Creating new variables

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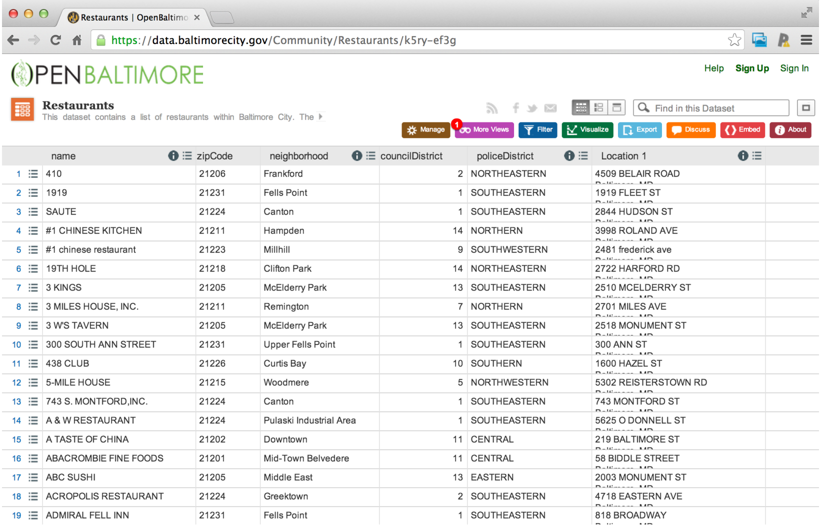
Why create new variables?

- Often the raw data won't have a value you are looking for
- You will need to transform the data to get the values you would like
- Usually you will add those values to the data frames you are working with
- Common variables to create
- Missingness indicators
- "Cutting up" quantitative variables
- Applying transforms

Example data set



Restaurants

This dataset contains a list of restaurants within Baltimore City. The

	name	zipCode	neighborhood	councilDistrict	policeDistrict	Location 1
1	410	21206	Frankford	2	NORTHEASTERN	4509 BELAIR ROAD
2	1919	21231	Fells Point	1	SOUTHEASTERN	1919 FLEET ST
3	SAUTE	21224	Canton	1	SOUTHEASTERN	2844 HUDSON ST
4	#1 CHINESE KITCHEN	21211	Hampden	14	NORTHERN	3998 ROLAND AVE
5	#1 chinese restaurant	21223	Millhill	9	SOUTHWESTERN	2481 frederick ave
6	19TH HOLE	21218	Clifton Park	14	NORTHEASTERN	2722 HARFORD RD
7	3 KINGS	21205	McElderry Park	13	SOUTHEASTERN	2510 MCELDERRY ST
8	3 MILES HOUSE, INC.	21211	Remington	7	NORTHERN	2701 MILES AVE
9	3 W'S TAVERN	21205	McElderry Park	13	SOUTHEASTERN	2518 MONUMENT ST
10	300 SOUTH ANN STREET	21231	Upper Fells Point	1	SOUTHEASTERN	300 ANN ST
11	438 CLUB	21226	Curtis Bay	10	SOUTHERN	1600 HAZEL ST
12	5-MILE HOUSE	21215	Woodmere	5	NORTHWESTERN	5302 REISTERSTOWN RD
13	743 S. MONTFORD,INC.	21224	Canton	1	SOUTHEASTERN	743 MONTFORD ST
14	A & W RESTAURANT	21224	Pulaski Industrial Area	1	SOUTHEASTERN	5625 O DONNELL ST
15	A TASTE OF CHINA	21202	Downtown	11	CENTRAL	219 BALTIMORE ST
16	ABACROMBIE FINE FOODS	21201	Mid-Town Belvedere	11	CENTRAL	58 BIDDLE STREET
17	ABC SUSHI	21205	Middle East	13	EASTERN	2003 MONUMENT ST
18	ACROPOLIS RESTAURANT	21224	Greektown	2	SOUTHEASTERN	4718 EASTERN AVE
19	ADMIRAL FELL INN	21231	Fells Point	1	SOUTHEASTERN	818 BROADWAY

https://data.baltimorecity.gov/Community/Restaurants/k5ry-ef3g

Getting the data from the web

```
if(!file.exists("./data")){dir.create("./data")}
fileUrl <- "https://data.baltimorecity.gov/api/views/k5ry-e
download.file(fileUrl,destfile="./data/restaurants.csv",met
restData <- read.csv("./data/restaurants.csv")
```

