Reshaping data

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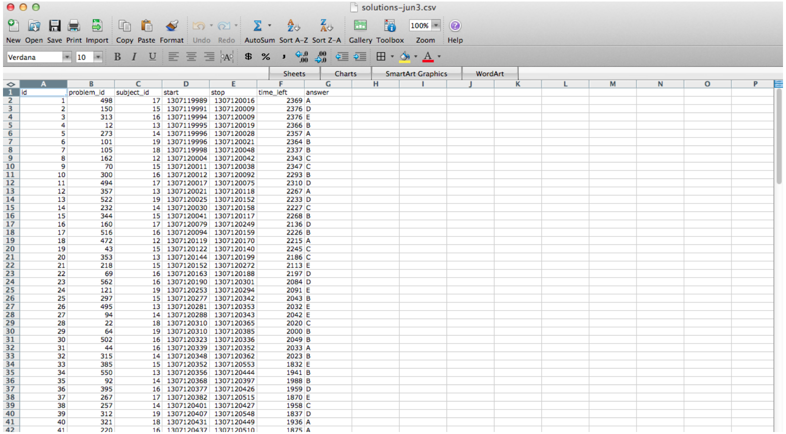
The goal is tidy data



id	problem_id	subject_id	start	stop	time_left	answer
1	498	17	1307119989	1307120016	2369	A
2	150	15	1307119991	1307120009	2376	D
3	313	16	1307119994	1307120009	2376	E
4	12	13	1307119995	1307120019	2366	B
5	273	14	1307119996	1307120028	2357	A
6	101	19	1307119996	1307120021	2364	B
7	105	18	1307119998	1307120048	2337	B
8	162	12	1307120004	1307120042	2343	C
9	70	15	1307120011	1307120038	2347	C
10	300	16	1307120012	1307120092	2293	B
11	494	17	1307120017	1307120075	2310	D
12	357	13	1307120021	1307120118	2267	A
13	522	19	1307120025	1307120152	2233	D
14	232	14	1307120030	1307120158	2227	C
15	344	15	1307120041	1307120117	2268	B
16	160	17	1307120079	1307120249	2136	D
17	516	16	1307120094	1307120159	2226	B
18	472	12	1307120119	1307120170	2215	A
19	43	15	1307120122	1307120140	2245	C
20	353	13	1307120144	1307120199	2186	C
21	218	15	1307120152	1307120272	2113	E
22	69	16	1307120163	1307120188	2197	D
23	562	16	1307120190	1307120301	2084	D
24	121	19	1307120253	1307120294	2091	E
25	297	15	1307120277	1307120342	2043	B
26	495	13	1307120281	1307120353	2032	E
27	94	14	1307120288	1307120343	2042	E
28	22	18	1307120310	1307120365	2020	C
29	64	19	1307120310	1307120385	2000	B
30	502	16	1307120323	1307120336	2049	B
31	44	16	1307120339	1307120352	2033	A
32	315	14	1307120348	1307120362	2023	B
33	385	15	1307120352	1307120553	1832	E
34	550	13	1307120356	1307120444	1941	B
35	92	14	1307120368	1307120397	1988	B
36	395	16	1307120377	1307120426	1959	D
37	267	17	1307120382	1307120515	1870	E
38	257	14	1307120401	1307120427	1958	C
39	312	19	1307120407	1307120548	1837	D
40	321	18	1307120431	1307120449	1936	A
41	220	16	1307120437	1307120510	1875	A

1. Each variable forms a column
2. Each observation forms a row
3. Each table/file stores data about one kind of observation (e.g. people/hospitals).

http://vita.had.co.nz/papers/tidy-data.pdf

Leek, Taub, and Pineda 2011 PLoS One

Start with reshaping

```
library(reshape2)
head(mtcars)
```

```
                   mpg cyl disp  hp drat    wt  qsec vs am gear carb
Mazda RX4         21.0   6  160 110 3.90 2.620 16.46  0  1    4    4
Mazda RX4 Wag     21.0   6  160 110 3.90 2.875 17.02  0  1    4    4
Datsun 710        22.8   4  108  93 3.85 2.320 18.61  1  1    4    1
Hornet 4 Drive    21.4   6  258 110 3.08 3.215 19.44  1  0    3    1
Hornet Sportabout 18.7   8  360 175 3.15 3.440 17.02  0  0    3    2
Valiant           18.1   6  225 105 2.76 3.460 20.22  1  0    3    1
```

