factor w/ 10 levels "0%","1-10%","11-23%",...: 2
## $ No.religion : Factor w/ 10 levels "0%","1-10%","11-23%",...: 4
## $ Married : Factor w/ 10 levels "0%","1-10%","11-23%",...: 8
## $ Living.together : Factor w/ 10 levels "0%","1-10%","11-23%",...: 1
## $ Other.relation : Factor w/ 10 levels "0%","1-10%","11-23%",...: 3
## $ Singles : Factor w/ 10 levels "0%","1-10%","11-23%",...: 2
## $ Household.without.children : Factor w/ 10 levels "0%","1-10%","11-23%",...: 3
## $ Household.with.children : Factor w/ 10 levels "0%","1-10%","11-23%",...: 7
## $ High.level.education : Factor w/ 10 levels "0%","1-10%","11-23%",...: 2
## $ Medium.level.education : Factor w/ 10 levels "0%","1-10%","11-23%",...: 3
## $ Lower.level.education : Factor w/ 10 levels "0%","1-10%","11-23%",...: 8
## $ High.status : Factor w/ 10 levels "0%","1-10%","11-23%",...: 2
## $ Entrepreneur : Factor w/ 10 levels "0%","1-10%","11-23%",...: 1
## $ Farmer : Factor w/ 10 levels "0%","1-10%","11-23%",...: 2
## $ Middle.management : Factor w/ 10 levels "0%","1-10%","11-23%",...: 3
## $ Skilled.labourers : Factor w/ 10 levels "0%","1-10%","11-23%",...: 6
## $ Unskilled.labourers : Factor w/ 10 levels "0%","1-10%","11-23%",...: 3
## $ Social.class.A : Factor w/ 10 levels "0%","1-10%","11-23%",...: 2
## $ Social.class.B1 : Factor w/ 10 levels "0%","1-10%","11-23%",...: 2
## $ Social.class.B2 : Factor w/ 10 levels "0%","1-10%","11-23%",...: 3
## $ Social.class.C : Factor w/ 10 levels "0%","1-10%","11-23%",...: 7
## $ Social.class.D : Factor w/ 10 levels "0%","1-10%","11-23%",...: 2
## $ Rented.house : Factor w/ 10 levels "0%","1-10%","11-23%",...: 2
## $ Home.owners : Factor w/ 10 levels "0%","1-10%","11-23%",...: 9
```



```

## $ X1.car : Factor w/ 10 levels "0%","1-10%","11-23%",... 9
## $ X2.cars : Factor w/ 10 levels "0%","1-10%","11-23%",... 1
## $ No.car : Factor w/ 10 levels "0%","1-10%","11-23%",... 2
## $ National.Health.Service : Factor w/ 10 levels "0%","1-10%","11-23%",... 9
## $ Private.health.insurance : Factor w/ 10 levels "0%","1-10%","11-23%",... 2
## $ Income...30 : Factor w/ 10 levels "0%","1-10%","11-23%",... 1
## $ Income.30.45.000 : Factor w/ 10 levels "0%","1-10%","11-23%",... 5
## $ Income.45.75.000 : Factor w/ 10 levels "0%","1-10%","11-23%",... 6
## $ Income.75.122.000 : Factor w/ 10 levels "0%","1-10%","11-23%",... 1
## $ Income..123.000 : Factor w/ 10 levels "0%","1-10%","11-23%",... 1
## $ Average.income : int 4 5 3 4 6 3 3 3 2 4 ...
## $ Purchasing.power.class : int 3 4 4 4 3 3 5 3 3 7 ...
## $ pr_num : int 55446888 30947608 52223731 76547439 100719...
## $ Contribution.private.third.party.insurance : int 0 2 2 0 0 0 0 0 0 2 ...
## $ Contribution.third.party.insurance..firms. : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.third.party.insurane..agriculture. : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.car.policies : int 6 0 6 6 0 6 6 0 5 0 ...
## $ Contribution.delivery.van.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.motorcycle.scooter.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.lorry.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.trailer.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.tractor.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.agricultural.machines.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.moped.policies : int 0 0 0 0 0 0 0 3 0 0 ...
## $ Contribution.life.insurances : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.private.accident.insurance.policies: int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.family.accidents.insurance.policies: int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.disability.insurance.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.fire.policies : int 5 2 2 2 6 0 0 0 0 3 ...
## $ Contribution.surfboard.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.boat.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.bicycle.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.property.insurance.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.social.security.insurance.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.private.3rd.party.insurance : int 0 2 1 0 0 0 0 0 0 1 ...
## $ No..of.3rd.party.insurance..firms. : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.3rd.party.insurane..agriculture. : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.car.policies : int 1 0 1 1 0 1 1 0 1 0 ...
## $ No..of.delivery.van.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.motorcycle.scooter.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.lorry.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.trailer.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.tractor.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.agricultural.machines.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.moped.policies : int 0 0 0 0 0 0 0 1 0 0 ...
## $ No..of.life.insurances : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.private.accident.insurance.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.family.accidents.insurance.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.disability.insurance.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.fire.policies : int 1 1 1 1 1 0 0 0 0 1 ...
## $ No..of.surfboard.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.boat.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.bicycle.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.property.insurance.policies : int 0 0 0 0 0 0 0 0 0 0 ...

```

