4360/6360 Final Project Update 1
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10/28/2021

Sartorius - Cell Instance Segmentation (Kaggle Competition)

Review:

The SH-SY5Y neuronal cell line is widely used in the production and research of drugs for the treatment of neurodegenerative diseases. Faster segmentation of these cells for data extraction and interpretation could be highly beneficial to the development of these pharmaceuticals in a timely, cost-effective manner. This is the goal of the Sartorius Cell Instance Segmentation competition on Kaggle. *Our project is continuing with its objective to perform instance segmentation on the SH-SY5Y cell line.*

Updates:

At this point, our focus is still on getting familiar with the data and exploring the best methods for our segmentation implementation. In our proposal, we touched on a few techniques that might be applicable to our scenario. After some discussion with the course TA, Farzan, we have narrowed down our methodology to a few key ideas. The U-net convolutional architecture is known to achieve highly accurate semantic segmentation on neuronal structures in very little time. While semantic segmentation is not the overall goal, if we can successfully use more coarse segmentation strategies, such as Voronoi segmentation, we could then apply semantic segmentation strategies on the isolated neuronal instances. We are still exploring these specific techniques, so it is possible we will finish this project using a different process.

Next:

After we have a clear idea of the methods we will use to segment the cell line, we plan on splitting the objective into whatever subcomponents best fit each of our members. The main task for the next update is to have some concrete results to verify if it is worth proceeding with the two types of segmentation algorithms we spoke about. Graph based methods of segmentation using spectral properties may be a workaround to the highly irregular, nonlinearity of the neuronal tissue. The schema of the stored segmentation data after processing also needs to be considered. The competition has a particular format for submissions, so better understanding of how to output, access, and write segmentation data will likely be beneficial to consider at an early stage of planning.