**Project Goal**

For this project, a dataset comprising 52 images of … from the olfactory epithelium region [murine model or ex vivo human?] was used. In some images, cloudy, grey areas are visible as distinct against the background noise; these are areas where [what kind of staining?] has revealed the presence of amyloid beta (Aβ) protein plaque in the given sample. To expedite the process of categorizing each image as containing Aβ or not, image classification was attempted on this data set.

**Image Processing Approach**

To determine whether an image contained Aβ plaques, two image processing approaches were attempted:

1. The use of K-means clustering (K = 2) to generate two-color images of each image roughly distinguishing areas of plaque from areas of background noise. These generated images were then fed into a logistic regression model to categorize the images.
2. The generation of Gray-Level Co-occurrence Matrices (GLCMs) for each image to distinguish each image by the texture of the plaque areas as compared to the background noise. Statistical parameters calculated from these matrices were then fed into a logistic regression model to categorize the images.

In both cases, an initial filtering step was performed on all images. This step consisted of a simple Gaussian filter [with a constant σ of …] in an attempt at reducing the influence of background noise on either classification approach. A Median filter was applied on one image arbitrarily selected from the image set – this filter increased the influence of background noise on the

Figure 1 illustrates the overall steps in the process.

Other image processing techniques were also attempted. Applying a Fast-Fourier Transform algorithm on one image arbitrarily selected from the image set revealed no significant patterns in the frequency spectrum, so no frequency filtering was applied as a pre-processing step.

The use of histogram equalization, in a similar manner to the Median filter, emphasized the noise in the images to such a degree that subsequent …

[Canny edge detection]

[hysteresis thresholding]

**Limitations**

The most notable limitation of both image classification approaches was in the relative paucity of image data.