

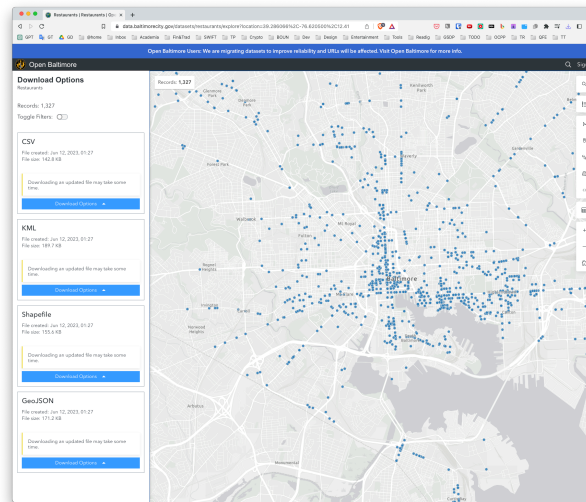
Summarizing Data

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1 Summarizing Data

1.1 Example data set



1.2 Getting the data from the web

```
if(!file.exists("data")) {  
  dir.create("data")  
}
```


[illegible]

1.4 Make summary

```
summary(rest)
```

##	X	Y	fid	gis_id
##	Min. :-8539412	Min. :4750389	Min. : 1.0	Length:1327
##	1st Qu.: -8529242	1st Qu.:4762318	1st Qu.: 332.5	Class :character
##	Median :-8528158	Median :4763186	Median : 664.0	Mode :character
##	Mean :-8527823	Mean :4764332	Mean : 664.0	
##	3rd Qu.: -8525719	3rd Qu.:4766022	3rd Qu.: 995.5	
##	Max. :-8519297	Max. :4775096	Max. :1327.0	
##	srcid_t	srcid_i	edit_date	fctype subtype
##	Mode:logical	Min. :0	Length:1327	Min. :27 Mode:logical
##	NA's:1327	1st Qu.:0	Class :character	1st Qu.:27 NA's:1327
##		Median :0	Mode :character	Median :27
##		Mean :0		Mean :27
##		3rd Qu.:0		3rd Qu.:27
##		Max. :0		Max. :27
##	loc_type	loc_meth	street_tag	prcl_pin
##	Length:1327	Length:1327	Min. :9.3e+14	Length:1327
##	Class :character	Class :character	1st Qu.:9.3e+14	Class :character
##	Mode :character	Mode :character	Median :9.3e+14	Mode :character
##			Mean :9.3e+14	
##			3rd Qu.:9.3e+14	
##			Max. :9.3e+14	
##	address	city	state	zipcode
##	Length:1327	Length:1327	Length:1327	Length:1327
##	Class :character	Class :character	Class :character	Class :character
##	Mode :character	Mode :character	Mode :character	Mode :character
##				
##				
##				
##	x_coord	y_coord	name	alias1
##	Min. :1394157	Min. :558801	Length:1327	Mode:logical
##	1st Qu.:1420033	1st Qu.:588972	Class :character	NA's:1327
##	Median :1422781	Median :591169	Mode :character	
##	Mean :1423632	Mean :594064		
##	3rd Qu.:1429019	3rd Qu.:598304		
##	Max. :1445374	Max. :621387		
##	nghbrhd	cncldst	stfid_blk	plcdst_no
##	Length:1327	Min. : 1.000	Min. :2.451e+13	Min. :1.000

```
## Class :character 1st Qu.: 2.000 1st Qu.:2.451e+13 1st Qu.:2.000
## Mode :character Median : 9.000 Median :2.451e+14 Median :2.000
## Mean : 7.191 Mean :1.671e+14 Mean :3.969
## 3rd Qu.:11.000 3rd Qu.:2.451e+14 3rd Qu.:6.000
## Max. :14.000 Max. :2.451e+14 Max. :9.000
## plcdst usng cntct_nme cntct_phn
## Length:1327 Length:1327 Mode:logical Mode:logical
## Class :character Class :character NA's:1327 NA's:1327
## Mode :character Mode :character
##
##
## cntct_dpt globalid url
## Mode:logical Length:1327 Mode:logical
## NA's:1327 Class :character NA's:1327
## Mode :character
##
##
##
```