```
## $ No..of.social.security.insurance.policies      : int  0 0 0 0 0 0 0 0 0 0 ...
## $ policy.output                                  : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1

#Variables Average.income and Purchasing.power.class are written as percentages as per the dataset, how
for (i in which(colnames(data)=="Average.income"):which(colnames(data)=="Purchasing.power.class"))
{
  data[,i] <- factor(data[,i],
                     levels=c(0:8),
                     labels=c("RS 0",
                              "RS 1 - 49",
                              "RS 50 - 99",
                              "RS 100 - 199",
                              "RS 200 - 499",
                              "RS 500 - 999",
                              "RS 1000 - 4999",
                              "RS 5000 - 9999",
                              "RS 10000 - 19999"
                              ))
}
str(data)

## 'data.frame':   13335 obs. of  87 variables:
## $ Customer.main.type      : Factor w/ 10 levels "1","2","3","4",...: 8 8 8 3
## $ Customer.Subtype        : Factor w/ 40 levels "1","2","3","4",...: 32 36 3
## $ Number.of.houses        : int   1 1 1 1 1 1 2 1 1 2 ...
## $ Avg.size.household      : int   3 2 2 3 4 2 3 2 2 3 ...
## $ Avg.age                 : Factor w/ 6 levels "20-30 years",...: 2 2 2 3 2
## $ Roman.catholic          : Factor w/ 10 levels "0%","1-10%","11-23%",...: 1
## $ Protestant              : Factor w/ 10 levels "0%","1-10%","11-23%",...: 6
## $ Other.religion          : Factor w/ 10 levels "0%","1-10%","11-23%",...: 2
## $ No.religion             : Factor w/ 10 levels "0%","1-10%","11-23%",...: 4
## $ Married                 : Factor w/ 10 levels "0%","1-10%","11-23%",...: 8
## $ Living.together         : Factor w/ 10 levels "0%","1-10%","11-23%",...: 1
## $ Other.relation          : Factor w/ 10 levels "0%","1-10%","11-23%",...: 3
## $ Singles                 : Factor w/ 10 levels "0%","1-10%","11-23%",...: 2
## $ Household.without.children : Factor w/ 10 levels "0%","1-10%","11-23%",...: 3
## $ Household.with.children  : Factor w/ 10 levels "0%","1-10%","11-23%",...: 7
## $ High.level.education     : Factor w/ 10 levels "0%","1-10%","11-23%",...: 2
## $ Medium.level.education   : Factor w/ 10 levels "0%","1-10%","11-23%",...: 3
## $ Lower.level.education    : Factor w/ 10 levels "0%","1-10%","11-23%",...: 8
## $ High.status              : Factor w/ 10 levels "0%","1-10%","11-23%",...: 2
## $ Entrepreneur            : Factor w/ 10 levels "0%","1-10%","11-23%",...: 1
## $ Farmer                  : Factor w/ 10 levels "0%","1-10%","11-23%",...: 2
## $ Middle.management        : Factor w/ 10 levels "0%","1-10%","11-23%",...: 3
## $ Skilled.labourers        : Factor w/ 10 levels "0%","1-10%","11-23%",...: 6
## $ Unskilled.labourers      : Factor w/ 10 levels "0%","1-10%","11-23%",...: 3
## $ Social.class.A           : Factor w/ 10 levels "0%","1-10%","11-23%",...: 2
## $ Social.class.B1          : Factor w/ 10 levels "0%","1-10%","11-23%",...: 2
## $ Social.class.B2          : Factor w/ 10 levels "0%","1-10%","11-23%",...: 3
## $ Social.class.C           : Factor w/ 10 levels "0%","1-10%","11-23%",...: 7
## $ Social.class.D           : Factor w/ 10 levels "0%","1-10%","11-23%",...: 2
## $ Rented.house             : Factor w/ 10 levels "0%","1-10%","11-23%",...: 2
## $ Home.owners              : Factor w/ 10 levels "0%","1-10%","11-23%",...: 9
## $ X1.car                   : Factor w/ 10 levels "0%","1-10%","11-23%",...: 9
## $ X2.cars                   : Factor w/ 10 levels "0%","1-10%","11-23%",...: 1
```

