



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:

THE**MITCHELL**LAB

Mitchell Lab, DBMI

Investigates augmented reality applications for public engagement and user-centered design for clinical guidelines on mobile devices



Who We R!?



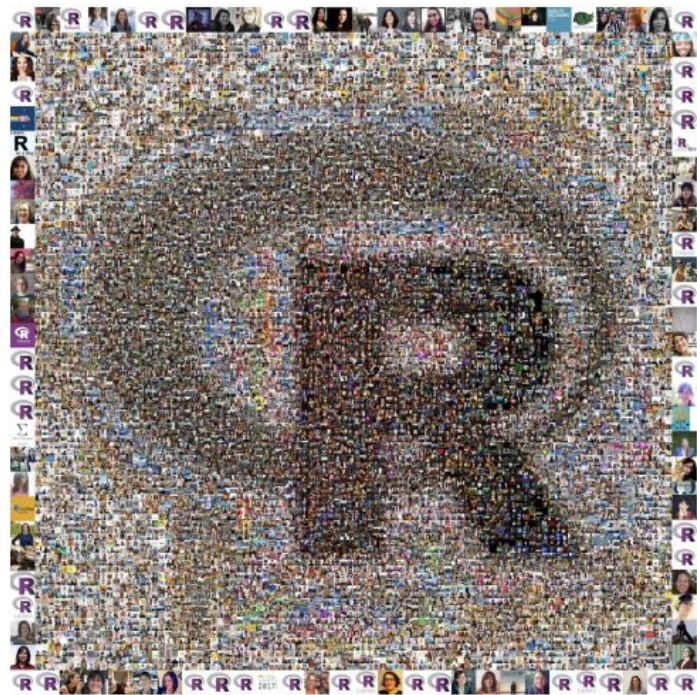
R-Ladies Kick-off Event on Jul 25, 2024




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




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







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

R-Ladies Aurora

 Aurora, CO, USA

 69 members · Public group

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

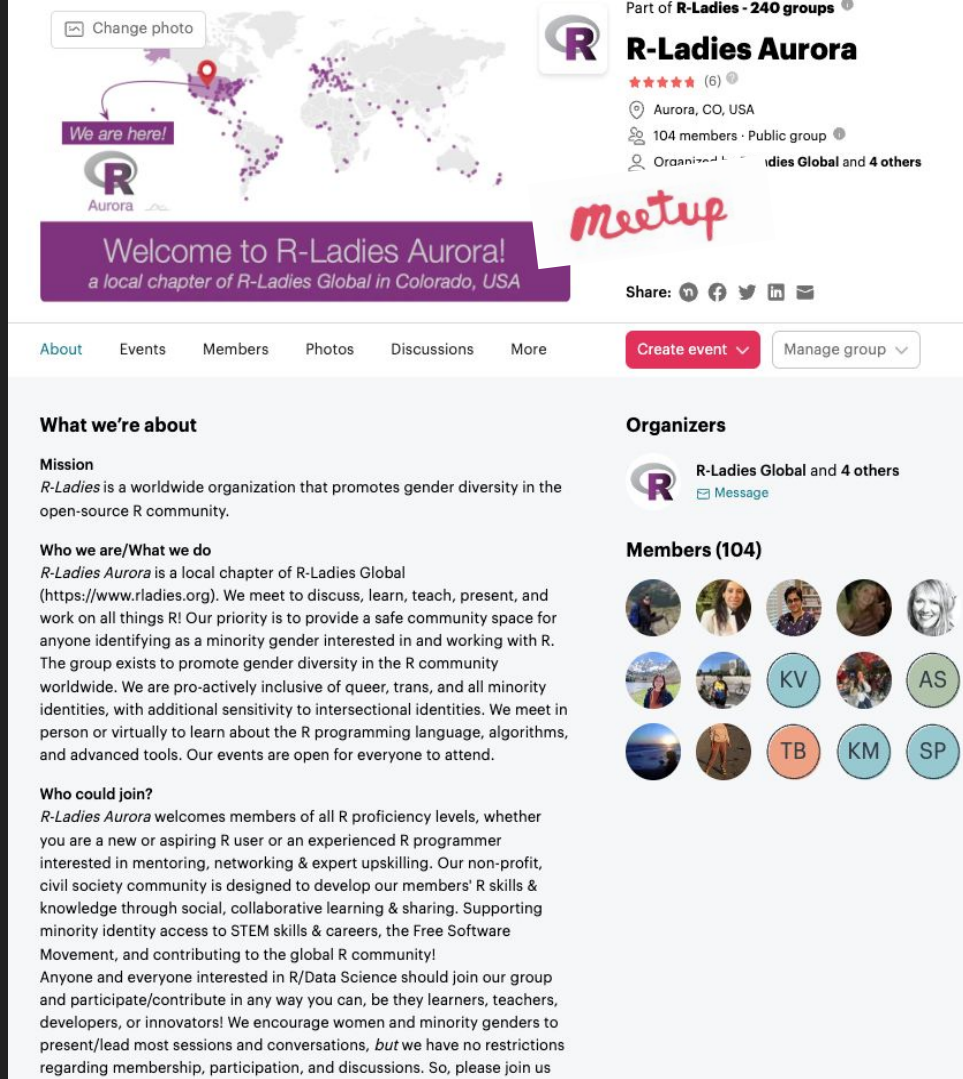
New Members?

