Intro to Modular w/ R Functions

October 01, 2024

Intro to Modular w/ R Functions

Today’s Co-organizer:

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Volunteer signup

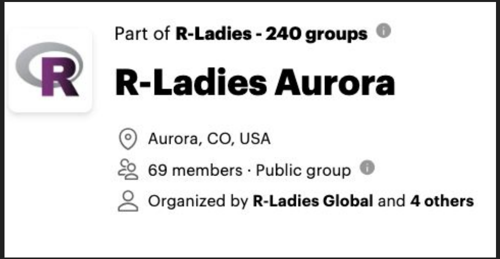
Today’s sponsor:

JRavi Lab, DBMI

Who We R!?

R-Ladies Kick-off Event on Jul 25, 2024

RLA Co-organizer team: Jade, Keenan, Janani, Kewalin, Stacey (left to right)



Part of **R-Ladies - 240 groups**

R-Ladies Aurora

Aurora, CO, USA

69 members · Public group

Organized by **R-Ladies Global** and **4 others**

Worldwide organization that promotes **gender diversity** in the **#rstats** community via meetups and mentorship in a **friendly** and **safe** environment

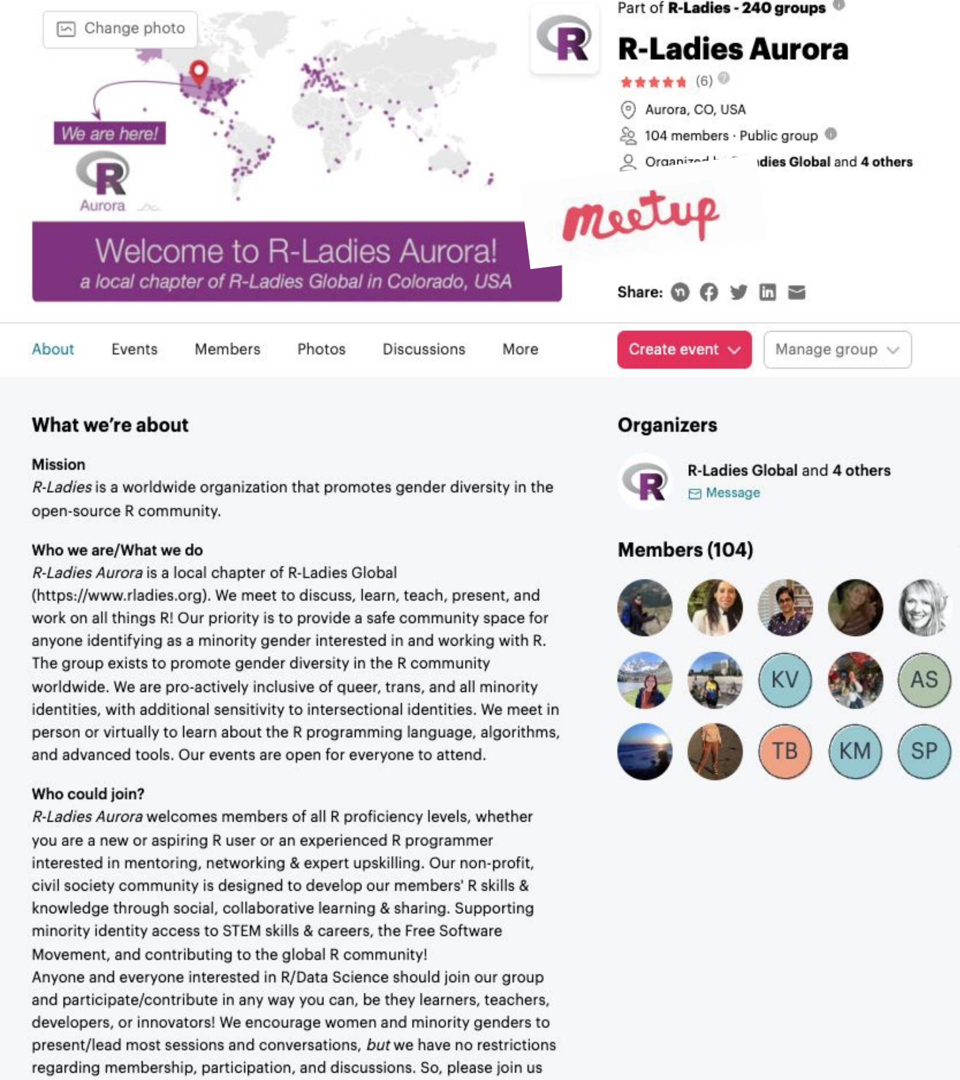
New Members?

