dplyr

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7/15/2022

Manipulating Data with dplyr Package

https://www.geek-share.com/detail/2669229281.html#grouping-and-chaining-with-dplyr-package

dplyr is a fast and powerful R package written by Hadley Wickham and Romain Francois. The dplyr philosophy is to have small functions that each do one thing well.

One unique aspect of dplyr is that the same set of tools allow you to work with tabular data from a cariety of sources, including

- data frame
- data tables
- databases
- multidimensional arrays

Task 1: load the data into R.

```
library(ISwR)
```

```
## Warning: package 'ISwR' was built under R version 4.2.1
```

Task 2: data structure.

```
str(mtcars)
```

```
## 'data.frame':    32 obs. of  11 variables:
##  $ mpg : num  21 21 22.8 21.4 18.7 18.1 14.3 24.4 22.8 19.2 ...
##  $ cyl : num  6 6 4 6 8 6 8 4 4 6 ...
##  $ disp: num  160 160 108 258 360 ...
##  $ hp  : num  110 110 93 110 175 105 245 62 95 123 ...
##  $ drat: num  3.9 3.9 3.85 3.08 3.15 2.76 3.21 3.69 3.92 3.92 ...
##  $ wt  : num  2.62 2.88 2.32 3.21 3.44 ...
##  $ qsec: num  16.5 17 18.6 19.4 17 ...
##  $ vs  : num  0 0 1 1 0 1 0 1 1 1 ...
##  $ am  : num  1 1 1 0 0 0 0 0 0 0 ...
##  $ gear: num  4 4 4 3 3 3 3 4 4 4 ...
##  $ carb: num  4 4 1 1 2 1 4 2 2 4 ...
```

Task 3: library dplyr package.

```
library(dplyr)
```

```
##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##     filter, lag

## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
# check version: you need to have version 0.4.0 or later
packageVersion("dplyr")
```

```
## [1] '1.0.9'
```

Task 4: Find the class of mtcars.

```
class(mtcars)
```

```
## [1] "data.frame"
```

Task 5: Dimension of mtcars

```
dim(mtcars)
```

```
## [1] 32 11
```

Let us consider the five manipulation tasks with dplyr

- `select()`
- `filter()`
- `arrange()`
- `mutate()`
- `summarize()`

Task 6: select three variables of stroke_tbl. There is no need to use the $ when specifying the variable names in dplyr.

```
select(mtcars, mpg, wt, vs)
```

```
##                      mpg    wt vs
## Mazda RX4           21.0 2.620  0
## Mazda RX4 Wag       21.0 2.875  0
## Datsun 710          22.8 2.320  1
## Hornet 4 Drive      21.4 3.215  1
## Hornet Sportabout   18.7 3.440  0
## Valiant             18.1 3.460  1
## Duster 360          14.3 3.570  0
## Merc 240D           24.4 3.190  1
## Merc 230            22.8 3.150  1
## Merc 280            19.2 3.440  1
## Merc 280C           17.8 3.440  1
## Merc 450SE          16.4 4.070  0
## Merc 450SL          17.3 3.730  0
## Merc 450SLC         15.2 3.780  0
## Cadillac Fleetwood  10.4 5.250  0
## Lincoln Continental 10.4 5.424  0
## Chrysler Imperial   14.7 5.345  0
## Fiat 128            32.4 2.200  1
## Honda Civic         30.4 1.615  1
## Toyota Corolla      33.9 1.835  1
## Toyota Corona       21.5 2.465  1
## Dodge Challenger    15.5 3.520  0
## AMC Javelin         15.2 3.435  0
## Camaro Z28          13.3 3.840  0
## Pontiac Firebird    19.2 3.845  0
## Fiat X1-9           27.3 1.935  1
## Porsche 914-2       26.0 2.140  0
## Lotus Europa        30.4 1.513  1
## Ford Pantera L      15.8 3.170  0
## Ferrari Dino        19.7 2.770  0
## Maserati Bora       15.0 3.570  0
## Volvo 142E          21.4 2.780  1
```

