Introduction to R

CSC121
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What is R?

- R is a **programming language**

- A **programming language** consists of instructions for a computer - they tell the computer what to do

- These instructions are more human readable than what the computer uses at the lowest level
  - 0's and 1's (electronic circuits)

- By telling the computer what to do, we can make it carry out instructions to **solve problems**

What is R? (con't)

- A set of instructions that solve problems is called an

Algorithm

ALGORITHM (Webster's Dictionary):

A step-by-step procedure for solving a problem or accomplishing some end

Algorithms

- We will first learn about the **set of instructions** that R lets us use to tell the computer what to do

- And then we will see how to combine these sets of instructions to carry out **algorithms**

Algorithms for computing

- As you may know, **algorithms** exist in many disciplines outside of computing

- For example, cooking!
  - Cooking is about following some set of instructions (a recipe) to solve a problem (I'm hungry)

- But what makes computers different from cooking?
  - Cooking manipulates food, but computing manipulates **data**

Data

- What kind of data can you think of?

- Numbers
- Text
- Logical values (True or False)
- Media: music, selfies etc.

So we have Algorithms and Data…but…

- One last thing we need for us to tell computers what to do… Structure!

- We need to be precise in how we 'instruct' the computer

- Computers are good at a lot of things, but are <u>very bad</u> at understanding unstructured, ambiguous commands

Example

The following sentence:

"I saw a man on a hill with a telescope."

What is this sentence saying?
- There's a man on a hill, and I'm watching him with my telescope.
- There's a man on a hill, who I'm seeing, and he has a telescope.
- There's a man, and he's on a hill that also has a telescope on it.
- I'm on a hill, and I saw a man using a telescope.
- There's a man on a hill, and I'm sawing him with a telescope.

Structure

- Humans can interpret context and meaning

- Computers cannot easily do that

- So we must have a structure that the computer understands and interprets correctly
    - That's what programming languages (like R) are for!

- Structure also lets us read code in a consistent way, and it lets other people understand your code more quickly and easily

Put it all together...

Algorithm + Data + Structure = **Program**

Computer Programming
is a mix of these three
elements.

Let's write some code!

- R is an **interactive** language
  - You can type something in and immediately see the result

- We're going to give R some commands and see what it does

- Then we'll explore some of the **data and structure** we are working with when programming in R

- I will post everything I write in RStudio on the course website

RStudio

- RStudio is an **IDE** (Integrated Development Environment)

- Lets you write and run R code easily

- We'll talk about its features in the next few weeks

Let's start!