Summarizing data

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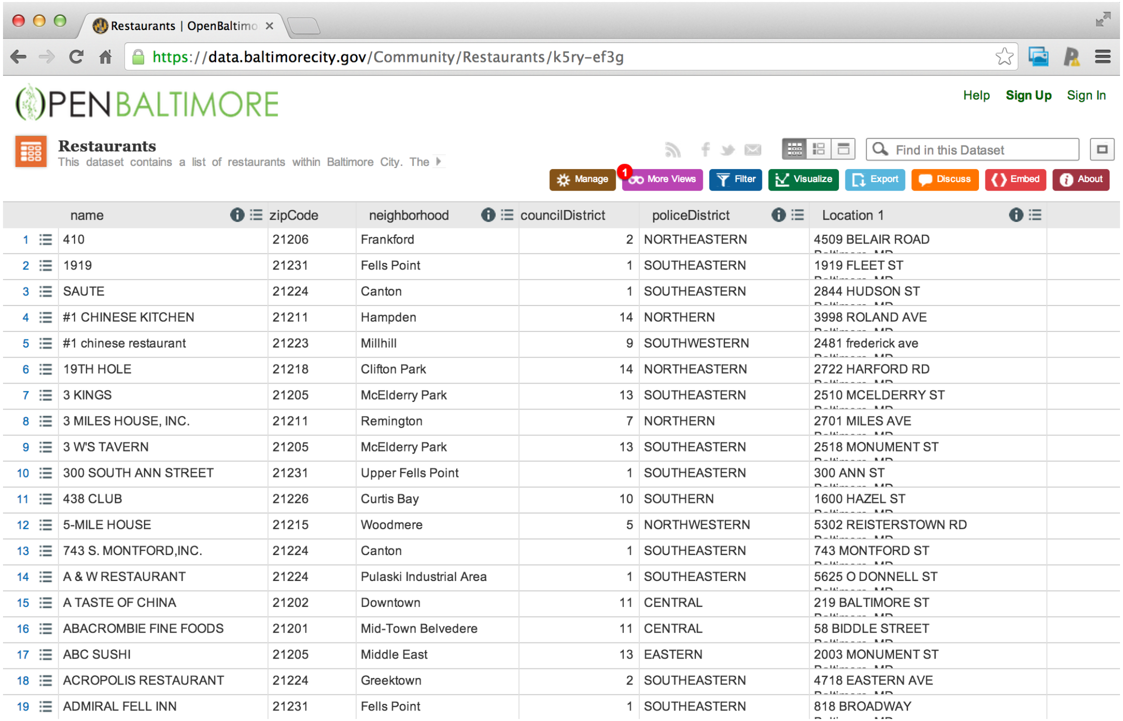
Example data set



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

```r
if(!file.exists("./data")){dir.create("./data")}
fileUrl <- "https://data.baltimorecity.gov/api/views/k5ry-ef3g/rows.csv?accessType=DOWNLOAD"
download.file(fileUrl,destfile="./data/restaurants.csv",method="curl")
restData <- read.csv("./data/restaurants.csv")
```

Look at a bit of the data

```
head(restData,n=3)
```

```
   name zipCode neighborhood councilDistrict policeDistrict                        Location.1
1   410   21206    Frankford               2   NORTHEASTERN 4509 BELAIR ROAD\nBaltimore, MD\n
2  1919   21231  Fells Point               1   SOUTHEASTERN    1919 FLEET ST\nBaltimore, MD\n
3 SAUTE   21224       Canton               1   SOUTHEASTERN   2844 HUDSON ST\nBaltimore, MD\n
```

```
tail(restData,n=3)
```

```
                 name zipCode  neighborhood councilDistrict policeDistrict
1325 ZINK'S CAF\u0090   21213 Belair-Edison              13   NORTHEASTERN
1326     ZISSIMOS BAR   21211       Hampden               7       NORTHERN
1327           ZORBAS   21224     Greektown               2   SOUTHEASTERN
                             Location.1
1325 3300 LAWNVIEW AVE\nBaltimore, MD\n
1326      1023 36TH ST\nBaltimore, MD\n
1327  4710 EASTERN Ave\nBaltimore, MD\n
```