Task 7: select a sequence of columns.

```
select(mtcars, mpg:drat)
```

```
##                      mpg cyl  disp  hp drat
## Mazda RX4           21.0   6 160.0 110 3.90
## Mazda RX4 Wag       21.0   6 160.0 110 3.90
## Datsun 710          22.8   4 108.0  93 3.85
## Hornet 4 Drive      21.4   6 258.0 110 3.08
## Hornet Sportabout   18.7   8 360.0 175 3.15
## Valiant             18.1   6 225.0 105 2.76
## Duster 360          14.3   8 360.0 245 3.21
## Merc 240D           24.4   4 146.7  62 3.69
## Merc 230            22.8   4 140.8  95 3.92
## Merc 280            19.2   6 167.6 123 3.92
## Merc 280C           17.8   6 167.6 123 3.92
## Merc 450SE          16.4   8 275.8 180 3.07
## Merc 450SL          17.3   8 275.8 180 3.07
## Merc 450SLC         15.2   8 275.8 180 3.07
```

```
## Cadillac Fleetwood  10.4   8 472.0 205 2.93
## Lincoln Continental 10.4   8 460.0 215 3.00
## Chrysler Imperial   14.7   8 440.0 230 3.23
## Fiat 128            32.4   4  78.7  66 4.08
## Honda Civic         30.4   4  75.7  52 4.93
## Toyota Corolla      33.9   4  71.1  65 4.22
## Toyota Corona       21.5   4 120.1  97 3.70
## Dodge Challenger    15.5   8 318.0 150 2.76
## AMC Javelin         15.2   8 304.0 150 3.15
## Camaro Z28          13.3   8 350.0 245 3.73
## Pontiac Firebird    19.2   8 400.0 175 3.08
## Fiat X1-9           27.3   4  79.0  66 4.08
## Porsche 914-2       26.0   4 120.3  91 4.43
## Lotus Europa        30.4   4  95.1 113 3.77
## Ford Pantera L      15.8   8 351.0 264 4.22
## Ferrari Dino        19.7   6 145.0 175 3.62
## Maserati Bora       15.0   8 301.0 335 3.54
## Volvo 142E          21.4   4 121.0 109 4.11
```

Task 8: throw away selected columns.(the negative sign in front of drat tells us we don't want those columns.)

```
select(mtcars, -drat)
```

```
##                     mpg cyl  disp  hp    wt  qsec vs am gear carb
## Mazda RX4          21.0   6 160.0 110 2.620 16.46  0  1    4    4
## Mazda RX4 Wag      21.0   6 160.0 110 2.875 17.02  0  1    4    4
## Datsun 710         22.8   4 108.0  93 2.320 18.61  1  1    4    1
## Hornet 4 Drive     21.4   6 258.0 110 3.215 19.44  1  0    3    1
## Hornet Sportabout  18.7   8 360.0 175 3.440 17.02  0  0    3    2
## Valiant            18.1   6 225.0 105 3.460 20.22  1  0    3    1
## Duster 360         14.3   8 360.0 245 3.570 15.84  0  0    3    4
## Merc 240D          24.4   4 146.7  62 3.190 20.00  1  0    4    2
## Merc 230           22.8   4 140.8  95 3.150 22.90  1  0    4    2
## Merc 280           19.2   6 167.6 123 3.440 18.30  1  0    4    4
## Merc 280C          17.8   6 167.6 123 3.440 18.90  1  0    4    4
## Merc 450SE         16.4   8 275.8 180 4.070 17.40  0  0    3    3
## Merc 450SL         17.3   8 275.8 180 3.730 17.60  0  0    3    3
## Merc 450SLC        15.2   8 275.8 180 3.780 18.00  0  0    3    3
## Cadillac Fleetwood 10.4   8 472.0 205 5.250 17.98  0  0    3    4
## Lincoln Continental 10.4  8 460.0 215 5.424 17.82  0  0    3    4
## Chrysler Imperial  14.7   8 440.0 230 5.345 17.42  0  0    3    4
## Fiat 128           32.4   4  78.7  66 2.200 19.47  1  1    4    1
## Honda Civic        30.4   4  75.7  52 1.615 18.52  1  1    4    2
## Toyota Corolla     33.9   4  71.1  65 1.835 19.90  1  1    4    1
## Toyota Corona      21.5   4 120.1  97 2.465 20.01  1  0    3    1
## Dodge Challenger   15.5   8 318.0 150 3.520 16.87  0  0    3    2
## AMC Javelin        15.2   8 304.0 150 3.435 17.30  0  0    3    2
## Camaro Z28         13.3   8 350.0 245 3.840 15.41  0  0    3    4
## Pontiac Firebird   19.2   8 400.0 175 3.845 17.05  0  0    3    2
## Fiat X1-9          27.3   4  79.0  66 1.935 18.90  1  1    4    1
## Porsche 914-2      26.0   4 120.3  91 2.140 16.70  0  1    5    2
## Lotus Europa       30.4   4  95.1 113 1.513 16.90  1  1    5    2
## Ford Pantera L     15.8   8 351.0 264 3.170 14.50  0  1    5    4
```

```
## Ferrari Dino        19.7   6 145.0 175 2.770 15.50  0  1    5    6
## Maserati Bora       15.0   8 301.0 335 3.570 14.60  0  1    5    8
## Volvo 142E          21.4   4 121.0 109 2.780 18.60  1  1    4    2
```