```

## $ No.car : Factor w/ 10 levels "0%","1-10%","11-23%",... 2
## $ National.Health.Service : Factor w/ 10 levels "0%","1-10%","11-23%",... 9
## $ Private.health.insurance : Factor w/ 10 levels "0%","1-10%","11-23%",... 2
## $ Income...30 : Factor w/ 10 levels "0%","1-10%","11-23%",... 1
## $ Income.30.45.000 : Factor w/ 10 levels "0%","1-10%","11-23%",... 5
## $ Income.45.75.000 : Factor w/ 10 levels "0%","1-10%","11-23%",... 6
## $ Income.75.122.000 : Factor w/ 10 levels "0%","1-10%","11-23%",... 1
## $ Income..123.000 : Factor w/ 10 levels "0%","1-10%","11-23%",... 1
## $ Average.income : Factor w/ 9 levels "RS 0","Rs 1 - 49",... 5 6 4
## $ Purchasing.power.class : Factor w/ 9 levels "RS 0","Rs 1 - 49",... 4 5 5
## $ pr_num : int 55446888 30947608 52223731 76547439 100719
## $ Contribution.private.third.party.insurance : int 0 2 2 0 0 0 0 0 0 2 ...
## $ Contribution.third.party.insurance..firms. : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.third.party.insurane..agriculture. : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.car.policies : int 6 0 6 6 0 6 6 0 5 0 ...
## $ Contribution.delivery.van.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.motorcycle.scooter.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.lorry.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.trailer.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.tractor.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.agricultural.machines.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.moped.policies : int 0 0 0 0 0 0 0 3 0 0 ...
## $ Contribution.life.insurances : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.private.accident.insurance.policies: int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.family.accidents.insurance.policies: int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.disability.insurance.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.fire.policies : int 5 2 2 2 6 0 0 0 0 3 ...
## $ Contribution.surfboard.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.boat.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.bicycle.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.property.insurance.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.social.security.insurance.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.private.3rd.party.insurance : int 0 2 1 0 0 0 0 0 0 1 ...
## $ No..of.3rd.party.insurance..firms. : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.3rd.party.insurane..agriculture. : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.car.policies : int 1 0 1 1 0 1 1 0 1 0 ...
## $ No..of.delivery.van.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.motorcycle.scooter.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.lorry.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.trailer.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.tractor.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.agricultural.machines.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.moped.policies : int 0 0 0 0 0 0 0 1 0 0 ...
## $ No..of.life.insurances : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.private.accident.insurance.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.family.accidents.insurance.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.disability.insurance.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.fire.policies : int 1 1 1 1 1 0 0 0 0 1 ...
## $ No..of.surfboard.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.boat.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.bicycle.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.property.insurance.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.social.security.insurance.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ policy.output : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1

```

#If any entry was not in the 0-9 range, it must be coded incorrectly, and would appear as NA now. Let us check for NAs.

```
sum(is.na(data))
```

```
## [1] 50
```

#50 NA variables, which are not coded properly, so can be removed.

```
data <- na.omit(data.main)
```

#Certain demographic and behavioral factors are another great place to explore.

#Among the demographic factors, we thought religion, marital status, level of education, occupation, and

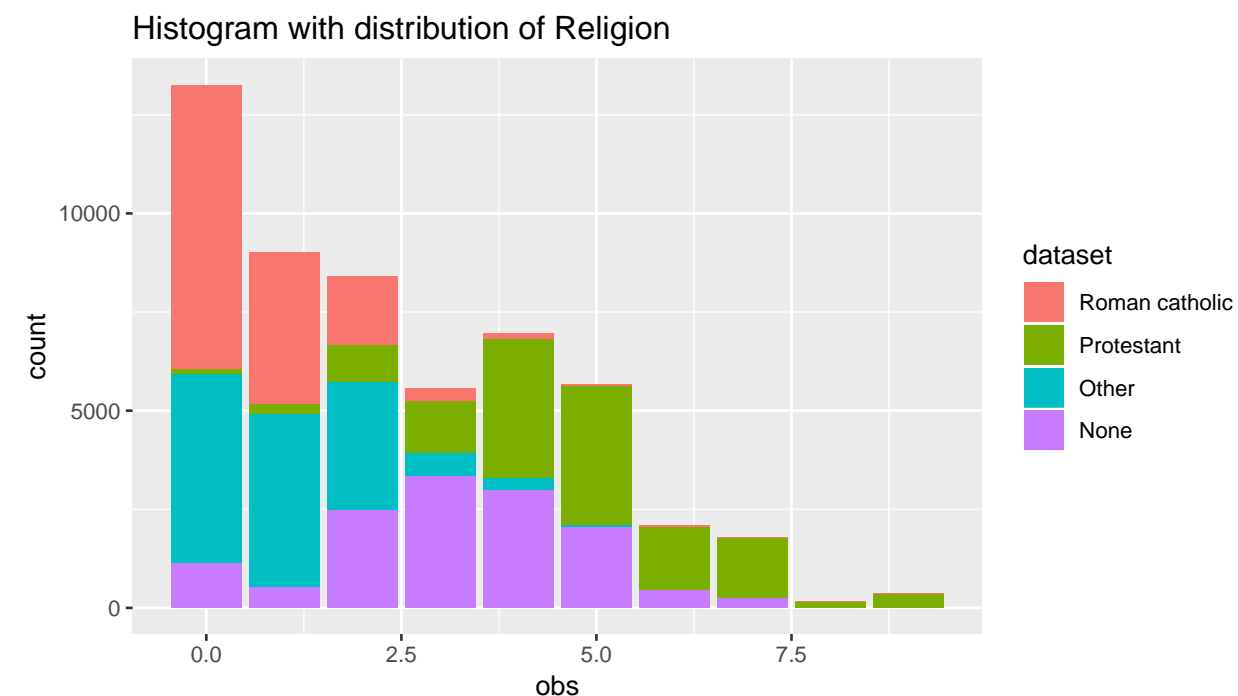
#Among the behavioral factors, such as contribution to and number of other insurance, may be influential

#Variables 6-9 are all linked to religion, let us interpret them together