1. Join us, RSVP for events on **Meetup**

https://www.meetup.com/rladies-aurora/

2. Join our discussion forum on **Discord**

https://bit.ly/RLA-discord



Welcome to R-Ladies Aurora!

a local chapter of R-Ladies Global in Colorado, USA

Part of **R-Ladies · 240 groups**

R-Ladies Aurora

★★★★★ (6)

Aurora, CO, USA

104 members · Public group

Organiz dies Global and **4 others**

Share:

What we're about

Mission

R-Ladies is a worldwide organization that promotes gender diversity in the open-source R community.

Who we are/What we do

R-Ladies Aurora is a local chapter of R-Ladies Global (https://www.rladies.org). We meet to discuss, learn, teach, present, and work on all things R! Our priority is to provide a safe community space for anyone identifying as a minority gender interested in and working with R. The group exists to promote gender diversity in the R community worldwide. We are pro-actively inclusive of queer, trans, and all minority identities, with additional sensitivity to intersectional identities. We meet in person or virtually to learn about the R programming language, algorithms, and advanced tools. Our events are open for everyone to attend.

Who could join?

R-Ladies Aurora welcomes members of all R proficiency levels, whether you are a new or aspiring R user or an experienced R programmer interested in mentoring, networking & expert upskilling. Our non-profit, civil society community is designed to develop our members' R skills & knowledge through social, collaborative learning & sharing. Supporting minority identity access to STEM skills & careers, the Free Software Movement, and contributing to the global R community!

Anyone and everyone interested in R/Data Science should join our group and participate/contribute in any way you can, be they learners, teachers, developers, or innovators! We encourage women and minority genders to present/lead most sessions and conversations, *but* we have no restrictions regarding membership, participation, and discussions. So, please join us

Organizers

R-Ladies Global and **4 others**

Message

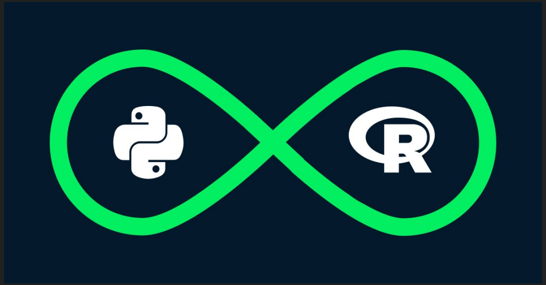
Members (104)

KV AS TB KM SP

Upcoming Workshops

Fall' 24 R-Ladies Aurora Series:

- Intro to R Functions
- DataViz 2.0
- R Package Development
- Presenting to Non-Scientific Audiences
- Python in R