Task 9: throw away multiple columns.

```
select(mtcars, -(drat:carb))
```

```
##                     mpg cyl  disp  hp
## Mazda RX4          21.0   6 160.0 110
## Mazda RX4 Wag      21.0   6 160.0 110
## Datsun 710         22.8   4 108.0  93
## Hornet 4 Drive     21.4   6 258.0 110
## Hornet Sportabout  18.7   8 360.0 175
## Valiant            18.1   6 225.0 105
## Duster 360         14.3   8 360.0 245
## Merc 240D          24.4   4 146.7  62
## Merc 230           22.8   4 140.8  95
## Merc 280           19.2   6 167.6 123
## Merc 280C          17.8   6 167.6 123
## Merc 450SE         16.4   8 275.8 180
## Merc 450SL         17.3   8 275.8 180
## Merc 450SLC        15.2   8 275.8 180
## Cadillac Fleetwood 10.4   8 472.0 205
## Lincoln Continental 10.4  8 460.0 215
## Chrysler Imperial  14.7   8 440.0 230
## Fiat 128           32.4   4  78.7  66
## Honda Civic        30.4   4  75.7  52
## Toyota Corolla     33.9   4  71.1  65
## Toyota Corona      21.5   4 120.1  97
## Dodge Challenger   15.5   8 318.0 150
## AMC Javelin        15.2   8 304.0 150
## Camaro Z28         13.3   8 350.0 245
## Pontiac Firebird   19.2   8 400.0 175
## Fiat X1-9          27.3   4  79.0  66
## Porsche 914-2      26.0   4 120.3  91
## Lotus Europa       30.4   4  95.1 113
## Ford Pantera L     15.8   8 351.0 264
## Ferrari Dino       19.7   6 145.0 175
## Maserati Bora      15.0   8 301.0 335
## Volvo 142E         21.4   4 121.0 109
```

Task 10: use filter function to select all rows for which the cyl is equal to 6.

```
filter(mtcars, cyl == 6)
```

```
##                 mpg cyl  disp  hp drat    wt  qsec vs am gear carb
## Mazda RX4      21.0   6 160.0 110 3.90 2.620 16.46  0  1    4    4
## Mazda RX4 Wag  21.0   6 160.0 110 3.90 2.875 17.02  0  1    4    4
## Hornet 4 Drive 21.4   6 258.0 110 3.08 3.215 19.44  1  0    3    1
## Valiant        18.1   6 225.0 105 2.76 3.460 20.22  1  0    3    1
## Merc 280       19.2   6 167.6 123 3.92 3.440 18.30  1  0    4    4
## Merc 280C      17.8   6 167.6 123 3.92 3.440 18.90  1  0    4    4
## Ferrari Dino   19.7   6 145.0 175 3.62 2.770 15.50  0  1    5    6
```

