Quantitative Methods Workshop 2022 | Cryo-EM image processing

In this section of the workshop, we will be using Python to visualize and coarsely process real cryoEM data. The goals of this section are to: 1) become familiar working with and manipulating imaging data programmatically; 2) get a feel for what real data looks like – the good, the bad, and the ugly; 3) learn a bit about Fourier transforms, the contrast transfer function, and cross correlations as applied to template matching. This is not meant to be an exhaustive description of any of these topics, but instead is aimed to get you excited about image processing and help guide you to resources to learn more.

I recommend that folks team up in groups of 2-3, sharing a single screen/laptop to work through each of the notebooks.

Before you get started, be sure to save a copy of the data to your own google account using this link:

> https://drive.google.com/drive/folders/17gJqcVaEjr_vzB8jDPuU1GTsWbEUh3tn
> - Follow the link, click on the arrow beside qmw_cryoem_data, choose "Add shortcut to Drive"

There is not a ton of coding, but it is important to try and read through the code provided and try to make sense of it. I have also curated some questions (in bold) and hints (in italics) – it is best to discuss many of these as an entire group (i.e. the entire table). Laurel, Barrett and I will be walking around the classroom to help, but if you are stuck, don't hesitate to raise a hand and ask for help (either from us or from others at your table). Finally, if you want to track your progress on the questions, you can add 'comments' to each text box with your answers.

As with all things in science, the most important thing is to ask questions when you're lost and above all else, HAVE FUN!

To access the data and the notebook, you will need to sign into your own google account, add a shortcut to the data as described above.

Once signed in, the notebooks can be found here:

Part 1: https://colab.research.google.com/drive/15W8ZXIUH3Opaj5Olg37iVjzWSY0PajOt?usp=sharing

Part 2: https://colab.research.google.com/drive/1T3TM6mBGDRw-i1kZ9FjhqL3Z_g0mLxPF?usp=sharing

Part 3: https://colab.research.google.com/drive/1aRKQtcnmkjE3eFEpq6DVX4PqdJLIlB-H?usp=sharing