

## Challenge for the Mouse Brain Tips

### Tips and Resources

Tips and resources will be posted at

<https://github.com/skunkworksneu/Projects/blob/master/Broad%20mouse%20brain%20challenge/>

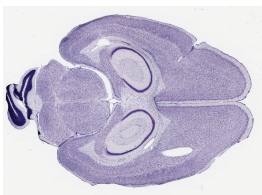
### Exploratory Data Analysis (EDA)

Start with exploratory data analysis (EDA)

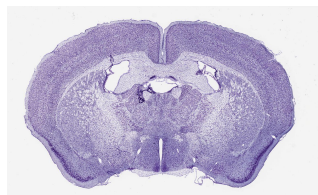
Get a hundred or so images of each anatomical plane and decide on a good way to convert them all to 512x512

[https://github.com/skunkworksneu/Projects/blob/master/Broad%20mouse%20brain%20challenge/Mouse\\_Brain\\_Challenge\\_Dataset\\_Guidelines.pdf](https://github.com/skunkworksneu/Projects/blob/master/Broad%20mouse%20brain%20challenge/Mouse_Brain_Challenge_Dataset_Guidelines.pdf)

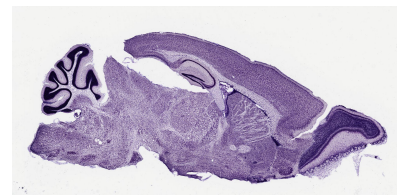
The images are available at very high resolution but the requirement is 512x512 so consider speed and storage along with accuracy.



**Horizontal (or axial)**



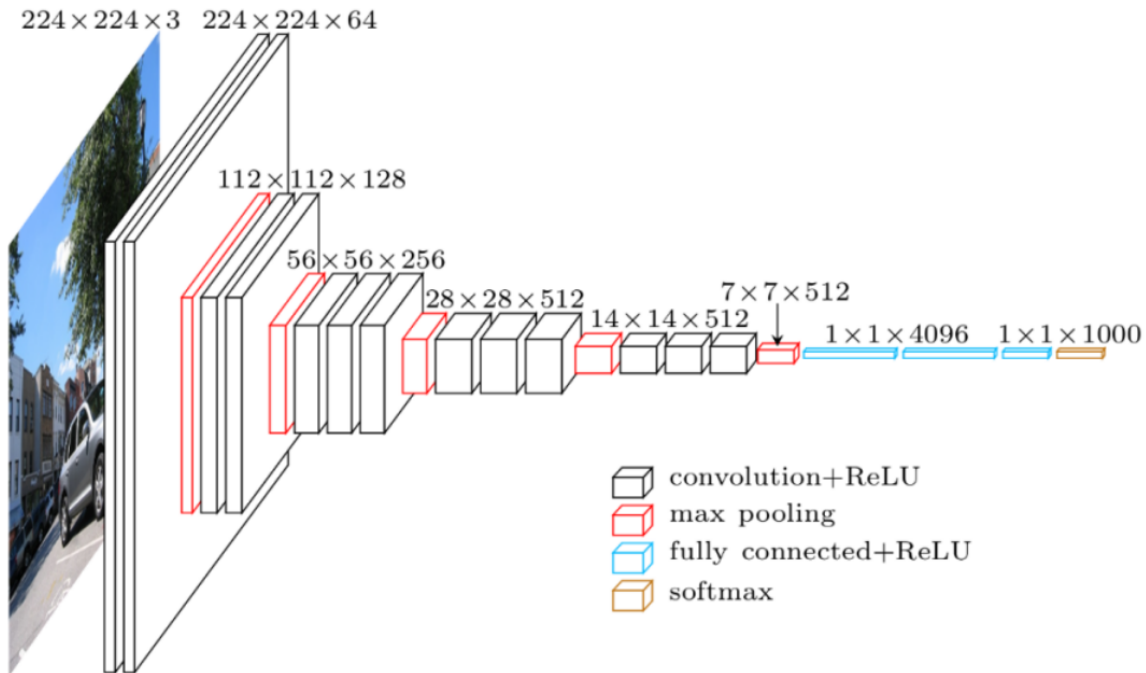
**Coronal**



**Sagittal**

### CNN Architecture

This is a classic CNN image classifier problem. It is fine to design your own architecture or extend an existing one like VGG or Resnet. Make sure you adapt the architecture to take 512x512 input, output three classes and output probabilities.



*An example architecture VGG-16*

### **Hyperparameter Tuning**

Make sure you evaluate your hyperparameters rather than just assume something like ReLU or max pooling is best for this problem. Use TensorBoard or a similar tool rather than run a network to completion as you tune hyperparameters.

This is an excellent TensorBoard tutorial: Hands-on TensorBoard (TensorFlow Dev Summit 2017)  
<https://youtu.be/eBbEDRsCmv4>

### **Evaluation**

Make sure you properly validate on out-of-sample data. Make sure your cost function is appropriate for probabilities. Make sure you calculate proper confidence intervals for your performance metric.

### **Coding Style**

Use a style guide like PEP 8 -- Style Guide for Python Code <https://www.python.org/dev/peps/pep-0008/> or Google Python Style Guide <https://google.github.io/styleguide/pyguide.html>

### **Notebook**



Make sure you explain your thinking and reasoning. Break the sections up in a readable and logical manner.

### **Questions**

Final submissions should be sent to skunkworksneu [skunkworksneu@gmail.com](mailto:skunkworksneu@gmail.com)

Please ask questions that relate to everyone on the NEU AI Skunkworks Slack  
<<https://neuaiskunkworks.slack.com>>

Challenge details <https://www.skonks.com/post/broad-institute-of-mit-and-harvard-and-neu-ai-skunkworks-mouse-brain-challenge>

E-mail final submission and requests for server access to skunkworksneu <[skunkworksneu@gmail.com](mailto:skunkworksneu@gmail.com)>

Please address any other specific question to Tommaso Biancalani  
<[tbiancal@broadinstitute.org](mailto:tbiancal@broadinstitute.org)>.

The Mouse Brain Challenge is brought to by the Broad Institute of MIT and Harvard and NEU AI Skunkworks.