Task 11: filter rows based on certain conditions. Those conditions (variables) are separated by commas.

```
filter(mtcars, cyl ==  6, hp > 120)
```

```
##               mpg cyl  disp  hp drat   wt qsec vs am gear carb
## Merc 280     19.2   6 167.6 123 3.92 3.44 18.3  1  0    4    4
## Merc 280C    17.8   6 167.6 123 3.92 3.44 18.9  1  0    4    4
## Ferrari Dino 19.7   6 145.0 175 3.62 2.77 15.5  0  1    5    6
```

https://www.datasciencemadesimple.com/filter-subsetting-rows-r-using-dplyr/

Task 12: subset mtcars rows with multiple conditions using %in% operator

```
filter(mtcars, gear %in% c(3,5))
```

```
##                      mpg cyl  disp  hp drat    wt  qsec vs am gear carb
## Hornet 4 Drive      21.4   6 258.0 110 3.08 3.215 19.44  1  0    3    1
## Hornet Sportabout   18.7   8 360.0 175 3.15 3.440 17.02  0  0    3    2
## Valiant             18.1   6 225.0 105 2.76 3.460 20.22  1  0    3    1
## Duster 360          14.3   8 360.0 245 3.21 3.570 15.84  0  0    3    4
## Merc 450SE          16.4   8 275.8 180 3.07 4.070 17.40  0  0    3    3
## Merc 450SL          17.3   8 275.8 180 3.07 3.730 17.60  0  0    3    3
## Merc 450SLC         15.2   8 275.8 180 3.07 3.780 18.00  0  0    3    3
## Cadillac Fleetwood  10.4   8 472.0 205 2.93 5.250 17.98  0  0    3    4
## Lincoln Continental 10.4   8 460.0 215 3.00 5.424 17.82  0  0    3    4
## Chrysler Imperial   14.7   8 440.0 230 3.23 5.345 17.42  0  0    3    4
## Toyota Corona       21.5   4 120.1  97 3.70 2.465 20.01  1  0    3    1
## Dodge Challenger    15.5   8 318.0 150 2.76 3.520 16.87  0  0    3    2
## AMC Javelin         15.2   8 304.0 150 3.15 3.435 17.30  0  0    3    2
## Camaro Z28          13.3   8 350.0 245 3.73 3.840 15.41  0  0    3    4
## Pontiac Firebird    19.2   8 400.0 175 3.08 3.845 17.05  0  0    3    2
## Porsche 914-2       26.0   4 120.3  91 4.43 2.140 16.70  0  1    5    2
## Lotus Europa        30.4   4  95.1 113 3.77 1.513 16.90  1  1    5    2
## Ford Pantera L      15.8   8 351.0 264 4.22 3.170 14.50  0  1    5    4
## Ferrari Dino        19.7   6 145.0 175 3.62 2.770 15.50  0  1    5    6
## Maserati Bora       15.0   8 301.0 335 3.54 3.570 14.60  0  1    5    8
```

```
filter(mtcars, gear %in% c(4,5) & carb==2)
```

```
##                mpg cyl  disp  hp drat    wt  qsec vs am gear carb
## Merc 240D     24.4   4 146.7  62 3.69 3.190 20.00  1  0    4    2
## Merc 230      22.8   4 140.8  95 3.92 3.150 22.90  1  0    4    2
## Honda Civic   30.4   4  75.7  52 4.93 1.615 18.52  1  1    4    2
## Porsche 914-2 26.0   4 120.3  91 4.43 2.140 16.70  0  1    5    2
## Lotus Europa  30.4   4  95.1 113 3.77 1.513 16.90  1  1    5    2
## Volvo 142E    21.4   4 121.0 109 4.11 2.780 18.60  1  1    4    2
```

