Examples of some `uwIntroStats` Functions
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1 Introduction

This document is meant to illustrate the use of some of the major `uwIntroStats` functions. The examples will be shown with R code and output. For more options, see the help files provided with the package. Thus, before starting, load both the packages that `uwIntroStats` relies on:

```
> ## uwIntroStats relies on the Exact, survival,
> ## plyr, and sandwich packages
> library(Exact)
> library(survival)
> library(plyr)
> library(sandwich)
```

Now load the `uwIntroStats` package (if you don't have it installed, go to "emersonstatistics.com/R" and download the appropriate file).

```
> library(uwIntroStats)
```

We will also be working with the `mri` dataset, so prepare that as well:

```
> data(mri)
> attach(mri)
```

The reference manual for the `mri` dataset can be found on "emersonstatistics.com/Datasets".

2 Descriptive Statistics

2.1 `descrip()`

Now that we have our package and dataset loaded, we can delve deeper into the functions. When we first get a dataset, we often want to find some descriptive statistics. The most common are the number of observations a variable has, the number of missing observations, the mean, median, standard deviation, and some others. The default `descrip()` function will give all of this and more to us. Let's say we wanted to get descriptive statistics for `age`:

```
> descrip(age)
```

```
       N     Msng  Mean      Std Dev    Min       25%        Mdn       75%
age:    735    0   74.57     5.451     65.00    71.000000   74.00     78.00
        Max
age:    99.00
```

However, what if we are interested in the whole dataset? We can do this too!

> descrip(mri)

```
            N     Msng  Mean      Std Dev    Min       25%           Mdn
    ptid:    735     0   368.0     212.3      1.000    1.845000e+02   368.0
 mridate:    735     0   76423     31896      10192    6.664200e+04   80992
     age:    735     0   74.57     5.451      65.00    7.100000e+01   74.00
    male:    735     0   0.4980    0.5003     0.0000   0.000000e+00   0.0000
    race:    735     0   1.318     0.6659     1.000    1.000000e+00   1.000
  weight:    735     0   159.9     30.74      74.00    1.385000e+02   158.0
  height:    735     0   165.8     9.710      139.0    1.580000e+02   165.9
 packyrs:    735     1   19.60     27.11      0.0000   0.000000e+00   6.500
 yrsquit:    735     0   9.661     14.10      0.0000   0.000000e+00   0.0000
   alcoh:    735     0   2.109     4.852      0.0000   0.000000e+00  0.01920
 physact:    735     0   1.922     2.052      0.0000   5.537500e-01   1.312
     chf:    735     0  0.05578    0.2297     0.0000   0.000000e+00   0.0000
     chd:    735     0   0.3347    0.6862     0.0000   0.000000e+00   0.0000
  stroke:    735     0   0.2367    0.6207     0.0000   0.000000e+00   0.0000
diabetes:    735     0   0.1075    0.3099     0.0000   0.000000e+00   0.0000
 genhlth:    735     0   2.588     0.9382     1.000    2.000000e+00   3.000
     ldl:    735    10   125.8     33.60      11.00    1.020000e+02   125.0
     alb:    735     2   3.994     0.2690     3.200    3.800000e+00   4.000
     crt:    735     2   1.064     0.3030     0.5000   9.000000e-01   1.000
     plt:    735     7   246.0     65.80      92.00    2.017500e+02   239.0
     sbp:    735     0   131.1     19.66      78.00    1.180000e+02   130.0
     aai:    735     9   1.103     0.1828     0.3171   1.026900e+00   1.112
     fev:    735    10   2.207     0.6875     0.4083   1.745000e+00   2.158
    dsst:    735    12   41.06     12.71      0.0000   3.200000e+01   40.00
 atrophy:    735     0   35.98     12.92      5.000    2.700000e+01   35.00
   whgrd:    735     1   2.007     1.410      0.0000   1.000000e+00   2.000
  numinf:    735     0   0.6109    0.9895     0.0000   0.000000e+00   0.0000
  volinf:    735     1   3.223     17.36      0.0000   0.000000e+00   0.0000
 obstime:    735     0    1804     392.3      68.00    1.837000e+03    1879
   death:    735     0   0.1810    0.3852     0.0000   0.000000e+00   0.0000
            75%       Max
    ptid:    551.5     735.0
 mridate:    91392    1.232e+05
     age:    78.00     99.00
    male:    1.000     1.000
    race:    1.000     4.000
  weight:    179.0     264.0
  height:    173.2     190.5
 packyrs:    33.75     240.0
 yrsquit:    18.50     56.00
   alcoh:    1.144     35.00
 physact:    2.513     13.81
     chf:    0.0000    1.000
     chd:    0.0000    2.000
  stroke:    0.0000    2.000
```

```
diabetes:     0.0000     1.000
 genhlth:     3.000      5.000
     ldl:     147.0      247.0
     alb:     4.200      5.000
     crt:     1.200      4.000
     plt:     285.0      539.0
     sbp:     142.0      210.0
     aai:     1.207      1.728
     fev:     2.649      4.471
    dsst:     50.00      82.00
 atrophy:     44.00      84.00
   whgrd:     3.000      9.000
  numinf:     1.000      5.000
  volinf:    0.09420     197.0
 obstime:      2044      2159
   death:     0.0000     1.000
```