```
JUST.FOR.PLOT <- rbind(data.frame(dataset="Roman catholic", obs=data$Roman.catholic),
  data.frame(dataset="Protestant", obs=data$Protestant),
  data.frame(dataset="Other ", obs=data$Other.religion),
  data.frame(dataset="None", obs=data$No.religion))
```

```
JUST.FOR.PLOT$dataset <- as.factor(JUST.FOR.PLOT$dataset)
```

```
ggplot(JUST.FOR.PLOT, aes(x=obs, fill=dataset)) +geom_bar() +
  ggtitle("Histogram with distribution of Religion")
```



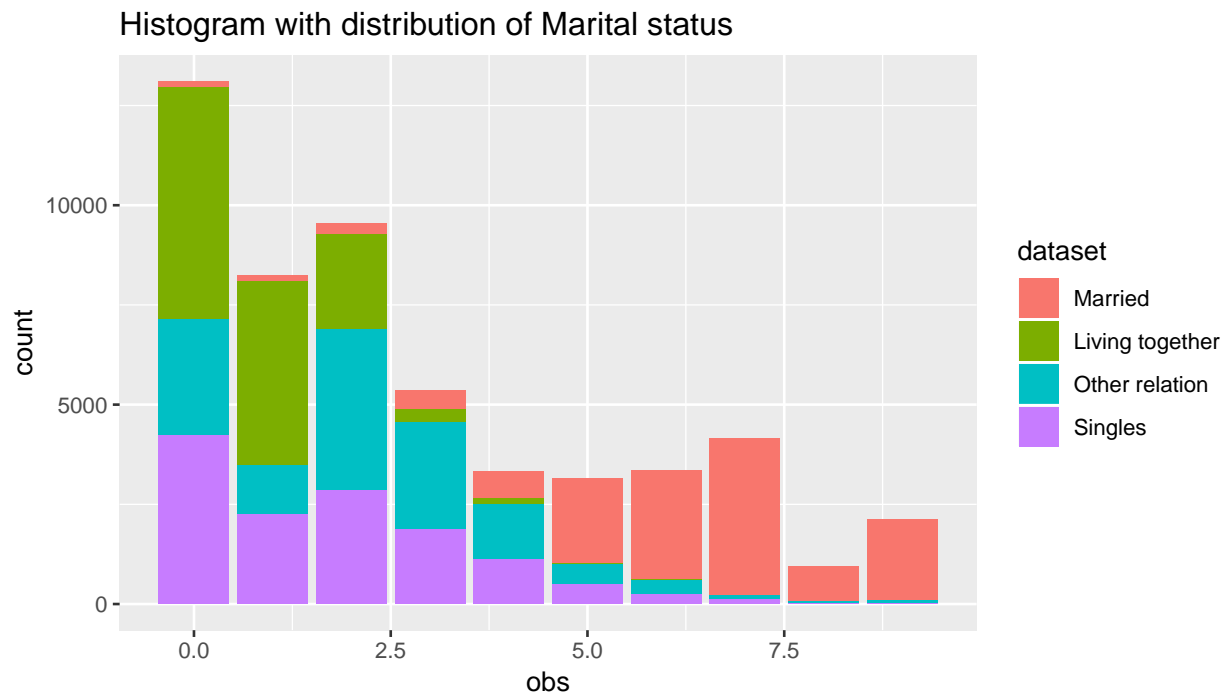
#We can see there is significant variation between each type of religion, and therefore these variables

#Variables 10-13 are all linked to Marital status, let us interpret them together

```
JUST.FOR.PLOT <- rbind(data.frame(dataset="Married", obs=data$Married),
  data.frame(dataset="Living together", obs=data$Living.together),
  data.frame(dataset="Other relation ", obs=data$Other.relation),
  data.frame(dataset="Singles", obs=data$Singles))
```