Creating sequences

Sometimes you need an index for your data set

```
s1 <- seq(1,10,by=2) ; s1
```

```
## [1] 1 3 5 7 9
```

```
s2 <- seq(1,10,length=3); s2
```

```
## [1]  1.0  5.5 10.0
```

```
x <- c(1,3,8,25,100); seq(along = x)
```

```
## [1] 1 2 3 4 5
```

Subsetting variables

```
restDataa$nearMe = restData$neighborhood %in% c("Roland Park
table(restData$nearMe)
```

```
##
## FALSE  TRUE
##  1314    13
```

Creating binary variables

```r
restData$zipWrong = ifelse(restData$zipCode < 0, TRUE, FALS
table(restData$zipWrong,restData$zipCode < 0)
```

```
##
##          FALSE TRUE
##   FALSE   1326    0
##   TRUE       0    1
```

Creating categorical variables

```
restData$zipGroups = cut(restData$zipCode,breaks=quantile(r
table(restData$zipGroups)
```

```
## 
## (-2.123e+04,2.12e+04]  (2.12e+04,2.122e+04] (2.122e+04,2
##                   337                   375
## (2.123e+04,2.129e+04]
##                   332
```

```
table(restData$zipGroups,restData$zipCode)
```

```
## 
##                          -21226 21201 21202 21205 21206 2
##   (-2.123e+04,2.12e+04]       0   136   201     0     0
##   (2.12e+04,2.122e+04]        0     0     0    27    30
##   (2.122e+04,2.123e+04]       0     0     0     0     0
##   (2.123e+04,2.129e+04]       0     0     0     0     0
## 
```

Easier cutting

```
library(Hmisc)
```

```
## Loading required package: lattice

## Loading required package: survival

## Loading required package: Formula

## Loading required package: ggplot2

##
## Attaching package: 'Hmisc'

## The following objects are masked from 'package:base':
##
##     format.pval, round.POSIXt, trunc.POSIXt, units
```

```
restData$zipGroups = cut2(restData$zipCode,g=4)
table(restData$zipGroups)
```

Creating factor variables

```
restDataSzcf <- factor(restData$zipCode)
restData$zcf[1:10]
```

```
##  [1] 21206 21231 21224 21211 21223 21218 21205 21211 212
## 32 Levels: -21226 21201 21202 21205 21206 21207 21208 21
```

```
class(restData$zcf)
```

```
## [1] "factor"
```

Levels of factor variables

```r
yesno <- sample(c("yes","no"),size=10,replace=TRUE)
yesnofac = factor(yesno,levels=c("yes","no"))
relevel(yesnofac,ref="no")
```

```
##  [1] yes no  yes yes no  yes no  yes no  yes
## Levels: no yes
```

```r
as.numeric(yesnofac)
```

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

Cutting produces factor variables

```
library(Hmisc)
restData$zipGroups = cut2(restData$zipCode,g=4)
table(restData$zipGroups)
```

```
##
## [-21226,21205) [ 21205,21220) [ 21220,21227) [ 21227,212
##            338            375            300
```

Using the mutate function

```r
library(Hmisc); library(plyr)
```

```
##
## Attaching package: 'plyr'

## The following objects are masked from 'package:Hmisc':
##
##     is.discrete, summarize
```

```r
restData2 = mutate(restData,zipGroups=cut2(zipCode,g=4))
table(restData2$zipGroups)
```

```
##
## [-21226,21205) [ 21205,21220) [ 21220,21227) [ 21227,212
##            338            375            300
```

Common transforms

- `abs(x)` absolute value
- `sqrt(x)` square root
- `ceiling(x)` ceiling(3.475) is 4
- `floor(x)` floor(3.475) is 3
- `round(x,digits=n)` round(3.475,digits=2) is 3.48
- `signif(x,digits=n)` signif(3.475,digits=2) is 3.5
- `cos(x)`, `sin(x)` etc.
- `log(x)` natural logarithm
- `log2(x)`, `log10(x)` other common logs
- `exp(x)` exponentiating x

`http://www.biostat.jhsph.edu/~ajaffe/lec_winterR/Lecture%202.pdf`
`http://statmethods.net/management/functions.html`

Notes and further reading

- A tutorial from the developer of plyr - `http://plyr.had.co.nz/09-user/`
- Andrew Jaffe's R notes `http://www.biostat.jhsph.edu/~ajaffe/lec_winterR/Lecture%202.pdf`
- A nice lecture on categorical and factor variables `http://www.stat.berkeley.edu/classes/s133/factors.html`