1.5 More in depth information

```
str(rest)
```

```
## 'data.frame': 1327 obs. of 32 variables:
## $ X : num -8522867 -8525894 -8524408 -8530754 -8533281 ...
## $ Y : num 4769142 4762539 4762175 4770074 4762363 ...
## $ fid : int 1 2 3 4 5 6 7 8 9 10 ...
## $ gis_id : chr "27_1" "27_2" "27_3" "27_4" ...
## $ srcid_t : logi NA NA NA NA NA NA ...
## $ srcid_i : int 0 0 0 0 0 0 0 0 0 0 ...
## $ edit_date : chr "2008/06/22 00:00:00+00" "2008/06/22 00:00:00+00" "2008/06/22 00:00:00+00" "2008/06/22 00:00:00+00" ...
## $ ftype : int 27 27 27 27 27 27 27 27 27 27 ...
## $ subtype : logi NA NA NA NA NA NA ...
## $ loc_type : chr "ST" "ST" "ST" "ST" ...
## $ loc_meth : chr "GC_300" "GC_300" "GC_300" "GC_300" ...
## $ street_tag: num 9.3e+14 9.3e+14 9.3e+14 9.3e+14 9.3e+14 ...
## $ prcl_pin : chr "5936A004" "1830009" "1878005" "3563006" ...
## $ address : chr "4509 BELAIR ROAD" "1919 FLEET ST" "2844 HUDSON ST" "3998 ROLAND AVE" ...
## $ city : chr "Baltimore" "Baltimore" "Baltimore" "Baltimore" ...
## $ state : chr "MD" "MD" "MD" "MD" ...
## $ zipcode : chr "21206" "21231" "21224" "21211" ...
## $ x_coord : num 1436170 1428555 1432338 1416120 1409774 ...
## $ y_coord : num 606299 589546 588642 608569 589022 ...
## $ name : chr "410" "1919" "SAUTE" "#1 CHINESE KITCHEN" ...
## $ alias1 : logi NA NA NA NA NA NA ...
## $ nghbrhd : chr "Frankford" "Fells Point" "Canton" "Hampden" ...
## $ cncldst : int 2 1 1 14 9 14 13 7 13 1 ...
## $ stfid_blk : num 2.45e+14 2.45e+13 2.45e+13 2.45e+14 2.45e+14 ...
## $ plcdst_no : int 4 2 2 5 8 4 2 5 2 2 ...
## $ plcdst : chr "NORTHEASTERN" "SOUTHEASTERN" "SOUTHEASTERN" "NORTHERN" ...
## $ usng : chr "18S UJ 65353 54630" "18S UJ 62920 49577" "18S UJ 64067 49276" "18S UJ 59260 554" ...
## $ cntct_nme : logi NA NA NA NA NA NA ...
## $ cntct_phn : logi NA NA NA NA NA NA ...
```

```
## $ cntct_dpt : logi NA NA NA NA NA NA ...
## $ globalid  : chr  "{B539CABF-622F-4C6E-9AE2-5C648EBBA530}" "{319B2500-6082-4DD9-A866-66308527E3B2}"
## $ url       : logi NA NA NA NA NA NA ...
```

1.6 Quantiles of quantitative variables

```
quantile(rest$cncldst, na.rm = TRUE)
```

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

```
quantile(rest$cncldst, na.rm = TRUE, probs = c(0.5,0.75,0.9))
```

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

1.7 Make table

```
table(rest$zipcode, useNA = "ifany")
```

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

The function `table()` in R is used to create a contingency table (a type of frequency table) from the input data. Here, the `table()` function is being used on the `zipcode` variable in the `rest` dataset.

