

Homework 2: Data Analysis Session 1

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Dear student,

this document is a supplement to the data analysis session 1. In the session we are working on a google colab notebook (also called jupyter notebook). You can find the notebook and future resources here:

<https://www.ipi.tuhh.de/process-imaging/>

In a colab notebook, you can execute python code, however the code is executed on a servers and you get to see the results on your computer through the colab website. This way you do not have to install any python or python extensions on your personal computer - everything works out of the box. All you need is a google account.

1. Login to your google account.
2. Find the link to the google colab notebook here and open it: <https://www.ipi.tuhh.de/process-imaging/>
3. Click "copy to drive" to have your own copy of the notebook. After creating your own copy, you can make individual changes to the code.

If you have no experience with python programming, you can find plenty of free resources on the internet. For example, have a look at this interactive course: <https://futurecoder.io/course/>

If you do not know what a jupyter notebook is, have a look at this tutorial:

<https://realpython.com/jupyter-notebook-introduction/#running-cells>

Session 1 homework description (07.06.2023 till 22.06.2023)

The goal of this session is to get familiar with python code and with jupyter notebooks (what we are using on google colab). We will

- Understand the the colab notebook and write down, what each section (cell) does. Maybe you want to make comments inside the code on a line by line basis. In python, you can use the # symbol to write a comment, as seen in this example:

```
x = 1 + 2 # this is a comment
# this is also a comment
```

- Find suitable parameters (Part 3) and document them (Part 5)
- What are the specific steps in Part 4, for example what is the difference between `computed_mask1` and `computed_mask2`?
- Try to improve the mask refinement algorithm in the Segmentation Block (Part 4). If you need inspiration for improving the mask (step 8), have a look at this or other examples from skimage. They use image filters and algorithms for various practical tasks seen in the link below.
https://scikit-image.org/docs/stable/auto_examples/applications/plot_fluorescence_nuclear_envelope.html#sphx-glr-auto-examples-applications-plot-fluorescence-nuclear-envelope-py

By completing the tasks mentioned in the notebook, you should be able to generate masks for individual frames. With this ability, we will scale these techniques for batch processing in session 2 (22.6.2023). During the consultation session (15.6.2023), you will have the ability to asks questions and geht help with the homework assignment.

Regards, Daniel Brummerloh

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