Task 13: Filter the rows in R with multiple conditions (NOT). using Dplyr

```
filter(mtcars, !gear %in% c(4,5))
```

```
##                      mpg cyl  disp  hp drat    wt  qsec vs am gear carb
## Hornet 4 Drive      21.4   6 258.0 110 3.08 3.215 19.44  1  0    3    1
## Hornet Sportabout   18.7   8 360.0 175 3.15 3.440 17.02  0  0    3    2
## Valiant             18.1   6 225.0 105 2.76 3.460 20.22  1  0    3    1
## Duster 360          14.3   8 360.0 245 3.21 3.570 15.84  0  0    3    4
## Merc 450SE          16.4   8 275.8 180 3.07 4.070 17.40  0  0    3    3
## Merc 450SL          17.3   8 275.8 180 3.07 3.730 17.60  0  0    3    3
## Merc 450SLC         15.2   8 275.8 180 3.07 3.780 18.00  0  0    3    3
## Cadillac Fleetwood  10.4   8 472.0 205 2.93 5.250 17.98  0  0    3    4
## Lincoln Continental 10.4   8 460.0 215 3.00 5.424 17.82  0  0    3    4
## Chrysler Imperial   14.7   8 440.0 230 3.23 5.345 17.42  0  0    3    4
## Toyota Corona       21.5   4 120.1  97 3.70 2.465 20.01  1  0    3    1
## Dodge Challenger    15.5   8 318.0 150 2.76 3.520 16.87  0  0    3    2
## AMC Javelin         15.2   8 304.0 150 3.15 3.435 17.30  0  0    3    2
## Camaro Z28          13.3   8 350.0 245 3.73 3.840 15.41  0  0    3    4
## Pontiac Firebird    19.2   8 400.0 175 3.08 3.845 17.05  0  0    3    2
```

Task 14: Filter the rows in R with Contains condition using Dplyr

```
filter(mtcars, grepl(0,hp))
```

```
##                     mpg cyl  disp  hp drat    wt  qsec vs am gear carb
## Mazda RX4          21.0   6 160.0 110 3.90 2.620 16.46  0  1    4    4
## Mazda RX4 Wag      21.0   6 160.0 110 3.90 2.875 17.02  0  1    4    4
## Hornet 4 Drive     21.4   6 258.0 110 3.08 3.215 19.44  1  0    3    1
## Valiant            18.1   6 225.0 105 2.76 3.460 20.22  1  0    3    1
## Merc 450SE         16.4   8 275.8 180 3.07 4.070 17.40  0  0    3    3
## Merc 450SL         17.3   8 275.8 180 3.07 3.730 17.60  0  0    3    3
## Merc 450SLC        15.2   8 275.8 180 3.07 3.780 18.00  0  0    3    3
## Cadillac Fleetwood 10.4   8 472.0 205 2.93 5.250 17.98  0  0    3    4
## Chrysler Imperial  14.7   8 440.0 230 3.23 5.345 17.42  0  0    3    4
## Dodge Challenger   15.5   8 318.0 150 2.76 3.520 16.87  0  0    3    2
## AMC Javelin        15.2   8 304.0 150 3.15 3.435 17.30  0  0    3    2
## Volvo 142E         21.4   4 121.0 109 4.11 2.780 18.60  1  1    4    2
```

Task 15: Subset using Slice Family of function in R dplyr

```
mtcars %>% slice_head(n = 5)
```

```
##                    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
```

Task 16: Subset using Slice Family of function in R dplyr

```
mtcars %>% slice_tail(n = 5)
```

```
##                mpg cyl  disp  hp drat    wt qsec vs am gear carb
```

```
## Lotus Europa   30.4   4  95.1 113 3.77 1.513 16.9  1  1    5    2
## Ford Pantera L 15.8   8 351.0 264 4.22 3.170 14.5  0  1    5    4
## Ferrari Dino   19.7   6 145.0 175 3.62 2.770 15.5  0  1    5    6
## Maserati Bora  15.0   8 301.0 335 3.54 3.570 14.6  0  1    5    8
## Volvo 142E     21.4   4 121.0 109 4.11 2.780 18.6  1  1    4    2
```

Task 17: slice_max() function returns the max n rows of the dataframe based on a column as shown below.

```
mtcars %>% slice_max(mpg, n = 5)
```

```
##                 mpg cyl disp  hp drat    wt  qsec vs am gear carb
## Toyota Corolla 33.9   4 71.1  65 4.22 1.835 19.90  1  1    4    1
## Fiat 128       32.4   4 78.7  66 4.08 2.200 19.47  1  1    4    1
## Honda Civic    30.4   4 75.7  52 4.93 1.615 18.52  1  1    4    2
## Lotus Europa   30.4   4 95.1 113 3.77 1.513 16.90  1  1    5    2
## Fiat X1-9      27.3   4 79.0  66 4.08 1.935 18.90  1  1    4    1
```