```
JUST.FOR.PLOT$dataset <- as.factor(JUST.FOR.PLOT$dataset)
```

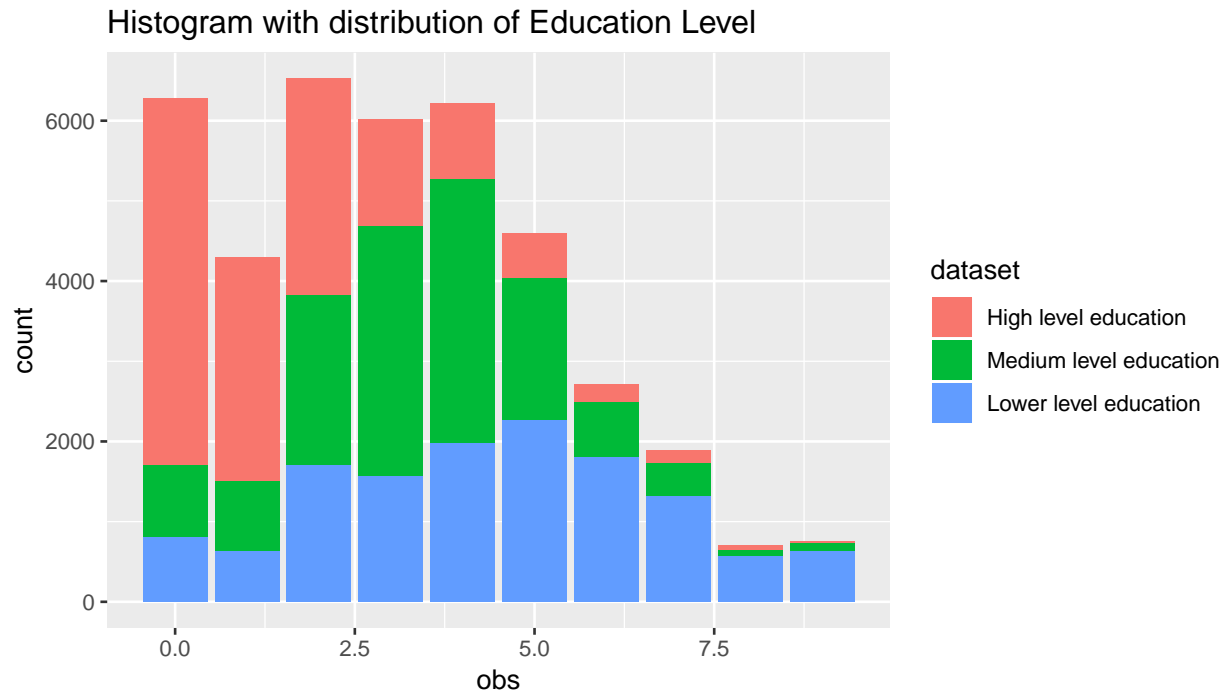
```
ggplot(JUST.FOR.PLOT, aes(x=obs, fill=dataset)) +geom_bar() +
  ggtitle("Histogram with distribution of Marital status")
```



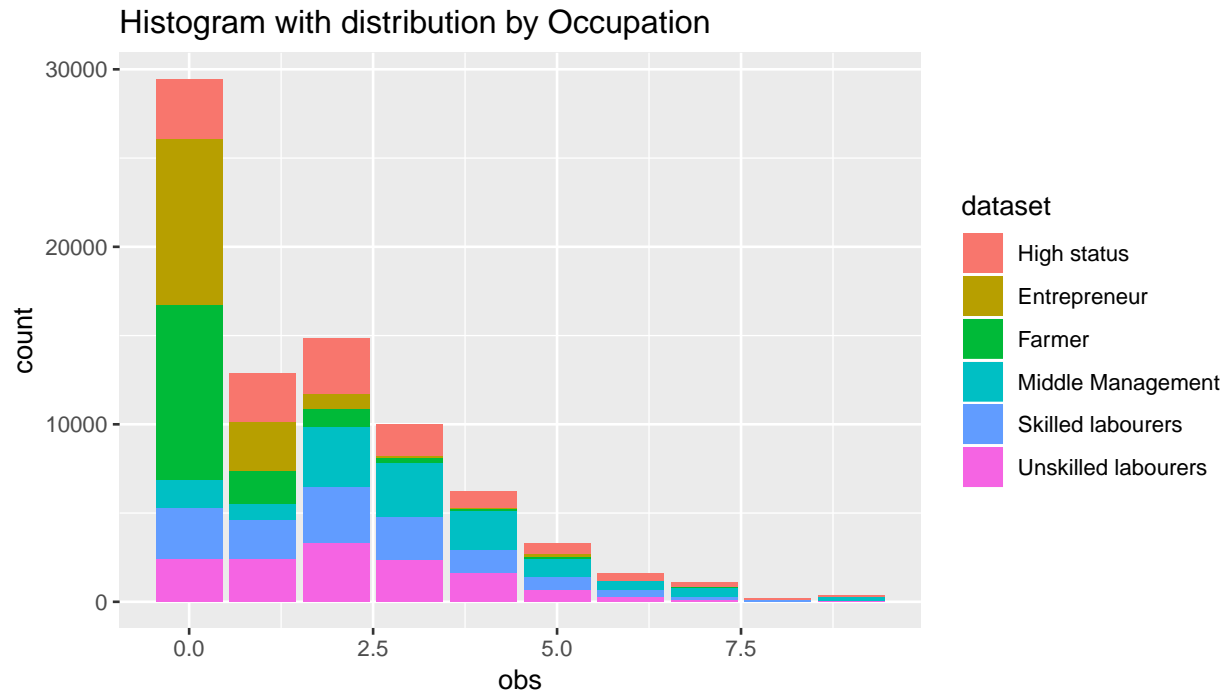
#We can see there is significant variation between each type of marital status, and therefore these var

#histogram by education

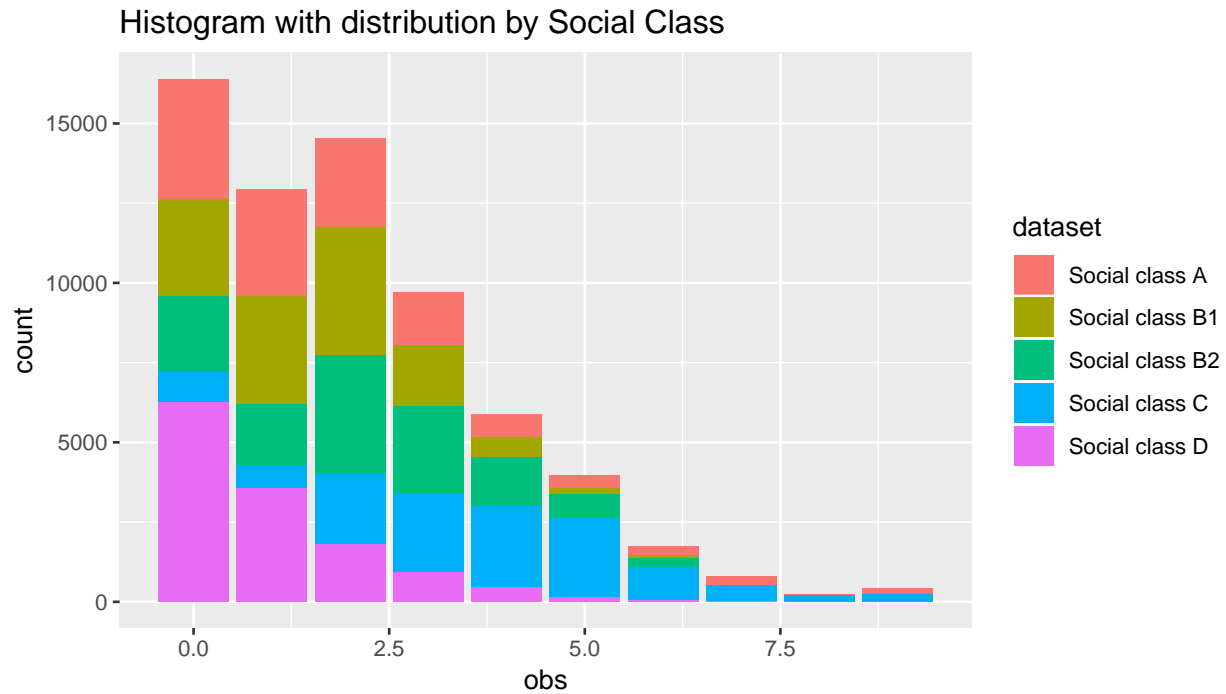
```
JUST.FOR.PLOT <- rbind(data.frame(dataset="High level education", obs=data$High.level.education),
  data.frame(dataset="Medium level education", obs=data$Medium.level.education),
  data.frame(dataset="Lower level education", obs=data$Lower.level.education)
)
JUST.FOR.PLOT$dataset <- as.factor(JUST.FOR.PLOT$dataset)