Now we know that the `male` variable can stratify the data. A natural question to ask is: what are the descriptive statistics for age stratified by sex?

```
> descrip(age, strata=male)
```

```
               N     Msng  Mean      Std Dev    Min       25%         Mdn
age:  All        735     0   74.57     5.451     65.00    71.000000   74.00
age:    Str  0   369     0   74.41     5.258     65.00    71.000000   73.00
age:    Str  1   366     0   74.73     5.642     66.00    71.000000   74.00
                75%       Max
age:  All        78.00     99.00
age:    Str  0   78.00     91.00
age:    Str  1   78.00     99.00
```

Other functionality of `descrip()`, as with all of the functions in R, can be found by typing

```
> ?descrip
```

2.2 tableStat()

The next step is to build tables of descriptive statistics. For example, suppose we wish to have a table with count, row percentage, column percentage, standard deviation, and range. This is easy with `tableStat()`! We will build this table using `stroke` as our variable, stratified by `race` and `male`

```
> tableStat(stroke, race, male, stat="count=@count@; row%=@row%@ col%=@col%@; sd=@sd@; range = @min@ - @
```

```
Tabled descriptive statistics by strata
Call:
      tableStat.default(variable = stroke, race, male, stat = "count=@count@; row%=@row%@ col%=@col%@; s
            - NaN denotes strata with no observations
            - NA arises from missing or censored data

Format:  count=Cnt; row%=% of row col%=% of col; sd=SD; range = Min - Max

         male.0
race.1   count=286.0; row%= 50.0% col%= 77.5%; sd=0.5184; range = 0.0 - 2.000
race.2   count= 53.0; row%= 51.0% col%= 14.4%; sd=0.4666; range = 0.0 - 2.000
race.3   count= 26.0; row%= 55.3% col%=  7.0%; sd=0.6794; range = 0.0 - 2.000
race.4   count=  4.0; row%= 33.3% col%=  1.1%; sd=0.0000; range = 0.0 - 0.000
race.ALL count=369.0; row%= 50.2% col%=100.0%; sd=0.5219; range = 0.0 - 2.000
```

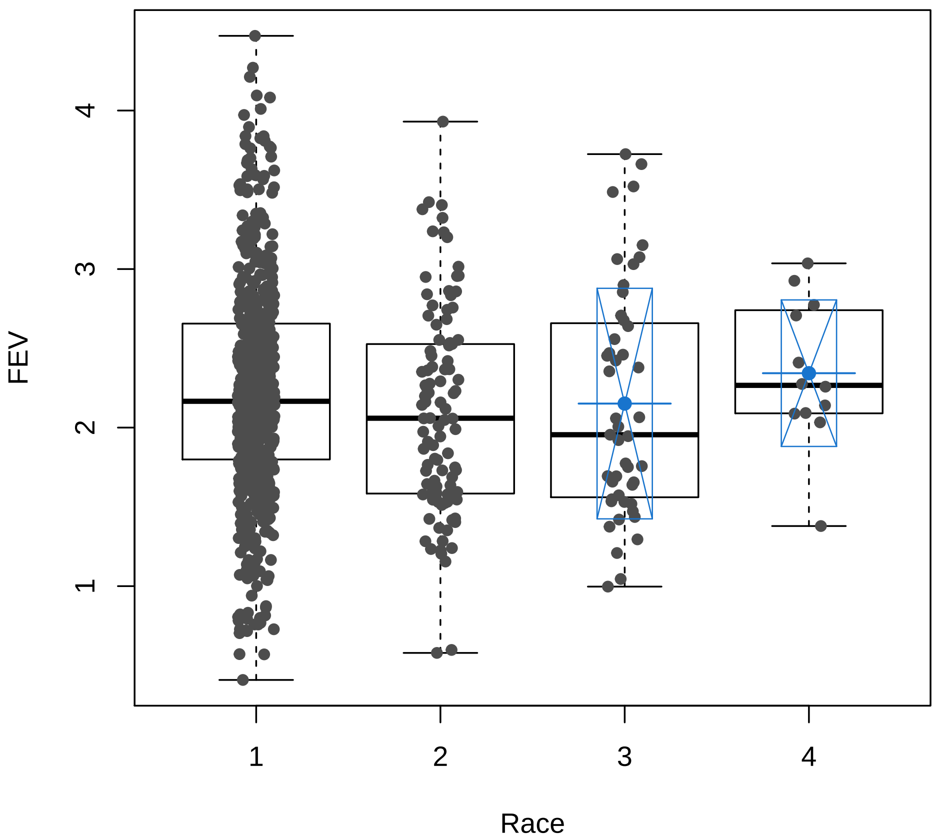
```
         male.1
race.1   count=286.0; row%= 50.0% col%= 78.1%; sd=0.7032; range = 0.0 - 2.000
race.2   count= 51.0; row%= 49.0% col%= 13.9%; sd=0.7013; range = 0.0 - 2.000
race.3   count= 21.0; row%= 44.7% col%=  5.7%; sd=0.7171; range = 0.0 - 2.000
race.4   count=  8.0; row%= 66.7% col%=  2.2%; sd=0.7071; range = 0.0 - 2.000
race.ALL count=366.0; row%= 49.8% col%=100.0%; sd=0.7010; range = 0.0 - 2.000
         male.ALL
race.1   count=572.0; row%=100.0% col%= 77.8%; sd=0.6210; range = 0.0 - 2.000
race.2   count=104.0; row%=100.0% col%= 14.1%; sd=0.5974; range = 0.0 - 2.000
race.3   count= 47.0; row%=100.0% col%=  6.4%; sd=0.6889; range = 0.0 - 2.000
race.4   count= 12.0; row%=100.0% col%=  1.6%; sd=0.5774; range = 0.0 - 2.000
race.ALL count=735.0; row%=100.0% col%=100.0%; sd=0.6207; range = 0.0 - 2.000
```