Task 18: slice_min() function returns the minimum n rows of the dataframe based on a column as shown below.

```
mtcars %>% slice_min(mpg, n = 5)
```

```
##                      mpg cyl disp  hp drat    wt  qsec vs am gear carb
## Cadillac Fleetwood  10.4   8  472 205 2.93 5.250 17.98  0  0    3    4
## Lincoln Continental 10.4   8  460 215 3.00 5.424 17.82  0  0    3    4
## Camaro Z28          13.3   8  350 245 3.73 3.840 15.41  0  0    3    4
## Duster 360          14.3   8  360 245 3.21 3.570 15.84  0  0    3    4
## Chrysler Imperial   14.7   8  440 230 3.23 5.345 17.42  0  0    3    4
```

Task 19: slice_sample() function returns the sample n rows of the dataframe as shown below.

```
mtcars %>% slice_sample(n = 5)
```

```
##               mpg cyl  disp  hp drat    wt  qsec vs am gear carb
## Ferrari Dino 19.7   6 145.0 175 3.62 2.770 15.50  0  1    5    6
## Merc 450SE   16.4   8 275.8 180 3.07 4.070 17.40  0  0    3    3
## Mazda RX4    21.0   6 160.0 110 3.90 2.620 16.46  0  1    4    4
## Camaro Z28   13.3   8 350.0 245 3.73 3.840 15.41  0  0    3    4
## Honda Civic  30.4   4  75.7  52 4.93 1.615 18.52  1  1    4    2
```

Task 20: slice_head() by group in R: returns the top n rows of the group using slice_head() and group_by() functions

```
mtcars %>% group_by(vs) %>% slice_head(n = 2)
```

```
## # A tibble: 4 x 11
## # Groups:   vs [2]
##     mpg   cyl  disp    hp  drat    wt  qsec    vs    am  gear  carb
##   <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
## 1  21       6   160   110  3.9   2.62  16.5     0     1     4     4
## 2  21       6   160   110  3.9   2.88  17.0     0     1     4     4
## 3  22.8     4   108    93  3.85  2.32  18.6     1     1     4     1
## 4  21.4     6   258   110  3.08  3.22  19.4     1     0     3     1
```

```
mtcars %>% group_by(vs)
```

```
## # A tibble: 32 x 11
## # Groups:   vs [2]
##      mpg   cyl  disp    hp  drat    wt  qsec    vs    am  gear  carb
##    <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
##  1  21       6  160    110  3.9   2.62  16.5     0     1     4     4
##  2  21       6  160    110  3.9   2.88  17.0     0     1     4     4
##  3  22.8     4  108     93  3.85  2.32  18.6     1     1     4     1
##  4  21.4     6  258    110  3.08  3.22  19.4     1     0     3     1
##  5  18.7     8  360    175  3.15  3.44  17.0     0     0     3     2
##  6  18.1     6  225    105  2.76  3.46  20.2     1     0     3     1
##  7  14.3     8  360    245  3.21  3.57  15.8     0     0     3     4
##  8  24.4     4  147.    62  3.69  3.19  20       1     0     4     2
##  9  22.8     4  141.    95  3.92  3.15  22.9     1     0     4     2
## 10  19.2     6  168.   123  3.92  3.44  18.3     1     0     4     4
## # ... with 22 more rows
```

```
sample_n(mtcars,4)
```

```
##                   mpg cyl  disp  hp drat    wt  qsec vs am gear carb
## Duster 360       14.3   8 360.0 245 3.21 3.570 15.84  0  0    3    4
## Hornet 4 Drive   21.4   6 258.0 110 3.08 3.215 19.44  1  0    3    1
## Pontiac Firebird 19.2   8 400.0 175 3.08 3.845 17.05  0  0    3    2
## Merc 240D        24.4   4 146.7  62 3.69 3.190 20.00  1  0    4    2
```