Research at MIL

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Chronology

- I virtually researched with the Molecular Imaging Lab (MIL) from Howard University for 8 weeks
 - Weekly meetings for sharing data, work-in-progress, and feedback
- First 4 weeks:
 - Introduced to the array of projects being done at the lab
 - Observed journal clubs, read working papers, learned new terminology/procedures
- Last 4 weeks:
 - Joined the Microglia Project

Why Research?

To Problem Solve!

- **Problem:** Cardiac arrest in newborns causes developmental delay and behavioral problems
- **Goal of Research:** use artificial intelligence to quantify microglia activation after cardiac arrest

My Role

- Objective: "classify, count, analyze"
 - With data from the ground truth, I was able to draw 9 regions of interest, then quantify the data
 - Used softwares ITK-Snap and Fiji (Image J) and scalable brain atlas to draw regions of interest from mouse brain
- Presented work-in-progress at weekly meetings
 Received feedback, and applied feedback
- Trained via online lecture





Procedures I learned..

- How to use Image J and ITK-Snap softwares to highlight regions
- The "hacks" to perfect images
- Saving/ Uploading ROI data
- Organizing white matter vs gray matter when drawing

What is Machine Learning?



Challenges/Mistakes

- Using the software efficiently
 - Restarting computer, clearing of opened tabs
 - Creating folder for work
- Slice Size/ Not enough memory
 - Memory change from 3,500-8,000 to accommodate image
- Including all microglia/Combining Drawings
 - With practice, the steps started to feel like muscle memory
 - Learning software "hacks" assisted me
- Missing pieces in my drawings
 - Highlighted the trends and gaps and asked for feedback!

Lessons/Knowledge Gained

- Brain anatomy and histology
 - White and Gray matter
 - Brain structure
- Approval process/passage of research papers
 - Working with reviewers and learning about common trends in their commentary/barriers
- Grit
 - I was able to improve each week by taking the extra steps of asking for help and allowing myself to get familiar with the brain through individual exploration

Beginning of the Projects





Raw Data Image



Histology Explained







Middle of the Project







End of the Project





These are the results of the cells quantified.

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Sources:

- "Machine Learning in the Microscopy Lab." *[Database Name]*, Sept. 2019, analyticalscience.wiley.com/do/10.1002/imaging.6770. Accessed 9 Sept. 2020.
- "Neuroanatomy at your fingertips." *Scalable Brain Atlas*,

scalablebrainatlas.incf.org. Accessed 15 July 2020.