The `useNA` argument determines how NA values (missing values) in the input are handled:

- If `useNA = "no"` (the default), then NA values are not included in the table.
- If `useNA = "ifany"`, then NA values are included in the table if there are any in the input data.
- If `useNA = "always"`, then NA is always included in the table, even if there are no NA values in the input data.

So, `table(rest$zipcode, useNA = "ifany")` is creating a frequency table of the `zipcode` variable in the `rest` dataset and including a count of NA values if there are any.

```
table(rest$cncldst, rest$zipcode)
```

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

```
## 13 0 0 20 3 0 0 0 0 0 0 13 0
## 14 0 0 0 0 0 0 0 0 4 14 0 1 0
##
##      21215 21216 21217 21218 21220 21222 21223 21224 21225 21226 21226- 21227
## 1 0 0 0 0 0 7 0 140 1 0 0 0
## 2 0 0 0 0 0 0 0 54 0 0 0 0
## 3 0 0 0 3 0 0 0 0 0 0 0 0 1
## 4 0 0 0 0 0 0 0 0 0 0 0 0 0
## 5 31 0 0 0 0 0 0 0 0 0 0 0
## 6 15 1 0 0 0 0 0 0 0 0 0 0
## 7 6 7 15 6 0 0 0 0 0 0 0 0
## 8 0 0 0 0 0 0 2 0 0 0 0 0 2
## 9 0 2 8 0 0 0 53 0 0 0 0 0
## 10 0 0 0 0 1 0 0 0 18 18 1 0
## 11 0 0 9 0 0 0 1 0 0 0 0 0
## 12 0 0 0 26 0 0 0 0 0 0 0 0
## 13 1 0 0 0 0 0 0 5 0 0 0 1
## 14 1 0 0 34 0 0 0 0 0 0 0 0
##
##      21229 21230 21231 21234 21237 21239 21251 21287
## 1 0 1 124 0 0 0 0
## 2 0 0 0 0 1 0 0 0
## 3 0 0 0 7 0 0 2 0
## 4 0 0 0 0 0 3 0 0
## 5 0 0 0 0 0 0 0 0
## 6 0 0 0 0 0 0 0 0
## 7 0 0 0 0 0 0 0 0
## 8 13 0 0 0 0 0 0
## 9 0 11 0 0 0 0 0
## 10 0 133 0 0 0 0 0
## 11 0 11 0 0 0 0 0
## 12 0 0 2 0 0 0 0
## 13 0 0 1 0 0 0 1
## 14 0 0 0 0 0 0 0
```

In this case, `table(rest$cncldst, rest$zipcode)` is creating a contingency table of the `cncldst` and `zipcode` variables in the `rest` data frame. This table will show how many times each combination of `cncldst` and `zipcode` occur in the data.

Each row in the table represents a level of `cncldst` and each column represents a level of `zipcode`. The value in each cell in the table represents the number of times that combination of `cncldst` and `zipcode` appears in the data frame.

1.8 Check for missing values

```
sum(is.na(rest$cncldst))
```

```
## [1] 0
```

```
any(is.na(rest$cncldst))
```

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

```
all(rest$zipcode > 0)
```

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

```
colSums(is.na(rest))
```

```
table(rest$zipcode %in% c("21212"))
```