Melting data frames

```
mtcars$carname <- rownames(mtcars)
carMelt <- melt(mtcars,id=c("carname","gear","cyl"),measure.vars=c("mpg","hp"))
head(carMelt,n=3)
```

```
        carname gear cyl variable value
1     Mazda RX4    4   6      mpg  21.0
2 Mazda RX4 Wag    4   6      mpg  21.0
3    Datsun 710    4   4      mpg  22.8
```

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

```
         carname gear cyl variable value
62  Ferrari Dino    5   6       hp   175
63 Maserati Bora    5   8       hp   335
64    Volvo 142E    4   4       hp   109
```

http://www.statmethods.net/management/reshape.html

Casting data frames

```
cylData <- dcast(carMelt, cyl ~ variable)
cylData
```

```
  cyl mpg hp
1   4  11 11
2   6   7  7
3   8  14 14
```

```
cylData <- dcast(carMelt, cyl ~ variable,mean)
cylData
```

```
  cyl   mpg     hp
1   4 26.66  82.64
2   6 19.74 122.29
3   8 15.10 209.21
```

http://www.statmethods.net/management/reshape.html

Averaging values

```
head(InsectSprays)
```

```
  count spray
1    10     A
2     7     A
3    20     A
4    14     A
5    14     A
6    12     A
```

```
tapply(InsectSprays$count,InsectSprays$spray,sum)
```

```
  A   B   C   D   E   F
174 184  25  59  42 200
```

http://www.r-bloggers.com/a-quick-primer-on-split-apply-combine-problems/

Another way - split

```
spIns =  split(InsectSprays$count,InsectSprays$spray)
spIns
```

```
$A
 [1] 10  7 20 14 14 12 10 23 17 20 14 13

$B
 [1] 11 17 21 11 16 14 17 17 19 21  7 13

$C
 [1] 0 1 7 2 3 1 2 1 3 0 1 4

$D
 [1]  3  5 12  6  4  3  5  5  5  5  2  4

$E
 [1] 3 5 3 5 3 6 1 1 3 2 6 4

$F
 [1] 11  9 15 22 15 16 13 10 26 26 24 13
```

Another way - apply

```
sprCount = lapply(spIns,sum)
sprCount
```

```
$A
[1] 174

$B
[1] 184

$C
[1] 25

$D
[1] 59

$E
[1] 42

$F
[1] 200
```

Another way - combine

```
unlist(sprCount)
```

```
  A   B   C   D   E   F
174 184  25  59  42 200
```

```
sapply(spIns,sum)
```

```
  A   B   C   D   E   F
174 184  25  59  42 200
```

Another way - plyr package

```
ddply(InsectSprays,.(spray),summarize,sum=sum(count))
```

```
  spray sum
1     A 174
2     B 184
3     C  25
4     D  59
5     E  42
6     F 200
```

Creating a new variable

```
spraySums <- ddply(InsectSprays,.(spray),summarize,sum=ave(count,FUN=sum))
dim(spraySums)
```

```
[1] 72  2
```

```
head(spraySums)
```

```
  spray sum
1     A 174
2     A 174
3     A 174
4     A 174
5     A 174
6     A 174
```

More information

- A tutorial from the developer of plyr - http://plyr.had.co.nz/09-user/
- A nice reshape tutorial http://www.slideshare.net/jeffreybreen/reshaping-data-in-r
- A good plyr primer - http://www.r-bloggers.com/a-quick-primer-on-split-apply-combine-problems/
- See also the functions
    - acast - for casting as multi-dimensional arrays
    - arrange - for faster reordering without using order() commands
    - mutate - adding new variables