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>



The screenshot shows the Meetup page for R-Ladies Aurora. At the top, there's a navigation bar with 'About', 'Events', 'Members', 'Photos', 'Discussions', and 'More'. A 'Create event' button and a 'Manage group' dropdown are on the right. The main content area is divided into three sections: 'What we're about', 'Organizers', and 'Members (104)'. The 'What we're about' section includes a 'Mission' paragraph and a 'Who we are/What we do' paragraph. The 'Organizers' section shows the group's name and a 'Message' button. The 'Members' section displays a grid of member profile pictures, some with labels like 'KV', 'AS', 'TB', 'KM', and 'SP'. A world map at the top left shows the group's location in Colorado, USA, with a red pin and the text 'We are here!'. A purple banner at the top right says 'Welcome to R-Ladies Aurora! a local chapter of R-Ladies Global in Colorado, USA'. The bottom left corner features a large purple 'R' logo.

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

R-Ladies Aurora

★★★★★ (6)

Aurora, CO, USA

104 members · Public group

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

Share:

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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.

Organizers

R-Ladies Global and 4 others
[Message](#)

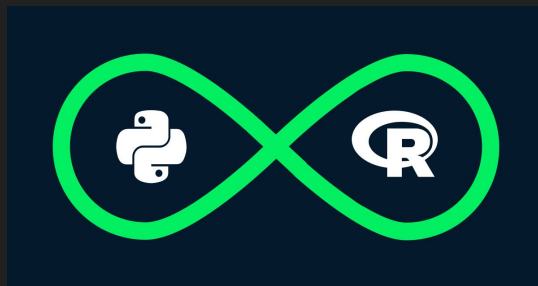
Members (104)

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

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

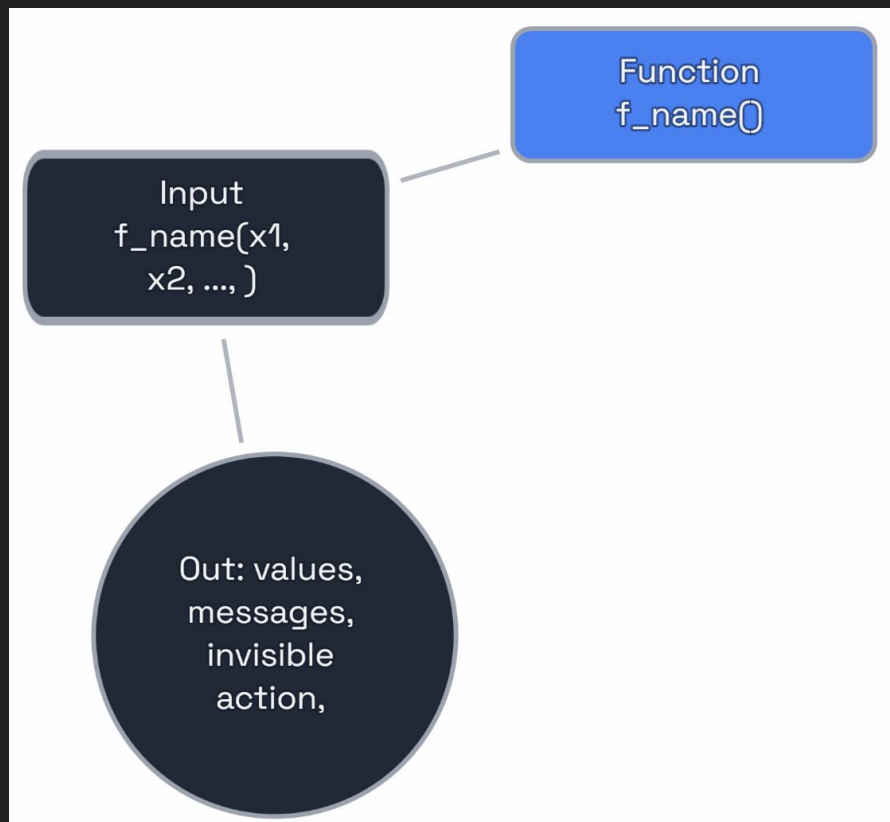


Today! Oct 01, 2024

TOPICS



- Intro to R functions

Ping us on Discord with any Questions




Presentation Materials

<https://github.com/rladies-aurora>

**rladies-aurora**

Q Type ↵ to search

[Overview](#) [Repositories 5](#) [Discussions](#) [Projects](#) [Packages](#) [Teams](#) [People 4](#) [Settings](#)



R-Ladies Aurora

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






Repositories

Type ▾ Language ▾ Sort ▾ [New](#)






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}
```

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

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



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