ggplot(JUST.FOR.PLOT, aes(x=obs, fill=dataset)) +geom_bar() +
ggtitle("Histogram with distribution of Education Level")
```



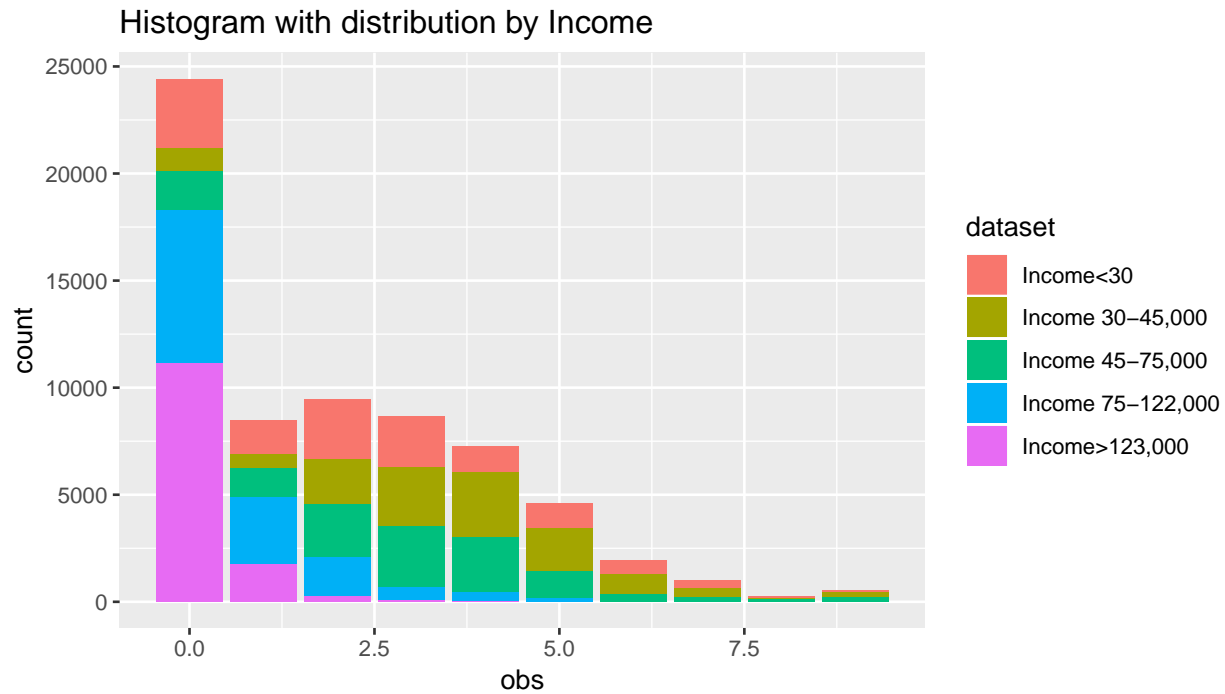
```
#histogram by occulption
JUST.FOR.PLOT <- rbind(data.frame(dataset="High status", obs=data$High.status),
  data.frame(dataset="Entrepreneur", obs=data$Entrepreneur),
  data.frame(dataset="Farmer", obs=data$Farmer),
  data.frame(dataset="Middle Management", obs=data$Middle.management),
  data.frame(dataset="Skilled labourers", obs=data$Skilled.labourers),
  data.frame(dataset="Unskilled labourers", obs=data$Unskilled.labourers)
)
JUST.FOR.PLOT$dataset <- as.factor(JUST.FOR.PLOT$dataset)
ggplot(JUST.FOR.PLOT, aes(x=obs, fill=dataset)) +geom_bar() +
ggtitle("Histogram with distribution by Occupation")
```



