Detection of Abnormalities in Synthetic Mammograms

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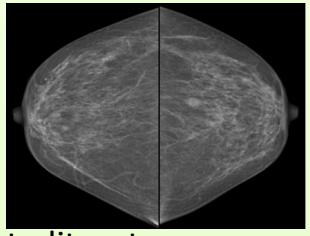
Introduction

Left and right mammograms are viewed as the mirror image of one another.



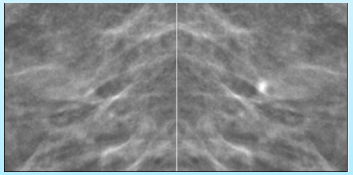
According to literature, symmetry is a robust detection mechanism[1] and asymmetries between corresponding regions in left and right breast can indicate a tumour[2] .

This study looks at alternative methods to detect a tumour. It compares the standard mirror method to non mirror, to see if symmetry does help. And then compares to a 'flicker' condition to see if there is a better method for detecting

Method

2AFC experiment. 2 participants.

Stimulus:- 2 square synthetic mammogram images presented side by side. On one of the images a synthetic 'blob' is presented.

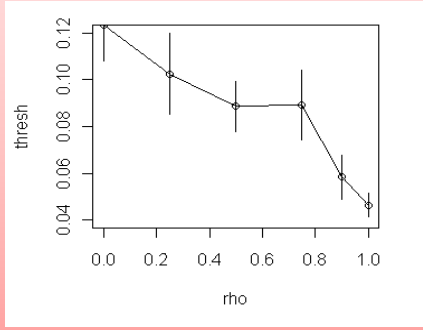


Task: Decide whether the signal is presented on the left or the right. The correlation between the two images is randomly varied. Values are; 0,.25,.5,.75,.9 &1.

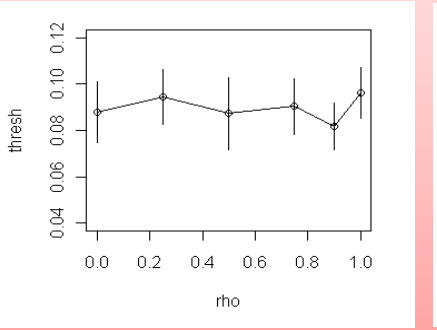
3 conditions: *Non Mirrored*- two images side by side. *Mirror*- two images in mirror image of each other. *Flick*- each of the two images each flicking between two frames.

Results

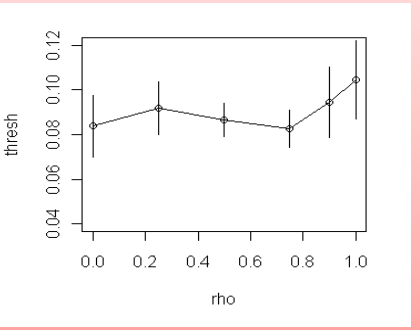
Flicker



Mirror



Non Mirrored



Conclusions

1)No difference in threshold for detecting blob for mirrored versus non mirrored displays.

2)Correlation **does not change** the threshold for the mirror condition and so symmetry does not help detection.

3)Flicker **reduced** the threshold substantially, especially when the images where similar.

Further research to test the 'flicker' condition's efficiency at detecting tumours is needed before anything is put into practice.

References

1.Wagemens J. (1995) Detection of visual symmetries. Spatial Vision 9, 9-32

2.2. Lau T.K, and Bischof, W.F (1991) Automated detection of breast tumours using the asymmetry approach. Computers and biomedical research 24, 237-295