

Python Bootcamp: Preparing Incoming Grad Students for the Programming Requirements of Courses and Research

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Motivation

Graduate coursework and research often require the use of a programming language, particularly in the STEM fields. Undergraduate programs have been slow to adapt to this need, so many incoming graduate students have little to no coding experience. This creates a disadvantage for these students, who must learn a programming language on top of their other coursework.

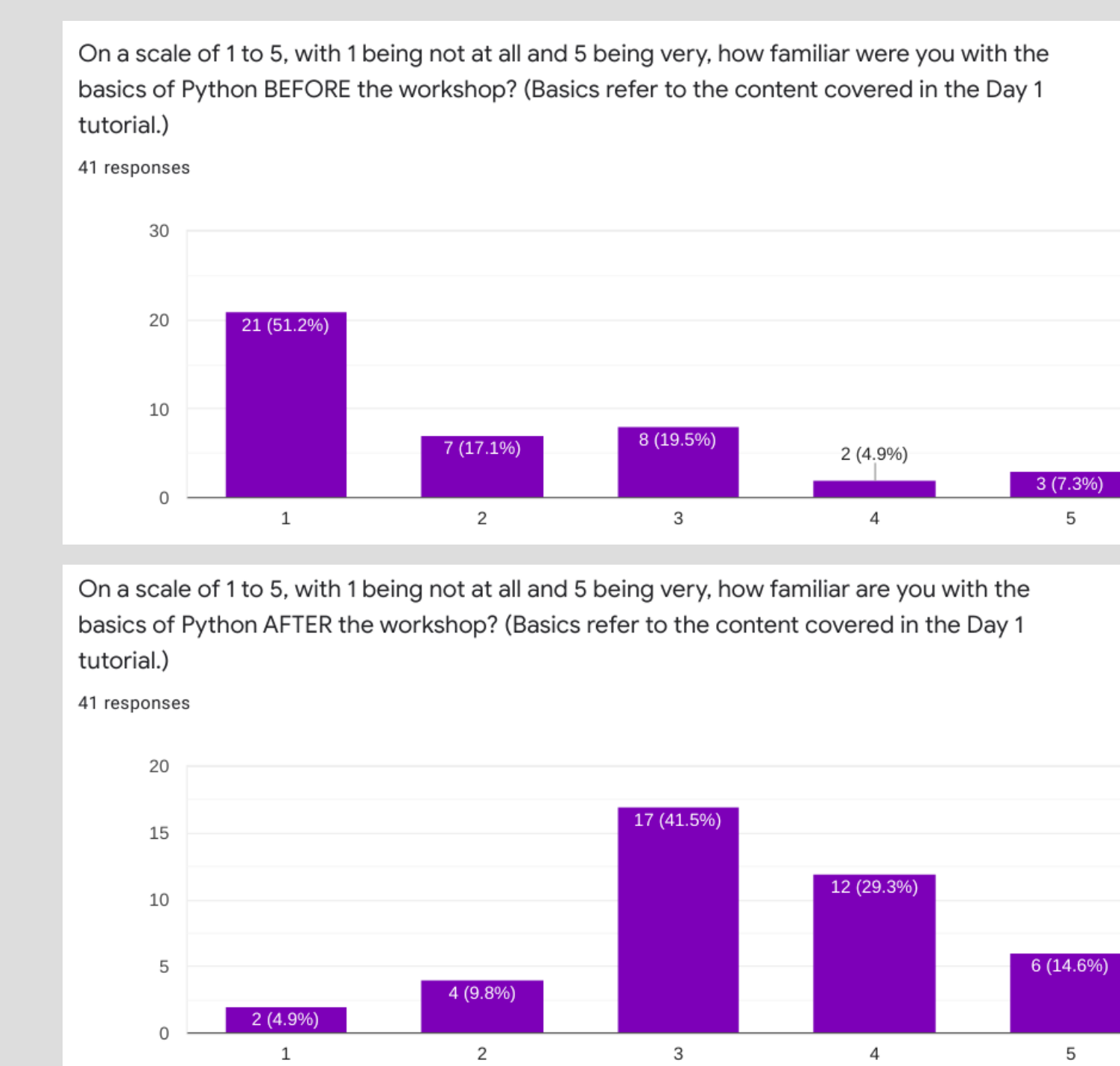
There are multiple resources on campus for learning the language R, but very few resources for learning Python, which is the most commonly used language in the physical sciences, and widely used elsewhere as well. None of these resources are available before or at the very beginning of the school year, when incoming graduate students most need them.

python bootcamp
Sept 22-24
6-7 PM PDT
Zoom
Designed for incoming graduate students,
open to all.
No coding experience required.
Learn Python basics for
classes and research,
from plotting and data analysis
to troubleshooting strategies.
python-bootcamp-ucd.github.io/bootcamp2020/
for info and registration

Impact

- ◆ 156 total attendees
- ◆ 41 survey respondents:
 - 4 needed Python for a course
 - 22 wanted to use Python for research
 - Others: future job, fun
- ◆ All learning goals were improved upon

Figure 2: On a scale of 1 to 5, participants were asked to rate their understanding of Python basics before and after the workshop, with 1 being none and 5 being mastery. The top is before, the bottom is after.



