

CMSC630-A2

Bobby Best

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1 Features

1.1 Canny Edge Detection

Canny edge detection is implemented following the algorithms described in [this tutorialspoint article](#). In short, it runs a Sobel filter over the image and finds the gradient at each point, minimizes the edge across it, and then thresholds to make sure we're left with a binary image.

1.2 Dilation and Erosion

Dilation and erosion operators are implemented following the explanations from class; dilation increases the size of each edge pixel to match the structuring element, and erosion filters out any edge pixel whose neighborhood is not implied by the structuring element (boolean implication).

1.3 Otsu Histogram Thresholding

Histogram thresholding is implemented using the algorithm from the lecture, which I did more research on and found out is also called Otsu thresholding. It tries every one of the possible 255 locations to place a threshold and chooses the one with the minimum intraclass variance, in order to maximize the interclass variance.

1.4 K-Means Clustering

Clustering is implemented with a simple k-means algorithm, randomly choosing k values in the intensity space, assigning each pixel to its closest value, and then adjusting the values to match the mean of the pixels assigned to them, repeating until the values settle into their optimal locations.

2 Examples

Below are examples of the new operations on each class of images

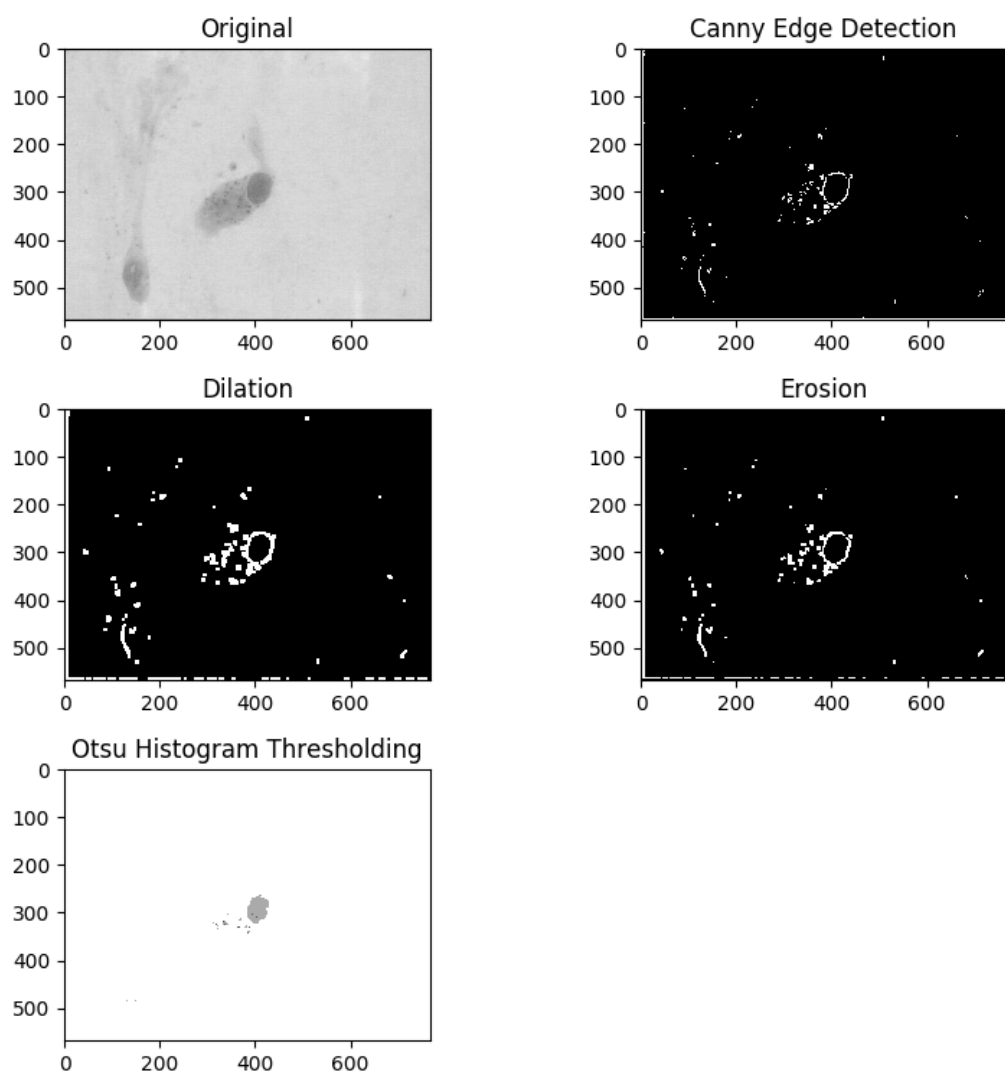


Figure 1: CYL Data

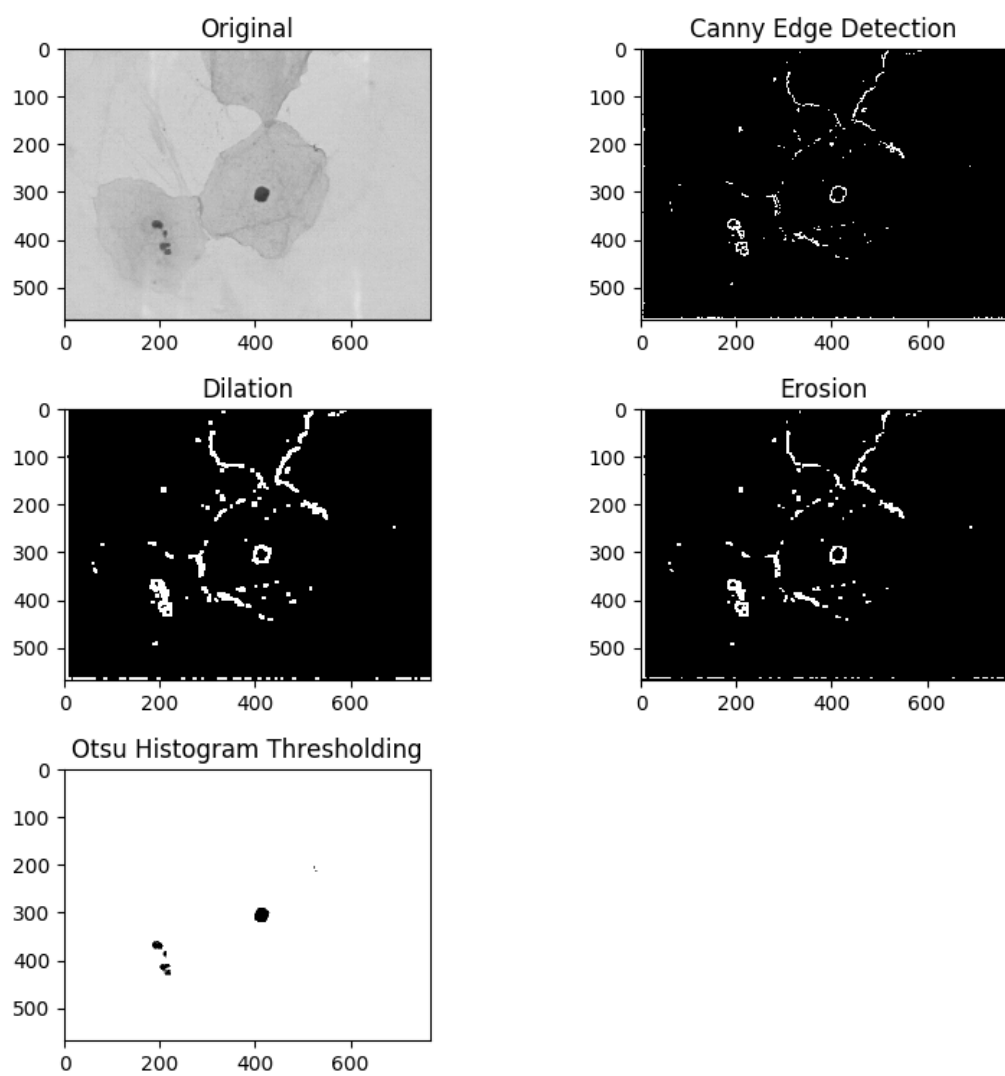


Figure 2: INTER Data

