Edge Detection

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Keywords: Filtering, Smoothing

1 INTRODUCTION

2 THEORY

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3 METHODS

4 LAPLACIAN OF GAUSSIAN

Laplacian of Gaussian refers to convolving a Gaussian smoothing mask with a Laplacian filter. The Laplacian is a 2-D isotropic measure of the 2nd spatial derivative of an image.[?] A small sample laplacian as as follows:

$$\begin{bmatrix} 0 & 1 & 0 \\ 1 & 4 & 1 \\ 0 & 1 & 0 \end{bmatrix}$$

Since MATLAB includes a function for calculcating the discrete laplacian, we can simply perform **del2**(img)[?] on the image, then convolve this onto the Gaussian. (This is because it requiers less computations to convolve the two smaller matricies first than to apply them sequencially to the image.) The final step is to refine the edges through zero crossing, this has been achived by *checking neighbours* of an element to change changes in sign. Changes in sign will represent an edge since the result of **LoG** is a differential image.

5 CELL DETECTION

Variable Smoothing

1. Create a set of Gaussian masks is produced for each filter.
2. Create Ω, a linear space bounded by 0 and the largest value possible for a given smoothed image.
3. Apply the given smoothed filter for ω where $\omega \in \Omega$
4. From the resulting set, calculate **TPR** and **FPR**.
5. Repeate for all Gaussians and return a set of coortinates.
6. Plot the set that contains the shortest distance to $(0, 1)$
7. Repeate for all filters and respective Gaussians.

Tuning Since each filter behaves differently, an appropriot set of Gaussian masks must be selected for each. Starting with fixed values of $\bar{X} = 0, \sigma = 1$ and a range of 0:1:10[1].

[1] From 0 to 10 and stepping by 1

6 RESULTS

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7 DISCUSSION

7.1 Analysis

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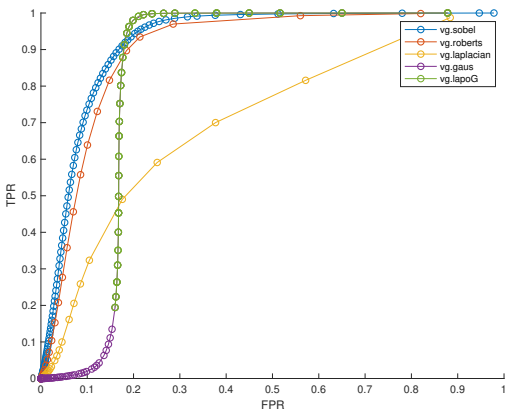

Fig. 1. Optimal curves when tested with identical Gaussians of size 0-10

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7.2 Validation

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8 CONCLUSION

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