Computational Astrophysics 2023/2024

Physics of Data

Part-1: *Transit Light Curves*

Submission deadline: 23/12/2024

Assignment 1: Better Together!

"But we are strong, each in our purpose, and we are all more strong together."

Bram Stoker

Learning aims: Through the solution of this exercise, you will set up the GitHub repository of your project and connect it with your local working machines using Git. You will also gain experience with the basic tools and commands to manage your Git repository.

Tasks:

A. **Let's start:** Fork the project Gitlab repository from https://github.com/tiziano1590/comp_astro_24. Then, invite me to your GitHub repository as a member with the role "developer". My GitHub username is @tiziano1590. It is up to you to decide if you want to have a public or private repository. *(My addition to the repository is enough to complete the task. In the assignment submission, just report the name and link of the repository).*

B. **Don't forget your parents:** Add the original GitHub repository as a remote and call it **ca24_remote**. Fetch the data from this remote. Get the date and the hashcode of the last commit of the remote. Add this information in your main branch in a file called **"assignment1_taskB.txt"**, commit and push this file to your remote. *(In the submission report the date and hashcode of the commit associated to the creation of the file assignment1_taskB.txt.)*

C. **Branch creation:** Create a new branch called **assignment1_taskC,** push it to your remote. Then, each member of the group has to create a file with name **taskC_gitlabusername.txt** where *gitlabusername* is the member username in gitlab. In the file put your real name. Finally, each member has

to commit and push this file using her/his GitHub account. *(In the submission report the username, the date date and hashcode of the commits made by all the members).*

D. **Let's merge:** Synchronise the content of the **main** and **assignment1_taskC** branch using the method/command you prefer (e.g. merger, rebase, cherry-pick). *(In the submission briefly describe the method you used and report the date and hashcode of the commits produced by the merger).*

E. **Ready to go!:** Create a dedicated conda environment with the batman-package installed. Print the list of packages in the environment to a file called "**assignment1_taskE.txt**". Finally push the file to your main branch. *(In the submission briefly describe the file. Report the date and the hashcode of the commit).*

F. **Planet sweet Planet!:** Choose a planet from the exoplanets encyclopedia. Create a file within the src/daneel/detection folder of your forked repository and call it "**transit.py**". Go through the batman tutorial using your planetary parameters and plot the lightcurve of your planet to a file called "**name_of_your_planet_assignment1_taskF.png**". Paste the code in the "**src/daneel/detection/transit.py**" file you previously created. Push the two files (the .py and the .png files) to your main branch. *(In the submission briefly describe the content of both files. Report the date and hashcode of the commits).*

Challenges (not mandatory):

G. **Where is my transit?:** Define the daneel.transit method (the one your transit.py file) you previously created, and call it from the command line (with the flag -t or --transit). Describe how to call this method in the README file. Finally, commit and push the changes to the main branch. The command should look like:
daneel -i path_to_the_parameters.yaml -t

This command should plot the transit light curve.

H) **The untouchable:** Use a parameters file to run it with the parameters of your planet given. Run it from a directory called 'run_daneel' out of your Git repository.

Then commit these changes and push them to GitHub. (Hint: use the parameters class already set up to read from an input file. Call it from the __main__ function in daneel and give it as an input for the transit method.)

I) **Universe is a weird place:** In astrophysics, we love acronyms. I challenge you to find an acronym for the name of your forked repository. We (I and the teaching assistants) will elect the best three (No, you will not have 'more exam points' for this...)

(For each of these optional challenges, report them with the relative date and hashcode of the commit.)