3 Plots

3.1 Box plots

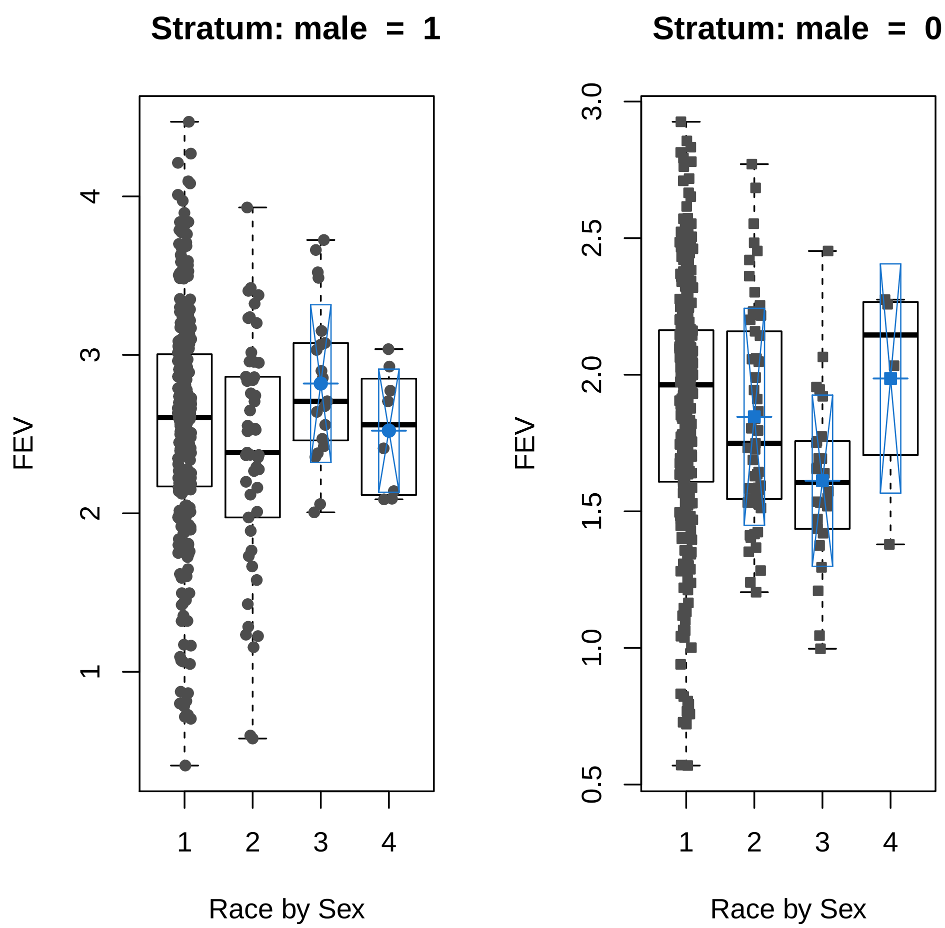
As we cover in our document "An Introduction to R", box plots can be controversial as a descriptive plot of the data. However, we aimed to mitigate some of those concerns with our box plot function. It is straightforward to add jittered data to the plot (allowing us to see all of the data allows us to see where "outliers" really are) and overlay the sample mean and standard deviation - giving us a much better picture of the data. Let's create a boxplot of fev by race:

```
> bplot(fev, race, xlab="Race", ylab="FEV")
```



Notice that by default the jittered data is added to the plot, and the plots are overlaid with sample mean and standard deviation. Now we can also stratify by sex:

```
> bplot(fev, race, strata=male, xlab="Race by Sex", ylab="FEV")
```



3.2 Scatter plots

We also often wish to view a scatter plot of the data.

4 Inference

4.1 `tabulate()`