```
#histogram by social class
JUST.FOR.PLOT <- rbind(data.frame(dataset="Social class A", obs=data$Social.class.A),
  data.frame(dataset="Social class B1", obs=data$Social.class.B1),
  data.frame(dataset="Social class B2", obs=data$Social.class.B2),
  data.frame(dataset="Social class C", obs=data$Social.class.C),
  data.frame(dataset="Social class D", obs=data$Social.class.D)
)
JUST.FOR.PLOT$dataset <- as.factor(JUST.FOR.PLOT$dataset)
ggplot(JUST.FOR.PLOT, aes(x=obs, fill=dataset)) +geom_bar() +
ggtitle("Histogram with distribution by Social Class")
```



```
#histogram by Income
JUST.FOR.PLOT <- rbind(data.frame(dataset="Income<30", obs=data$Income...30),
  data.frame(dataset="Income 30-45,000", obs=data$Income.30.45.000),
  data.frame(dataset="Income 45-75,000", obs=data$Income.45.75.000),
  data.frame(dataset="Income 75-122,000", obs=data$Income.75.122.000),
  data.frame(dataset="Income>123,000", obs=data$Income..123.000)
)
JUST.FOR.PLOT$dataset <- as.factor(JUST.FOR.PLOT$dataset)
ggplot(JUST.FOR.PLOT, aes(x=obs, fill=dataset)) +geom_bar() +
ggtitle("Histogram with distribution by Income")
```

Split dataset into test and training

#split the training and test data sets, so we can proceed with analysis on training data set, and check

```
N <- length(data$pr_num)
set.seed(10)
index.train <- sample(N, 0.8*N)
data.train <- data[index.train,] #dim(data.train)
data.test <- data[-index.train,]
dim(data.train)
```

```
## [1] 10668 87
```

```
dim(data.test)
```

```
## [1] 2667 87
```

```
str(data.train)
```

```
## 'data.frame': 10668 obs. of 87 variables:
## $ Customer.main.type : int 1 5 3 8 8 2 1 6 8 1 ...
## $ Customer.Subtype : int 3 23 11 36 33 7 4 26 33 1 ...
## $ Number.of.houses : int 1 1 1 1 1 1 1 1 1 1 ...
## $ Avg.size.household : int 3 2 3 2 3 3 2 2 3 2 ...
## $ Avg.age : int 3 2 3 4 3 2 4 4 2 4 ...
## $ Roman.catholic : int 1 0 1 2 0 1 0 0 0 0 ...
## $ Protestant : int 5 2 4 4 5 2 5 7 5 2 ...
## $ Other.religion : int 2 1 1 2 1 1 2 0 0 0 ...
## $ No.religion : int 3 7 4 2 4 5 3 2 4 7 ...
## $ Married : int 5 3 6 7 7 7 5 4 7 6 ...
## $ Living.together : int 1 5 0 0 2 1 1 0 0 0 ...
## $ Other.relation : int 4 2 3 2 1 1 4 5 2 3 ...
## $ Singles : int 1 2 2 2 0 1 3 4 1 5 ...
```