X	Y	fid	gis	sic	id	city	state	zip	county	name	alias	gh	ld	st	bl	ht	mcnt	cnt	ctg	tbl
111-	47665127_N_8A0	2002/7/6/A	ST GC9_3407103B	Baltimore	21223	352935	ALTON	ONE	2.45	108	RISSE	NANA	{A41RAAB47-8525206	00:00:00+00	BE-LAIR RD	ES-Clifton Park	UJ	062F-45CD-A089-FE4234620971}		
187-	47738727_N_8A0	2002/7/6/A	ST GC9_35094380B	Baltimore	21223	352935	FARROSE	ONE	2.45	102	RISSE	NANA	{69730AFD-8528303	00:00:00+00	E BELVEDERE AVE	ZEN	UJ	325A-61211-4492-A1EB-241156A3D2D2}		
220-	47723017_N_2A0	2002/7/6/A	ST GC9_3503429B	Baltimore	21227	352935	CLONQUAP	ONE	2.45	102	RISSE	NANA	{FE9FA6BC-8528133	00:00:00+00	E BELVEDERE AVE	FINE Park-FOODS Belvedere	UJ	9F28-61342-4F02-58424-9D78-6DD297286124}		
266-	47626027_N_2A0	2002/7/6/A	ST GC9_34092700B	Baltimore	21238	352935	LENTON	ONE	2.45	108	RISSE	NANA	{N086NACFF-8526026	00:00:00+00	ST. LO DR	PARK Park GOLF COURSE SNACK BAR	UJ	9435-62877-434E-96A8-061BF9279700}		
276-	47627627_N_2A0	2002/7/6/A	ST GC9_34004840B	Baltimore	21235	352935	ORANGEVILLE	ONE	2.45	102	RISSE	NANA	{334CAF FF-8523358	00:00:00+00	ERD-MAN AVE	HOUSE In-dus-& trial GRILL Area	UJ	AD3C-45FF-B220-43CA6EAB7B20}		
289-	47628507_N_2A0	2002/7/6/A	ST GC9_34004840B	Baltimore	21235	352935	ORANGEVILLE	ONE	2.45	102	RISSE	NANA	{3B1NCDF7-8523358	00:00:00+00	ERD-MAN AVE	BAR In-dus-& trial GRILL Area	UJ	149E-40AD-A8F7-8EC1C037F82E}		
291-	47629527_N_2A0	2002/7/6/A	ST GC9_34062105B	Baltimore	21237	352935	COKABROADWAY	ONE	2.45	108	RISSE	NANA	{7CAEF8905-8525812	00:00:00+00	E NORTH AVE	LOU'S East	UJ	9DB9-443E-A8E5-DAE75968BEC1}		
362-	47665227_N_3A0	2002/7/6/A	ST GC9_34062300B	Baltimore	21235	352935	EMMABROADWAY	ONE	2.45	108	RISSE	NANA	{E2779VAD-8525452	00:00:00+00	E LAFAYETTE AVE	TAV- East ERN, CAR-RIBEAN U.S.A.	UJ	E291-4ADC-9393-EECF5391DC1F}		
373-	47728127_N_3A0	2002/7/6/A	ST GC9_35026420B	Baltimore	21225	352935	DUNKIN	ONE	2.45	102	RISSE	NANA	{4D856A84-8528175	00:00:00+00	YORK RD	DONUTS	UJ	DE75-61294-4C46-9FD8-9F5BD05FCD68}		

[illegible]

[illegible]