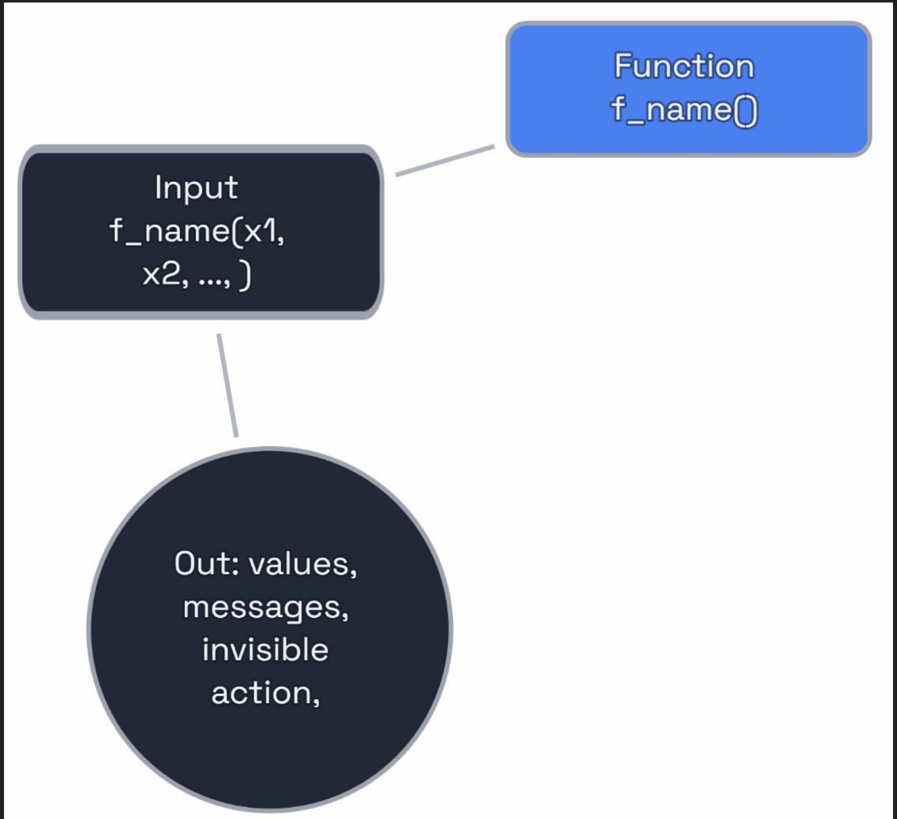


Today! Oct 01, 2024

TOPICS

- **Intro to R functions**

Ping us on Discord with any Questions



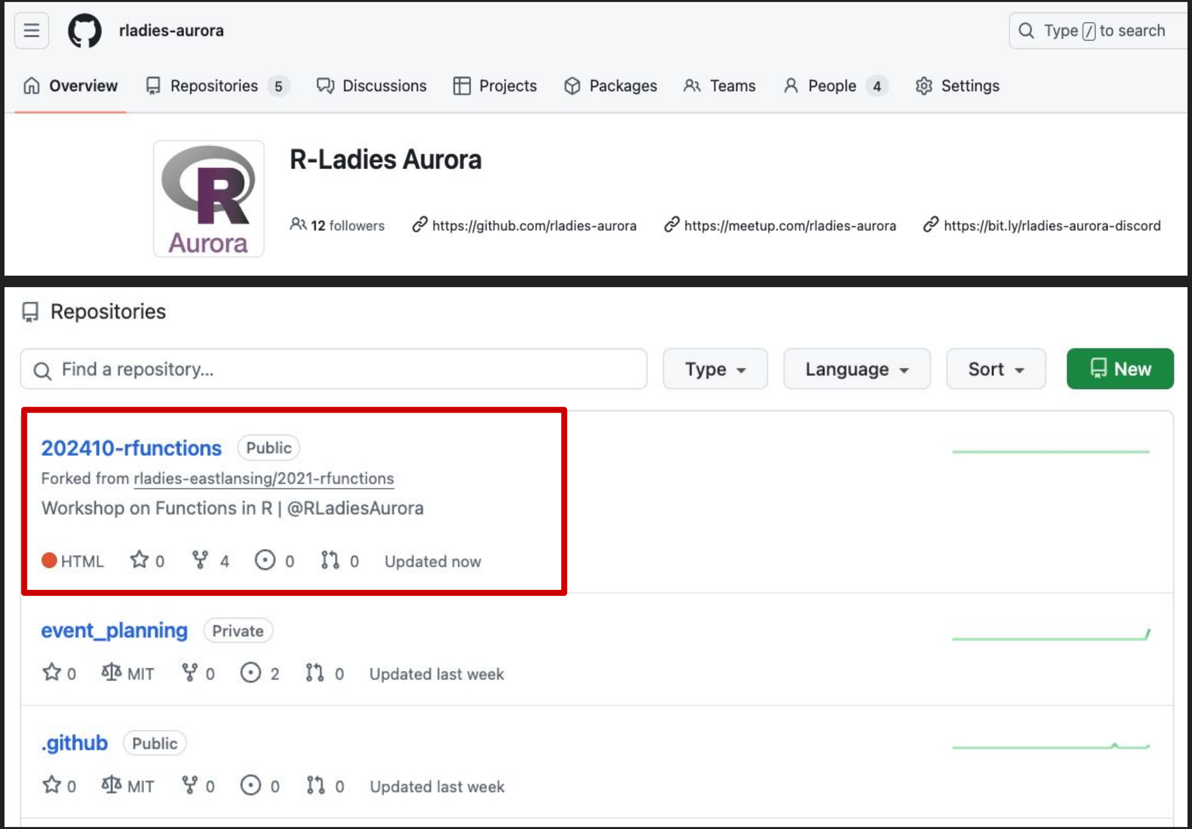
Function
f_name()

Input
f_name(x1,
x2, ...,)

Out: values,
messages,
invisible
action,

Presentation Materials

https://github.com/rladies-aurora



R-Ladies Aurora

12 followers https://github.com/rladies-aurora https://meetup.com/rladies-aurora https://bit.ly/rladies-aurora-discord

Repositories

202410-rfunctions Public
Forked from rladies-eastlansing/2021-rfunctions
Workshop on Functions in R | @RLadiesAurora
HTML ☆ 0 4 0 0 Updated now

event_planning Private
☆ 0 MIT 0 2 0 Updated last week

.github Public
☆ 0 MIT 0 0 0 Updated last week

Intro | Meet & Greet

- **Pizza + Sign-up** 🍕
- **Familiar w/ R and ggplot? → *Shuffle***
- **Introduce yourself to your neighbor**
- Who you are | Name, affiliation
- Do you have the same version of R (4.0+), RStudio & Tidyverse?
  - NO? Installation time!
    - https://rstudio-education.github.io/hopr/starting.html
- **Need help? Pink sticky up! All set: Blue!**

R Functions

- **You should consider writing a function whenever you've copied and pasted a block of code more than twice.**

