



Ugh! If only I had studied CS!

Scientists program to analyse their data. However they are often self taught.

This leads to messy code, making reproducibility hard!

```
#!/usr/bin/env python
# -*- coding: utf-8 -*-

import matplotlib.pyplot as plt
fig = plt.figure(figsize=(10, 10))

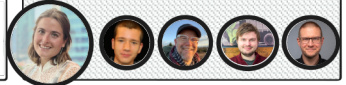
# printing the figure instance
print(fig)

cell = [1, 2, 3]
fig = plt.figure(figsize=(10, 10))
plt.plot(cell, cell)
```

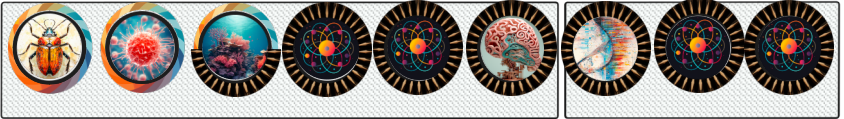
Ugh! Why is this not working?!

We wanted to understand this...

The Computational Ecosystem of Scientists Programming for Data Analysis



We watched scientists code. Asked them questions and looked at their code.



Legend for language  

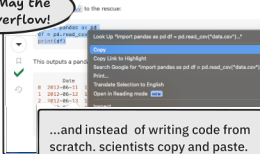
Interviews

Observations

and we found that...

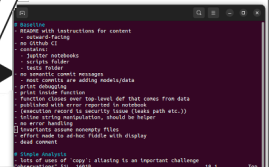
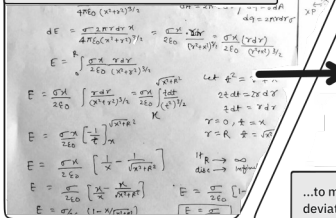
Scientists write code on their own, instead of programming collaboratively with colleagues...

o lord! May the stack overflow!



...and instead of writing code from scratch, scientists copy and paste.

They translate hand drawn derivations...



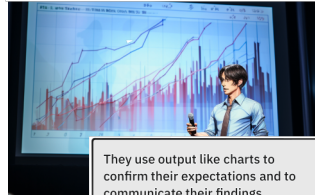
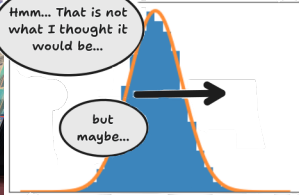
...to mathematical code that is experimental and deviates from software engineering best practices.

To the scientists, the output is more important than the code itself.



Hmm... That is not what I thought it would be...

but maybe...



They use output like charts to confirm their expectations and to communicate their findings.

Future work could explore...



GitHub

Add your ideas here:



Wanna know more?

Read me!

Scientists and Code: Programming as a Tool

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Abstract

How scientists are programming to analyze their data. In this paper, we explore the computational ecosystem of scientists and the challenges they face. We discuss the scientific process, the scientific data, the scientific tools, the scientific methods, the scientific results, the scientific communication, the scientific collaboration, the scientific education, the scientific career, the scientific community, the scientific culture, the scientific environment, the scientific infrastructure, the scientific resources, the scientific knowledge, the scientific innovation, the scientific progress, the scientific impact, the scientific legacy, the scientific future.

Keywords: Scientific programming, Programming practice, Tool design, Computational science

1 Introduction

Programming is an important tool for many scientists' research activities [1, 2]. Despite reporting