X	Y	fid	gis	sick	ci	lift	date	publ	det	typ	map	hdp	jms	stat	p	code	name	alias	ghr	hld	slc	chd	usngt	cnt	cntg	tbl	bil
949	47794028	NA07	2002/7/6/AST	GC9_36043023	BalMHP	r2142278	BEFENAS	Seba	2.4510270	PSENANANA	{26EAC99-8528179}	00:00:00+00	YORK RD	EN-TER-PRISES	UJ	61308	DAD0-4DAD-A04A-517CC8BD8A3B}										
957	4768527	NA6	2002/7/6/AST	GC9_36013539	BalMHP	r2143393	BHANATOMB	S	2.4510800	PSENANASTNEH	{SCAA579F-8523759}	00:00:00+00	BE-LAIR RD	BAR AND GRILL	Edison UJ	64650	5CE3-4C65-90D6-082E4D9FB70A}										
976	47794027	NA0	2002/7/6/AST	GC9_36043500	BalMHP	r2142277	FEAWS	Sto	2.4510270	PSENANANA	{3B1CFA60-8528150}	00:00:00+00	YORK RD	FA-MOUS FRIED CHICKEN	Govans UJ	61300	29FA-4E18-8D11-0EE6B6A1B15D}										
994	47669527	NA0	2002/7/6/AST	GC9_36047205	BalMHP	r2142593	CTPABIS	Sadway	2.4510800	PSENANANA	{6E1EAF33-8525568}	00:00:00+00	E NORTH AVE	NEST East	UJ	63227	41B7-B109-FAF1FE0C7DB0}										
1017	4765827	NA07	2002/7/6/AST	GC9_36047850	BalMHP	r2142593	CTNLAB	Sadway	2.4510800	PSENANANA	{ED3CD15D-8526272}	00:00:00+00	RUT-LAND AVE	BAR East	UJ	62673	4189-BDBE-5B702AD8E963}										
1018	47789028	NA08	2002/7/6/AST	GC9_36043400	BalMHP	r2142298	BYGANS	Chinquapi	2.4510270	PSENANANA	{4B85BA78-8528033}	00:00:00+00	E BELVEDERE AVE	DAUGH Park-TER Belvedere	UJ	61420	3738-423D-987E-1BDC37503423}										
1022	47788227	NA02	2002/7/6/AST	GC9_36043850	BalMHP	r2142268	45ga	NAMid4	2.4510270	PSENANANA	{2FC3EA063-8528182}	00:00:00+00	york rd	re-mem-bered restaurant	Govans UJ	61303	A8B3-438A-9CC0-BEBB92E9ADCC}										
1053	4765835	NA63	2002/7/6/AST	GC9_36043400	BalMHP	r2142593	711NLAB	Sadway	2.4510800	PSENANANA	{DBN9AEFD7-8525434}	00:00:00+00	E OLIVER ST	HONEY HOLE	East UJ	63322	3973-4B5D-95BA-FA9B8F4CAC1A}										
1120	4765227	NA00	2002/7/6/AST	GC9_36052400	BalMHP	r2143306	ST ENABEL	J3	2.4510800	PSENANANA	{54C9A81F-8525292}	00:00:00+00	E CHASE ST	CHASE II	Street UJ	63424	D74E-4BB3-8AB3-D564FD6DF726}										
1122	47661227	NA02	2002/7/6/AST	GC9_36040008	BalMHP	r2142570	92CBNAV	Liv	2.4510900	PSENANANA	{7ECB3699-8526999}	00:00:00+00	E NORTH AVE		UJ	62118	39F6-4722-9330-9C1BAAA9B99B}										