```

## $ Household.without.children : int 4 6 2 4 5 3 4 5 0 3 ...
## $ Household.with.children : int 4 2 5 3 4 5 3 1 8 2 ...
## $ High.level.education : int 3 0 1 1 2 3 2 1 0 3 ...
## $ Medium.level.education : int 5 4 4 5 3 5 4 3 0 4 ...
## $ Lower.level.education : int 1 5 5 4 4 2 4 5 9 2 ...
## $ High.status : int 2 0 2 1 4 3 3 2 3 7 ...
## $ Entrepreneur : int 1 0 1 0 0 1 1 0 0 0 ...
## $ Farmer : int 0 0 1 0 0 0 1 0 2 0 ...
## $ Middle.management : int 6 4 3 3 1 4 3 4 3 0 ...
## $ Skilled.labourers : int 1 2 3 1 4 2 2 1 1 2 ...
## $ Unskilled.labourers : int 1 4 2 4 2 2 2 3 3 0 ...
## $ Social.class.A : int 3 0 2 1 3 2 2 1 0 4 ...
## $ Social.class.B1 : int 2 2 2 1 0 3 2 3 2 0 ...
## $ Social.class.B2 : int 4 3 2 4 2 3 2 2 7 4 ...
## $ Social.class.C : int 1 5 4 4 4 2 4 2 1 1 ...
## $ Social.class.D : int 1 0 1 0 1 1 1 3 0 0 ...
## $ Rented.house : int 1 6 3 2 3 3 4 8 9 0 ...
## $ Home.owners : int 8 3 6 7 6 6 5 1 0 9 ...
## $ X1.car : int 5 5 6 5 5 7 6 2 5 9 ...
## $ X2.cars : int 1 1 1 3 4 1 1 1 3 0 ...
## $ No.car : int 3 4 2 2 1 2 3 7 2 0 ...
## $ National.Health.Service : int 5 9 6 5 6 5 6 8 5 2 ...
## $ Private.health.insurance : int 4 0 3 4 4 4 3 1 4 7 ...
## $ Income...30 : int 1 2 3 2 1 2 4 4 1 2 ...
## $ Income.30.45.000 : int 4 6 2 5 5 3 2 4 6 2 ...
## $ Income.45.75.000 : int 2 2 3 3 2 4 3 2 3 5 ...
## $ Income.75.122.000 : int 4 0 1 0 0 2 1 0 0 0 ...
## $ Income..123.000 : int 1 0 1 0 2 1 0 0 0 0 ...
## $ Average.income : int 6 3 4 4 6 5 3 3 4 4 ...
## $ Purchasing.power.class : int 6 3 6 3 3 6 6 1 3 8 ...
## $ pr_num : int 38915379 47056194 69337147 54625419 184956...
## $ Contribution.private.third.party.insurance : int 0 2 2 0 0 2 0 2 0 2 ...
## $ Contribution.third.party.insurance..firms. : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.third.party.insurane..agriculture. : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.car.policies : int 0 6 6 0 0 6 6 0 6 0 ...
## $ Contribution.delivery.van.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.motorcycle.scooter.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.lorry.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.trailer.policies : int 0 0 0 0 2 0 0 0 0 0 ...
## $ Contribution.tractor.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.agricultural.machines.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.moped.policies : int 0 0 3 0 0 0 0 0 0 0 ...
## $ Contribution.life.insurances : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.private.accident.insurance.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.family.accidents.insurance.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.disability.insurance.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.fire.policies : int 3 2 4 0 0 4 0 2 0 0 ...
## $ Contribution.surfboard.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.boat.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.bicycle.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.property.insurance.policies : int 0 0 0 0 0 0 0 0 0 0 ...
## $ Contribution.social.security.insurance.policies : int 0 0 0 0 0 3 0 0 0 0 ...
## $ No..of.private.3rd.party.insurance : int 0 1 1 0 0 1 0 1 0 1 ...
## $ No..of.3rd.party.insurance..firms. : int 0 0 0 0 0 0 0 0 0 0 ...

```

```

## $ No..of.3rd.party.insurane..agriculture.      : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.car.policies                          : int  0 1 1 0 0 1 1 0 1 0 ...
## $ No..of.delivery.van.policies                 : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.motorcycle.scooter.policies           : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.lorry.policies                        : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.trailer.policies                      : int  0 0 0 0 1 0 0 0 0 0 ...
## $ No..of.tractor.policies                      : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.agricultural.machines.policies        : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.moped.policies                       : int  0 0 1 0 0 0 0 0 0 0 ...
## $ No..of.life.insurances                      : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.private.accident.insurance.policies   : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.family.accidents.insurance.policies   : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.disability.insurance.policies         : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.fire.policies                        : int  1 1 1 0 0 1 0 1 0 0 ...
## $ No..of.surfboard.policies                   : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.boat.policies                        : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.bicycle.policies                     : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.property.insurance.policies           : int  0 0 0 0 0 0 0 0 0 0 ...
## $ No..of.social.security.insurance.policies    : int  0 0 0 0 0 1 0 0 0 0 ...
## $ No..of.mobile.home.policies                  : int  0 0 0 1 0 0 0 0 0 0 ...
## - attr(*, "na.action")= 'omit' Named int  13336 13337 13338 13339 13340 13341 13342 13343 13344 13345 ...
## ..- attr(*, "names")= chr  "13336" "13337" "13338" "13339" ...

```

Model Building