Goals

Flatten the Python learning curve that incoming graduate students with no coding experience face

To achieve this I aimed to:

- ◆ Teach basic Python skills
- ◆ Demonstrate capability of extensive Python libraries
- ◆ Teach problem solving and troubleshooting skills
- ◆ Provide additional resources for continued learning and future reference
- ◆ Provide a chance to practice new skills by completing a small project
- ◆ Keep all instruction within the limited time frame of a busy orientation week to prevent Zoom fatigue and scheduling conflicts
- ◆ Develop a website to allow all materials and resources to be available as needed, whether or not one attended the workshop

Workshop Details

- ◆ Workshops with instruction held 9/22 – 9/24. Extra help session held 9/25. All workshops done on Zoom.
- ◆ Each workshop had instruction from 6-7 PM followed by time to work on the assignment in breakout rooms.
 - Day 1: The Basics
 - Day 2: Manipulating Lists and Doing Math
 - Day 3: Integrated Development Environments, Additional Libraries, Debugging
- ◆ Videos, coding examples, and additional resources on website.
- ◆ Each workshop recorded and posted on website.
- ◆ Homework assignment built on itself after each workshop.
- ◆ Post-workshop survey sent out during week 2 of the quarter.

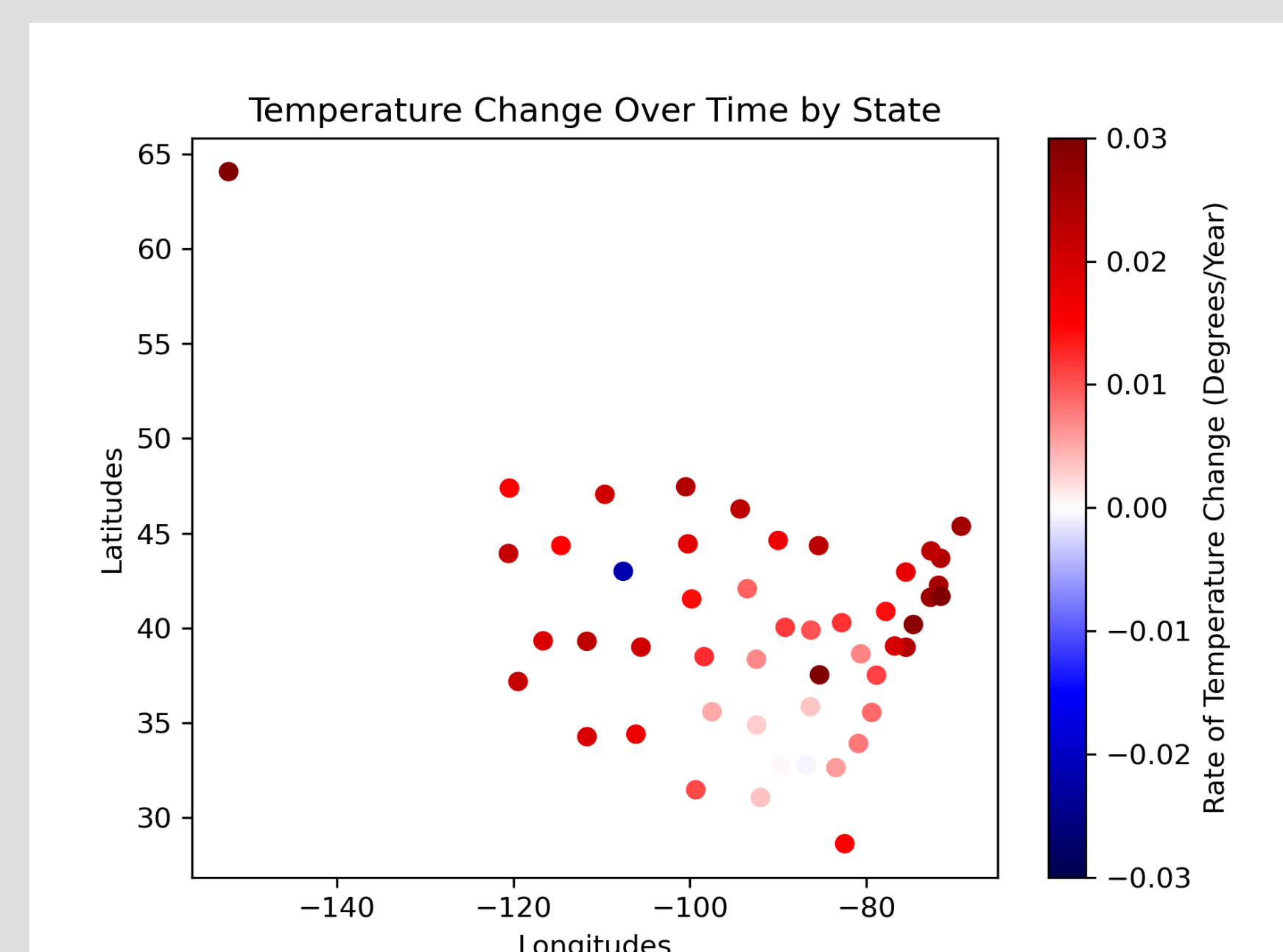


Figure 1: The completed assignment is shown above. Participants used a dataset of historical state temperatures to plot rate of temperature change in each state in the US.

Feedback

- ◆ “I know it's a lot of content to cover, and that impacts speed, but I would probably have preferred a longer course at a slower speed. It was very useful information and I feel less intimidated by Python, but I would like to understand why we did the different steps instead of just struggling to retype and follow along. But thank you so much for putting it on and making it available to everyone! You guys did a great job.”
- ◆ “This was a great program and idea, the first lesson had good pacing. I wish there was more of a set up period built in to the first session. It seems better to teach less more slowly, once people get the basics down they can problem solve more easily on their own.”
- ◆ “I think you all did a great job making all the resources available and letting us know what is out there. It's less daunting now that I know some of the resources that are out there for me.”
- ◆ “I wish it went more slowly, spread more sessions, so I can get comfortable with a topic before moving on to the next.”

Acknowledgments

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