X	Y	fid	gis	sic	citi	lift	pub	oc	st	pr	th	h	is	stat	p	co	o	ne	lia	sh	ho	ld	bl	ch	d	no	gnt	ct	ch	gl	bl	id			
1153	4778127	B127_NA63	2008/7/06/A9T	GC9_360937	A7DB5	MIDr21	222626	AM	NMid4	2.45	10270	PSSNANANA	{A68FA724-8528179	00:00:00+00		YORK RD	TAM Govans									UJ	19DB-61299	4CDD-57996					NA{A68FA724-8528179}		
1155	4778158	B127_NA65	2008/7/06/A9T	GC9_360937	A7DB5	MIDr21	222626	AM	NMid4	2.45	10270	PSSNANANA	{6E6FA694-8528158	00:00:00+00		E BELVEDERE AVE	Govans									UJ	213B-61323	4D28-58423					NA{6E6FA694-8528158}		
1159	4765438	B127_NA69	2008/7/06/A9T	GC9_360937	A7DB5	MIDr21	222626	AM	NORs	2.45	10270	PSSNANANA	{4350BA130-8524358	00:00:00+00		N PO-TOMAC ST	EAST									UJ	094F-64150	4723-51813					NA{4350BA130-8524358}		
1186	4765892	B127_NA66	2008/7/06/A9T	GC9_360937	A7DB5	MIDr21	222626	AM	NBroadway	2.45	10270	PSSNANANA	{F350CA01-8525892	00:00:00+00		E FED-ERAL ST	EDGE East BAR & LOUNGE									UJ	BAD4-62969	40E7-52245					NA{F350CA01-8525892}		
1187	4765892	B127_NA67	2008/7/06/A9T	GC9_360937	A7DB5	MIDr21	222626	AM	NBroadway	2.45	10270	PSSNANANA	{C82FA6DE-8525892	00:00:00+00		E FED-ERAL ST	EDGE East BAR & LOUNGE									UJ	3521-62969	43C8-52245					NA{C82FA6DE-8525892}		
1198	4778179	B127_NA98	2008/7/06/A9T	GC9_360937	A7DB5	MIDr21	222626	AM	NRoseba	2.45	10270	PSSNANANA	{3F0FA6B2-8528179	00:00:00+00		YORK RD	HOL-LOW BAR & GRILL									UJ	3C0F-61308	412B-58478					NA{3F0FA6B2-8528179}		
1209	4765780	B127_NA09	2008/7/06/A9T	GC9_360937	A7DB5	MIDr21	222626	AM	NBroadway	2.45	10270	PSSNANANA	{1565AF0-8525780	00:00:00+00		N CHESTER ST	NEW East BUCK-ETT'S LOUNGE									UJ	410F-63053	4BC8-52085					NA{1565AF0-8525780}		
1232	4768380	B127_NA02	2008/7/06/A9T	GC9_360937	A7DB5	MIDr21	222626	AM	NBelair	2.45	10270	PSSNANANA	{B85FA846-8523800	00:00:00+00		be-lair RD	ACE'S Edison									UJ	18D1-64618	4CE3-53896					NA{B85FA846-8523800}		
1246	4765248	B127_NA06	2008/7/06/A9T	GC9_360937	A7DB5	MIDr21	222626	AM	NMain's	2.45	10270	PSSNANANA	{AD94AF021-8526428	00:00:00+00		ELLSWORTH ST	HIDE- East A-WAY									UJ	DACE-62548	4BA2-51938					NA{AD94AF021-8526428}		

X	Y	fid	gis	sic	id	lift	date	log	city	strength	height	dist	status	zip	code	longitude	latitude	alias	gho	ld	stplc	blt	cont	ent	ctng	tbl	hid
1259	47627027_NA069	8526989	2008/06/27	AST GC9_36043830B	Baltimore	2122576125	7025	NALittle	Italy	UJ	DE92-62075	48E5-49773	9853-70BD	C8437DC9}													

1.11 Cross tabs

```
data("UCBAdmissions")
DF <- as.data.frame(UCBAdmissions)
summary(DF)
```

```
##      Admit      Gender Dept      Freq
## Admitted:12  Male :12  A:4  Min.   : 8.0
## Rejected:12  Female:12 B:4  1st Qu.: 80.0
##                                     C:4  Median :170.0
##                                     D:4  Mean   :188.6
##                                     E:4  3rd Qu.:302.5
##                                     F:4  Max.   :512.0
```

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

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

1.12 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
##
##      tension
## wool  L  M  H
##   A 54 29 24
##   B 29 19 24
##
## , , replicate = 4
##
##      tension
## wool  L  M  H
##   A 25 17 18
##   B 19 16 17
```

```
##
## , , replicate = 5
##
##      tension
## wool  L  M  H
##      A 70 12 10
##      B 29 39 13
##
## , , replicate = 6
##
##      tension
## wool  L  M  H
##      A 52 18 43
##      B 31 28 15
##
## , , replicate = 7
##
##      tension
## wool  L  M  H
##      A 51 35 28
##      B 41 21 15
##
## , , replicate = 8
##
##      tension
## wool  L  M  H
##      A 26 30 15
##      B 20 39 16
##
## , , replicate = 9
##
##      tension
## wool  L  M  H
##      A 67 36 26
##      B 44 29 28
```

```
fable(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
```

1.13 Size of a data set

```
fakeData <- rnorm(1e5)
object.size(fakeData)
```

```
## 800048 bytes
```

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

```
## 0.8 Mb
```