**Cell Detection Report**

**Aim :**To determine which edge detector from the set of kernels we have; produces the most accurate result when convolved with an image, via ROC analysis.

**Method:** For every image we have, there are many factors that we can change.

We are interested in the best edge filter available, so our method of determining this will be as follows:

A) For each edge filter

1) Convolve the edge filter with the image (both in X direction and Y).

2) Calculate the magnitude/zero-crossing (of image from step 1).

3) Use a range of values for thresholding the image (from step 2).

a) Calculate the ROC value for each image produced (from step 3). \*[due to the range of threshold values (0-100), we get multiple images]

b) The threshold value that produces the best ROC value (indicated by the smallest Manhatten distance from (0,1)) can be used as a close approximation of where the best threshold value may lie (to the nearest integer).

4) Repeat step 3 with the mean filter (if possible) and also use multiple mean filter sizes.

5) Repeat step 3 again with the gaussian filter (if possible) and also use multiple gaussian filter sizes and different sigma values (with median value 0).

6) We will then have 3 Best ROC values produced for each edge filter: (?)

1 from applying the threshold alone.

1 from applying mean filter w/ threshold.

1 from applying gaussian filter w/ threshold.

B) Compare all ROC values to determine best ROC value.

C) Conclude on best edge filter to use for the image.

**Glossary**

D = distance (manhattan distance from 0,1 [best point]).

T = threshold value.

Sz = Noise filter size used.

Si = Sigma value used to produce gaussian filter

\* If Sz is listed without Si, then the mean filter is used, or else it is gaussian filter that is used.

\* All gaussian filters used mean value = 0.

**Results for Image 9343 AM - (Manhat Value, Factors to produce it)**

Sobel : 0.1951D, 47.0000T

Roberts: 0.2073D,15.0000T,9.0000Sz,0.5000Si

First-order Gaussian: (!?!?)

Laplacian: 0.6652D,7.0000T

Laplacian of Gaussian: (!?!?)

Filters ordered by ROC value: (!?!?)

The filter that could produce the best image was: (!?!?)

Add some images here for results, also showing why filter above was best (!?!?)

**Results for Image 43590 AM - (Manhat Value, Factors to produce it)**

Sobel: (!?!?)

Roberts: (!?!?)

First-order Gaussian: (!?!?)

Laplacian: (!?!?)

Laplacian of Gaussian: (!?!?)

Filters ordered by ROC value: (!?!?)

The filter that could produce the best image was: (!?!?)

Add some images here for results, also showing why filter above was best (!?!?)

**Results for Image 10905 JL - (Manhat Value, Factors to produce it)**

Sobel: (!?!?)

Roberts: (!?!?)

First-order Gaussian: (!?!?)

Laplacian: (!?!?)

Laplacian of Gaussian: (!?!?)

Filters ordered by ROC value: (!?!?)

The filter that could produce the best image was:(!?!?)

Add some images here for results, also showing why filter above was best (!?!?)

**Conclusion**

Determine the possible best filter overall. Maybe a filter won 2/3 of all filteres.

(????)

Our result may not be entirely useful as we used the matlab function for purposes of calculating the zerocrosses and for canny function. The results we obtained are bad in comparison to the filters we handled ourselves (as shown by the Best Manhatten distance each filter produced values). This may have affected our result entirely and prove our experiment's result very innaccurate.

**Extras**

* Used edge(I,'zerocross) function for laplacian.
* Used edge(I,'canny) for canny.
* BW = im2bw(Image) for training image

Discovery & Thinking :

1.The current condition of our analysis is limited because of the limitation of the picture resolution. We currently introduced the threshold in a linear status. In theory we introduce a binary search method to detects the best threashhold to save the time testing logn(deeper).

But currently

2.