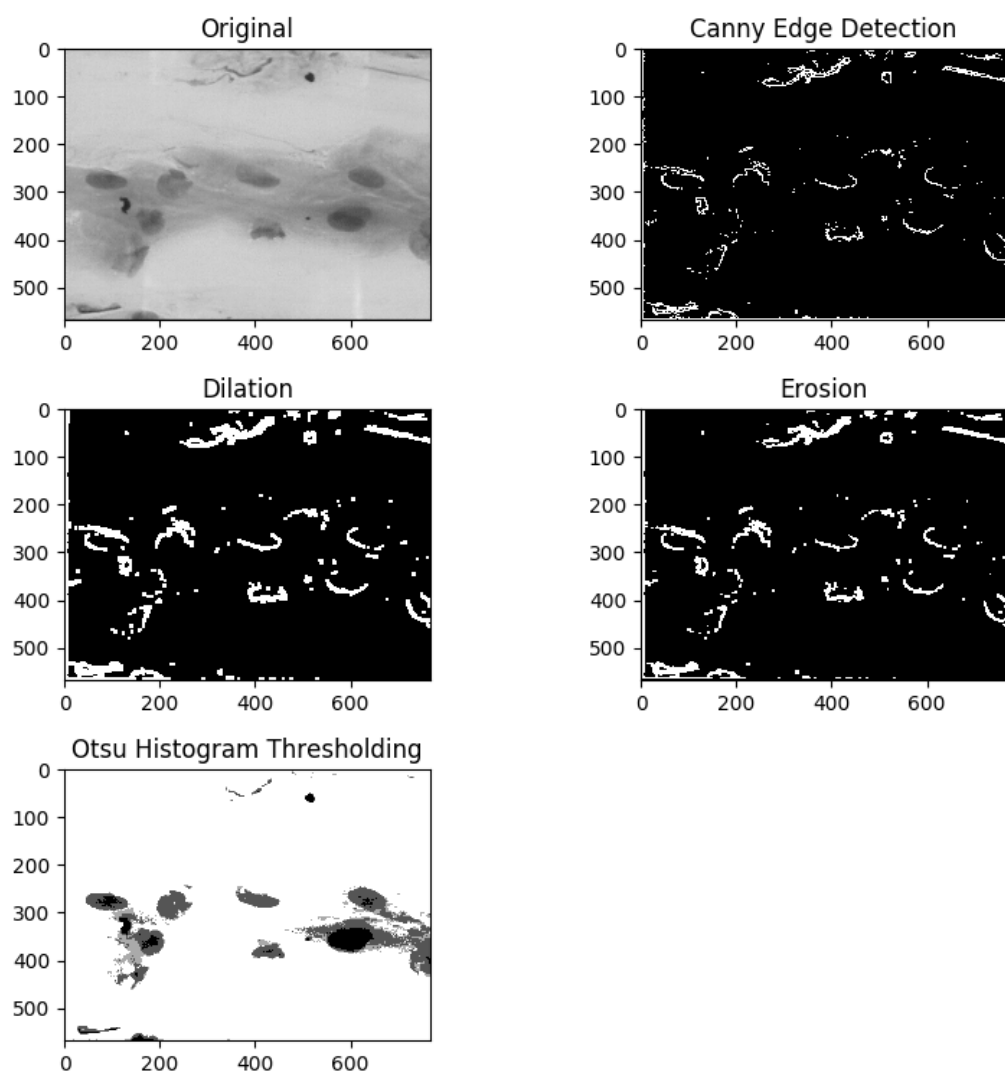


Figure 3: LET Data

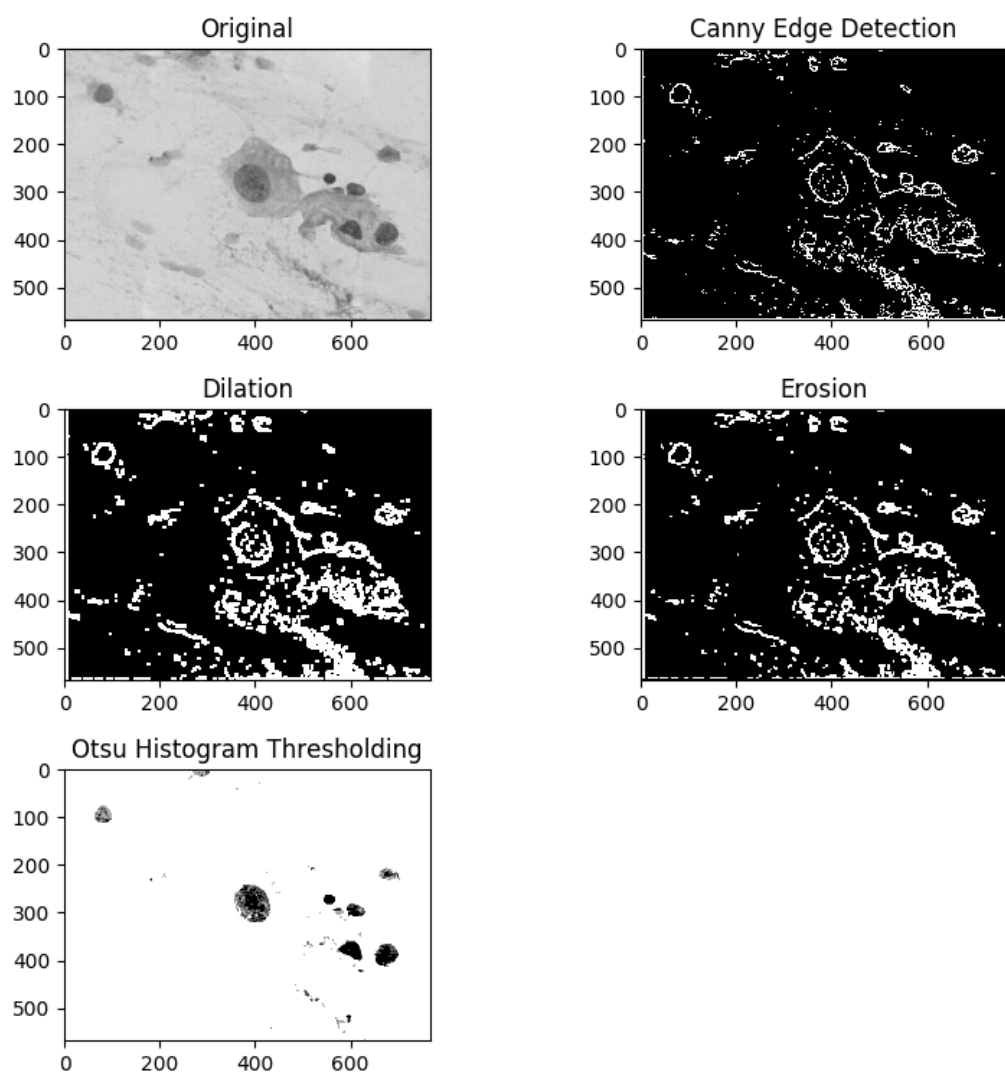


Figure 4: MOD Data

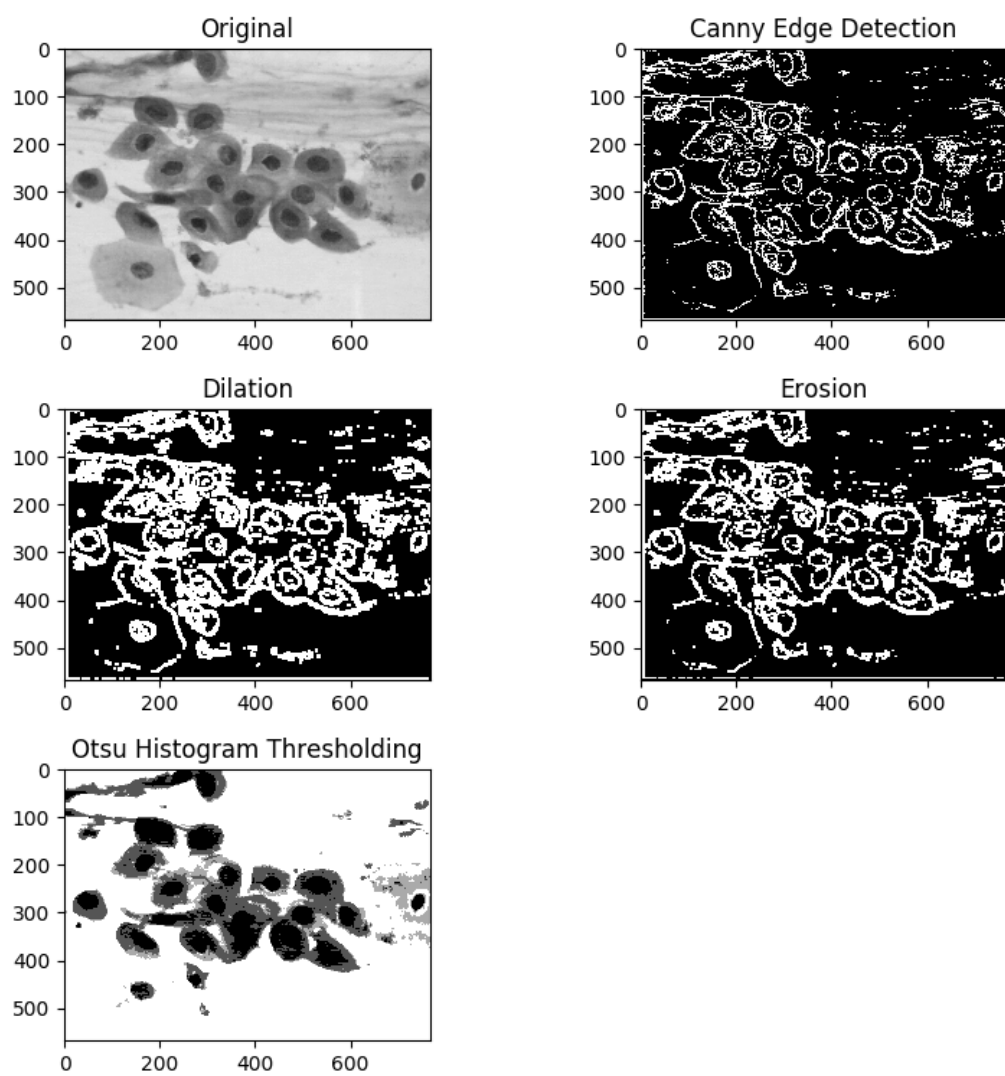


Figure 5: PARA Data

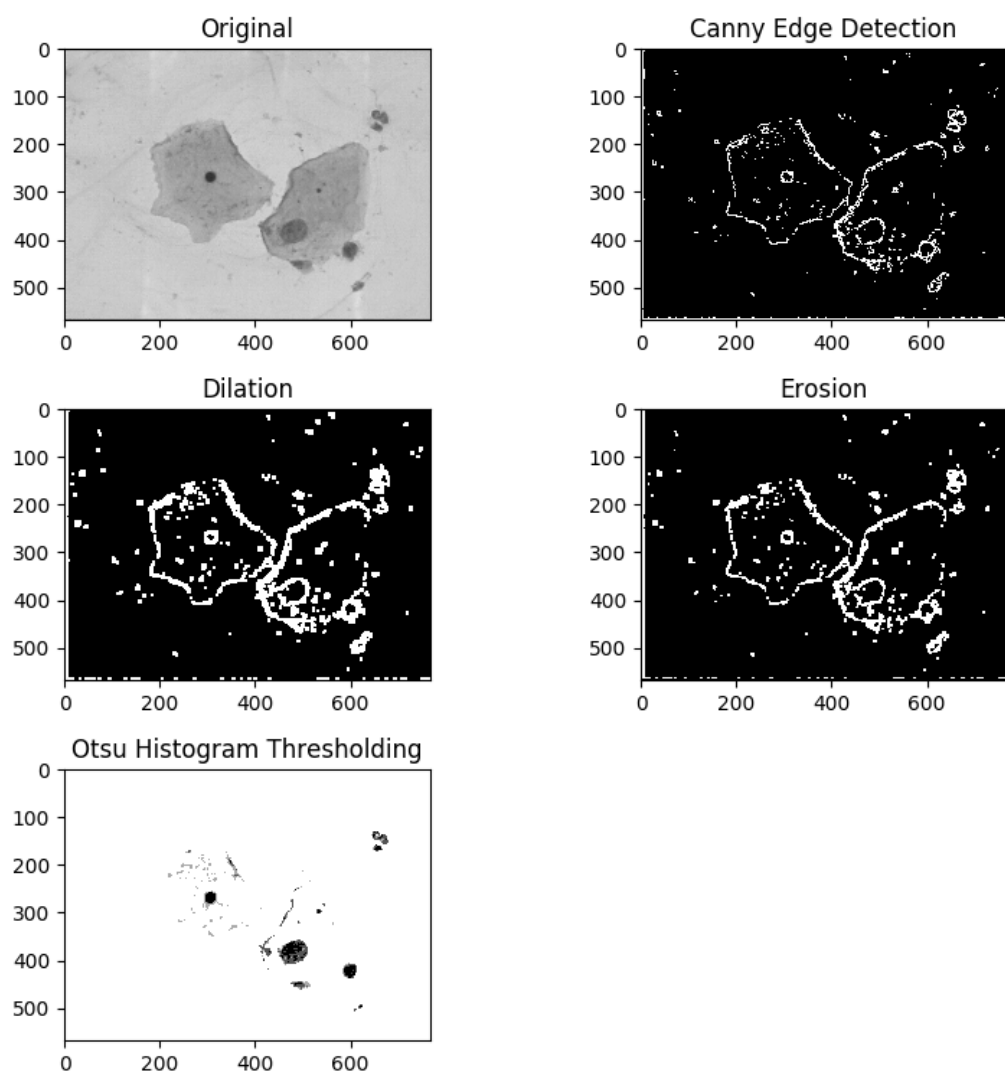


Figure 6: SUPER Data

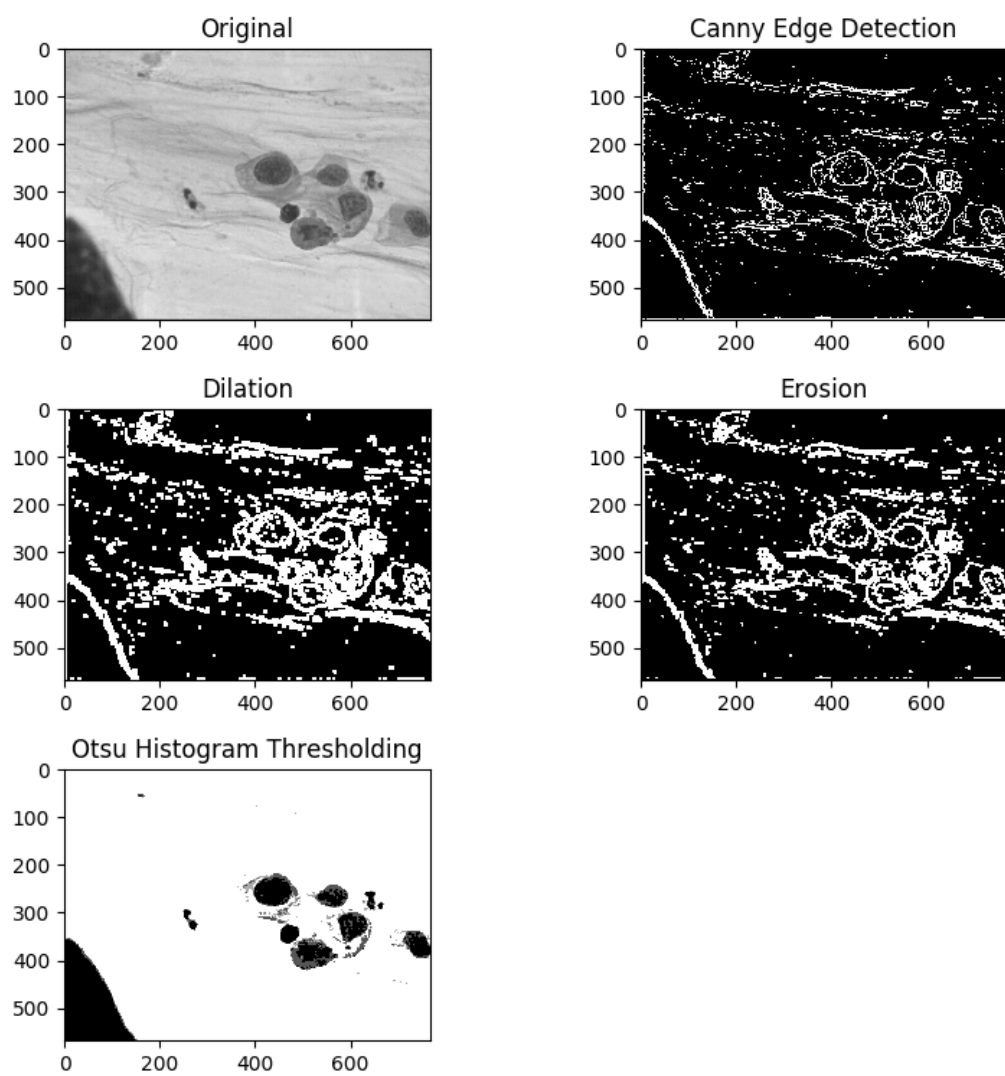


Figure 7: SVAR Data