Make summary

```
summary(restData)
```

```
                           name         zipCode             neighborhood councilDistrict
 MCDONALD'S                  :   8   Min.   :-21226   Downtown    :128   Min.   : 1.00
 POPEYES FAMOUS FRIED CHICKEN:   7   1st Qu.: 21202   Fells Point : 91   1st Qu.: 2.00
 SUBWAY                      :   6   Median : 21218   Inner Harbor: 89   Median : 9.00
 KENTUCKY FRIED CHICKEN      :   5   Mean   : 21185   Canton      : 81   Mean   : 7.19
 BURGER KING                 :   4   3rd Qu.: 21226   Federal Hill: 42   3rd Qu.:11.00
 DUNKIN DONUTS               :   4   Max.   : 21287   Mount Vernon: 33   Max.   :14.00
 (Other)                     :1293                    (Other)     :863
      policeDistrict                        Location.1
 SOUTHEASTERN:385    1101 RUSSELL ST\nBaltimore, MD\n:   9
 CENTRAL     :288    201 PRATT ST\nBaltimore, MD\n   :   8
 SOUTHERN    :213    2400 BOSTON ST\nBaltimore, MD\n :   8
 NORTHERN    :157    300 LIGHT ST\nBaltimore, MD\n   :   5
 NORTHEASTERN: 72    300 CHARLES ST\nBaltimore, MD\n :   4
 EASTERN     : 67    301 LIGHT ST\nBaltimore, MD\n   :   4
 (Other)     :145    (Other)                         :1289
```

Mpre in depth information

```
str(restData)
```

```
'data.frame':   1327 obs. of  6 variables:
 $ name           : Factor w/ 1277 levels "#1 CHINESE KITCHEN",..: 9 3 992 1 2 4 5 6 7 8 ...
 $ zipCode        : int  21206 21231 21224 21211 21223 21218 21205 21211 21205 21231 ...
 $ neighborhood   : Factor w/ 173 levels "Abell","Arlington",..: 53 52 18 66 104 33 98 133 98 157 ...
 $ councilDistrict: int  2 1 1 14 9 14 13 7 13 1 ...
 $ policeDistrict : Factor w/ 9 levels "CENTRAL","EASTERN",..: 3 6 6 4 8 3 6 4 6 6 ...
 $ Location.1     : Factor w/ 1210 levels "1 BIDDLE ST\nBaltimore, MD\n",..: 835 334 554 755 492 537 5
```

Quantiles of quantitative variables

```
quantile(restData$councilDistrict,na.rm=TRUE)
```

```
  0%  25%  50%  75% 100% 
   1    2    9   11   14 
```

```
quantile(restData$councilDistrict,probs=c(0.5,0.75,0.9))
```

```
50% 75% 90% 
  9  11  12 
```

Make table

```
table(restData$zipCode,useNA="ifany")
```

```

-21226  21201  21202  21205  21206  21207  21208  21209  21210  21211  21212  21213  21214  21215
     1    136    201     27     30      4      1      8     23     41     28     31     17     54
 21216  21217  21218  21220  21222  21223  21224  21225  21226  21227  21229  21230  21231  21234
    10     32     69      1      7     56    199     19     18      4     13    156    127      7
 21237  21239  21251  21287
     1      3      2      1
```

Make table

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

```
    -21226 21201 21202 21205 21206 21207 21208 21209 21210 21211 21212 21213 21214 21215 21216
  1      0     0    37     0     0     0     0     0     0     0     0     2     0     0     0
  2      0     0     0     3    27     0     0     0     0     0     0     0     0     0     0
  3      0     0     0     0     0     0     0     0     0     0     0     2    17     0     0
  4      0     0     0     0     0     0     0     0     0     0    27     0     0     0     0
  5      0     0     0     0     0     3     0     6     0     0     0     0     0    31     0
  6      0     0     0     0     0     0     0     1    19     0     0     0     0    15     1
  7      0     0     0     0     0     0     0     1     0    27     0     0     0     6     7
  8      0     0     0     0     0     1     0     0     0     0     0     0     0     0     0
  9      0     1     0     0     0     0     0     0     0     0     0     0     0     0     2
  10     1     0     1     0     0     0     0     0     0     0     0     0     0     0     0
  11     0   115   139     0     0     0     1     0     0     0     1     0     0     0     0
  12     0    20    24     4     0     0     0     0     0     0     0    13     0     0     0
  13     0     0     0    20     3     0     0     0     0     0     0    13     0     1     0
  14     0     0     0     0     0     0     0     0     4    14     0     1     0     1     0

    21217 21218 21220 21222 21223 21224 21225 21226 21227 21229 21230 21231 21234 21237 21239
```

