

Survival skills: Troubleshooting computer code

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Workshop exercises

Pseudocode with line numbers for Exercises 1 and 3

Goal: use a colleague's old code to plot a new dataset and save the plot as an image file. The colleague has been able to create a plot from this file, but on your computer, you are not getting a plot of your new data nor is it saved to an image file.

```
1 Plotdata = data.source(filepath =  
2 "~\MyProject\2020projectdata\20201231_xy.csv")  
3 load.libraries("PlottingPackage")  
4 PlottingPackage.plot(data = Plotdata,  
5     independent_var_name = header1,  
6     dependent_var_name = header2)
```

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Exercise 1: developing hypotheses about why your code isn't working correctly

Overall

- ☐ Did it run but provide unexpected results? Did it generate any results at all?

We specify in the example that this code did not generate a plot nor save an image, but we know that it did work for someone else on a different computer with a different dataset. So it did not generate any results, which suggests the code isn't running. In real life, most programs will show you errors at this point. We'll work on interpreting errors in Exercise 2.

- ☐ What is the commenting symbol for a programming language that you are learning? (search "comment symbol in [your programming language]")

Line by line

- ☐ On what lines are required software dependencies loaded? (Most programs depend on other code (function, libraries, etc to do common tasks) in order to run, and this outside code may need to be explicitly loaded so that your program can find them.)

Line number(s):

- ☐ Do all goals have line(s) of code implementing those steps? (choose one)

Plot image: yes (line number:), no, I'm not sure.

Save image as file: yes (line number:), no, I'm not sure.

- ☐ Does a function exist to implement any missing steps? Search online for "save image in [your programming language]" for examples.

- ☐ What values should you replace with your own data, file path, or column headers?

Line number(s):

Exercise 2: Read an error message

The error below is from the Media Filter component of the DSpace Java application, which extracts text from documents like PDFs and Word Docs. For this exercise:

- ☐ You'll start out lost!
- ☐ Find what broke by scanning for keywords like "Error" or "Exception".
- ☐ What other lines look like important context?
- ☐ What was happening when it failed? Speculate wildly!

You can also read this error at <https://osf.io/w82qx>

```
1 java.io.IOException: Unknown dir object c=')' cInt=41 peek=')' peekInt=41 at offset 5900
2   at org.apache.pdfbox.pdfparser.BaseParser.parseDirObject(BaseParser.java:951)
3   at org.apache.pdfbox.pdfparser.BaseParser.parseCOSArray(BaseParser.java:651)
4   at org.apache.pdfbox.pdfparser.PDFStreamParser.parseNextToken(PDFStreamParser.java:175)
5   at org.apache.pdfbox.contentstream.PDFStreamEngine.processStreamOperators(PDFStreamEngine.java:479)
6   at org.apache.pdfbox.contentstream.PDFStreamEngine.processStream(PDFStreamEngine.java:446)
7   at org.apache.pdfbox.contentstream.PDFStreamEngine.processPage(PDFStreamEngine.java:149)
8   at org.apache.pdfbox.text.PDFTextStreamEngine.processPage(PDFTextStreamEngine.java:136)
9   at org.apache.pdfbox.text.PDFTextStripper.processPage(PDFTextStripper.java:391)
10  at org.apache.pdfbox.text.PDFTextStripper.processPages(PDFTextStripper.java:319)
11  at org.apache.pdfbox.text.PDFTextStripper.writeText(PDFTextStripper.java:266)
12  at org.dspace.app.mediafilter.PDFFilter.getDestinationStream(PDFFilter.java:110)
13  at org.dspace.app.mediafilter.MediaFilterServiceImpl.processBitstream(MediaFilterServiceImpl.java:370)
14  at org.dspace.app.mediafilter.MediaFilterServiceImpl.filterBitstream(MediaFilterServiceImpl.java:227)
15  at org.dspace.app.mediafilter.MediaFilterServiceImpl.filterItem(MediaFilterServiceImpl.java:190)
16  at org.dspace.app.mediafilter.MediaFilterServiceImpl.applyFiltersItem(MediaFilterServiceImpl.java:168)
17  at org.dspace.app.mediafilter.MediaFilterServiceImpl...FiltersAllItems(MediaFilterServiceImpl.java:120)
18  at org.dspace.app.mediafilter.MediaFilterCLITool.main(MediaFilterCLITool.java:303)
19  at sun.reflect.NativeMethodAccessorImpl.invoke0(Native Method)
20  at sun.reflect.NativeMethodAccessorImpl.invoke(NativeMethodAccessorImpl.java:62)
21  at sun.reflect.DelegatingMethodAccessorImpl.invoke(DelegatingMethodAccessorImpl.java:43)
22  at java.lang.reflect.Method.invoke(Method.java:498)
23  at org.dspace.app.launcher.ScriptLauncher.runOneCommand(ScriptLauncher.java:229)
24  at org.dspace.app.launcher.ScriptLauncher.main(ScriptLauncher.java:81)
```

Exercise 3:

Thought experiment: let's print status messages for Exercise 1

You've extended the graphing pseudo-code from Exercise 1. It now:

- Existing pseudo-code: Reads new data from a file
- Existing pseudo-code: Graphs the results
- Pretend we added this: Saves the graph as an image file

But you're not getting the expected output in your graphs.

Discuss in your group

- ☐ What are line numbers in the pseudocode where you might want status messages to help you debug?
 - ☐ Print to check key values at lines:
 - ☐ Print status messages at lines:
 - ☐ Print to check code execution at lines:
- ☐ Search online for "print data in [your programming language]" to see what the function or syntax is that you can use in your own code later.

Resources we like

- What does debugging a program look like? by Julia Evans
<https://jvns.ca/blog/2019/06/23/a-few-debugging-resources/>
- Rubber Duck Debugging <https://rubberduckdebugging.com/>
- The Pocket Guide to Debugging: Stellar Strategies for Sticky Situations by Julia Evans
 - Available on Reserves at QA 76.6 .E93 2022 TEXTBOOKS
 - Permalink to OU Catalog entry:
https://ou-primo.hosted.exlibrisgroup.com/primo-explore/fulldisplay?docid=NORMANLAW_ALMA21689783710002042&vid=OUNEW&search_scope=ou_alma&tab=default_tab&lang=en_US&context=L
- CS 312 Lecture 26 Debugging Techniques
<https://www.cs.cornell.edu/courses/cs312/2006fa/lectures/lec26.html>
- Debugging code for absolute beginners - Microsoft Docs
<https://learn.microsoft.com/en-us/visualstudio/debugger/debugging-absolute-beginners?view=vs-2022&tabs=csharp>
- 22 Debugging | Advanced R <https://adv-r.hadley.nz/debugging.html#debugging-strategy>
- Stack Overflow's guide to asking questions: <https://stackoverflow.com/help/how-to-ask>
Following their guide to asking questions can often result in you solving your problem.

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