  -- Book by Wickham & Grolemund

- **Book by Wickham & Grolemund, R4DS**
  - Chapter 19 on Functions

    https://r4ds.had.co.nz/functions.html

R Functions

Convert the temperature into different units:

$$C = (F - 32) \times \frac{5}{9}$$

```
C_vec[1] = (F_vec[1] - 32)*5/9
C_vec[2] = (F_vec[2] - 32)*5/9
C_vec[3] = (F_vec[3] - 32)*5/9
C_vec[4] = (F_vec[4] - 32)*5/9
```

❌

Function Structure

```
function_name  <- function (argument1 , argument2, …)  {
    # function body
             Line 1
             Line 2
             …
}
```

Call a function:

```
function_name(argument1 = x, argument2 = y, …)
```

Demo time!

Function Structure

```
f_to_c <- function(f_value){
      c_value = (f_value - 32)*5/9
            return(c_value)
}
```

Both **function** and **return** are keywords in R, you also notice the color in R Studio

R Functions

Convert the temperature in different units:

$$C = (F - 32) \times \frac{5}{9}$$

```
C_vec = sapply(F_vec, FUN=f_to_c)
```
✓

`sapply`: apply the function on every element in the vector F_vec.

What’s *wrong* with this function?

```
current_temp_F = 100
current_temp_C = 38

f_to_c_mtk <- function(f_value) {
  current_temp_C = (f_value - 32)*5/9}

f_to_c_mtk(85)
f_to_c_mtk(65)
f_to_c_mtk(45)
```

Attempting to change a global variable **inside a function!!!**

Local Variables and Global Variables

- Beginners are easy to mess up their difference:
  - Global variables are for the assignment done in the main environment or outside the chunk of function.
  - Local variables are for the assignment done inside the chunk of function.
- Don’t attempt to change a global variable inside a function.
- Correct way: return a value from the function and assign it to global variables.
- Observe the Environment window in the RStudio all the time for new assignment.

Correct way

```
current_temp_F = 100
current_temp_C = 38

f_to_c_corr <- function(f_value) {
  c_value = (f_value - 32)*5/9
  return(c_value)
}

current_temp_C = f_to_c_corr(85)
current_temp_C = f_to_c_corr(65)
current_temp_C = f_to_c_corr(45)
```

✓

From Easy to Moderate Function

```
f_to_c_human <- function(f_value) {
    if (f_value >= 91.8 & f_value <= 100.8) {
        c_value = (f_value - 32)*5/9
        return(c_value)
    }
    else {
        message("Too low or too high!!")
    }
}
```

From Easy to Moderate Function

```
f_to_c_human_msg <- function(f_value) {

    if (f_value >= 91.8 & f_value <= 100.8) {
        c_value = (f_value - 32)*5/9
        return(c_value)
    }
     else if (f_value < 91.8) {
         message("Too low!!")
     }
    else {
        message("Too high!!")
    }
}
```

Error Control

- Beginners usually don’t pay enough attention on the error control.
- A lot of programming bugs are due to inappropriate error control.
- Error control can handle the incorrect or unexpected input.
- The function `f_to_c_human_msg()` is an example with error control.
- Think about what is your expected result when encounter unexpected inputs.
    - Ignore the error and keep the function running?
    - Stop the function?

Stop the function

```
f_to_c_human_stop <- function(f_value) {

    if (f_value >= 91.8 & f_value <= 100.8) {
        c_value = (f_value - 32)*5/9
         return(c_value)
    }
    else if (f_value < 91.8) {
        stop("Too low!!") # stop the function
    }
    else {
        stop("Too high!!") # stop the function
    }
}
```

Compare the difference

```
C_vec = sapply(F_vec, FUN = f_to_c_human_msg)
C_vec = sapply(F_vec, FUN = f_to_c_human_stop)
```

message: Keep the function running and store NULL values for invalid input in C_vec.

stop: stop the function and reset the vector C_vec.

You Don't Need to Reinvent the Wheel!

- Try to explore if there are some existing functions or packages in R.
- Create your own functions ONLY if you can’t find any available functions.
- Don’t limit the function output as values, numbers, messages. It can be figures!
- Let’s try to run a function using ggplot2 functions.

Good Coding Practices

- Function names: verbs, never start with numbers. Consider using underscores to separate words, e.g., `impute_missing(), calc_avg().`

- Argument names: nouns

- Output: explicitly return values or messages using `return(), message()`

Useful Materials

- R for Data Science https://r4ds.had.co.nz/
- Advanced R https://adv-r.hadley.nz/
- Best Coding Practices for R

  https://bookdown.org/content/d1e53ac9-28ce-472f-bc2c-f499f18264a3/
- Intro to functions in R, R-Ladies East Lansing

  https://github.com/rladies-eastlansing/2021-rfunctions

Thank you!

R-Ladies Aurora