Check for missing values

```
sum(is.na(restData$councilDistrict))
```

```
[1] 0
```

```
any(is.na(restData$councilDistrict))
```

```
[1] FALSE
```

```
all(restData$zipCode > 0)
```

```
[1] FALSE
```

Row and column sums

```
colSums(is.na(restData))
```

```
           name         zipCode    neighborhood councilDistrict  policeDistrict      Location.1 
              0               0               0               0               0               0 
```

```
all(colSums(is.na(restData))==0)
```

```
[1] TRUE
```

Values with specific characteristics

```r
table(restData$zipCode %in% c("21212"))
```

```

FALSE  TRUE 
 1299    28 
```

```r
table(restData$zipCode %in% c("21212","21213"))
```

```

FALSE  TRUE 
 1268    59 
```

Values with specific characteristics

```
restData[restData$zipCode %in% c("21212","21213"),]
```

```
                                     name zipCode                neighborhood councilDistrict
29                      BAY ATLANTIC CLUB   21212                    Downtown              11
39                            BERMUDA BAR   21213               Broadway East              12
92                              ATWATER'S   21212   Chinquapin Park-Belvedere               4
111            BALTIMORE ESTONIAN SOCIETY   21213          South Clifton Park              12
187                              CAFE ZEN   21212                    Rosebank               4
220                   CERIELLO FINE FOODS   21212   Chinquapin Park-Belvedere               4
266    CLIFTON PARK GOLF COURSE SNACK BAR   21213                 Darley Park              14
276                CLUB HOUSE BAR & GRILL   21213 Orangeville Industrial Area              13
289                 CLUBHOUSE BAR & GRILL   21213 Orangeville Industrial Area              13
291                           COCKY LOU'S   21213               Broadway East              12
362       DREAM TAVERN, CARRIBEAN  U.S.A.   21213               Broadway East              13
373                         DUNKIN DONUTS   21212                    Homeland               4
383        EASTSIDE  SPORTS  SOCIAL  CLUB   21213               Broadway East              13
417                      FIELDS OLD TRAIL   21212                  Mid-Govans               4
475                             GRAND CRU   21212   Chinquapin Park-Belvedere               4
545                           RANDY'S BAR   21213               Broadway East              12
604     MURPHY'S NEIGHBORHOOD BAR & GRILL   21212                  Mid-Govans               4
```

Cross tabs

```
data(UCBAdmissions)
DF = as.data.frame(UCBAdmissions)
summary(DF)
```

```
      Admit       Gender   Dept       Freq    
 Admitted:12   Male  :12   A:4   Min.   :  8  
 Rejected:12   Female:12   B:4   1st Qu.: 80  
                           C:4   Median :170  
                           D:4   Mean   :189  
                           E:4   3rd Qu.:302  
                           F:4   Max.   :512  
```

Cross tabs

```
xt <- xtabs(Freq ~ Gender + Admit,data=DF)
xt
```

```
        Admit
Gender   Admitted Rejected
  Male       1198     1493
  Female      557     1278
```

Flat tables

```
warpbreaks$replicate <- rep(1:9, len = 54)
xt = xtabs(breaks ~.,data=warpbreaks)
xt
```

```
, , replicate = 1

    tension
wool  L  M  H
   A 26 18 36
   B 27 42 20

, , replicate = 2

    tension
wool  L  M  H
   A 30 21 21
   B 14 26 21

, , replicate = 3
```

Flat tables

```
ftable(xt)
```

```
             replicate  1  2  3  4  5  6  7  8  9
wool tension                                     
A    L                 26 30 54 25 70 52 51 26 67
     M                 18 21 29 17 12 18 35 30 36
     H                 36 21 24 18 10 43 28 15 26
B    L                 27 14 29 19 29 31 41 20 44
     M                 42 26 19 16 39 28 21 39 29
     H                 20 21 24 17 13 15 15 16 28
```

Size of a data set

```
fakeData = rnorm(1e5)
object.size(fakeData)
```

```
800040 bytes
```

```
print(object.size(fakeData),units="Mb")
```

```
0.8 Mb
```