Summarizing data

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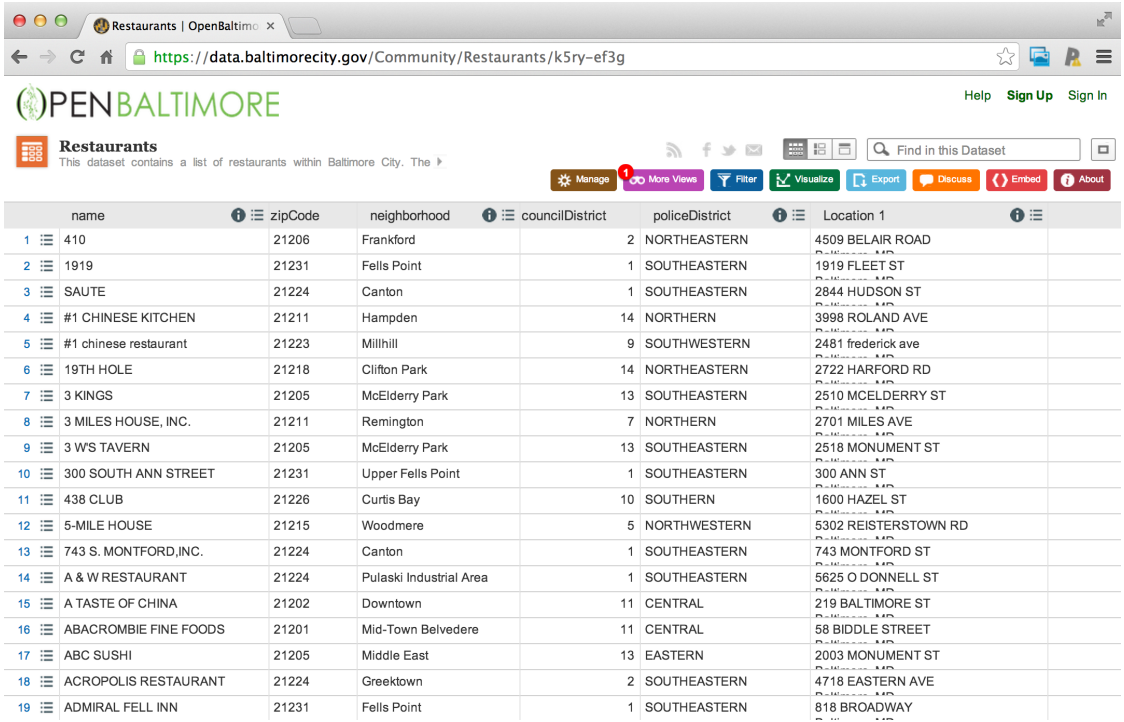
Example data set



	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-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

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

```
FALSE  TRUE
 1299    28
```

```
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
```