Breast Cancer Risk Assessment using Texture & Shape Analysis of Mammograms (Technical Perspective)

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collaborating with

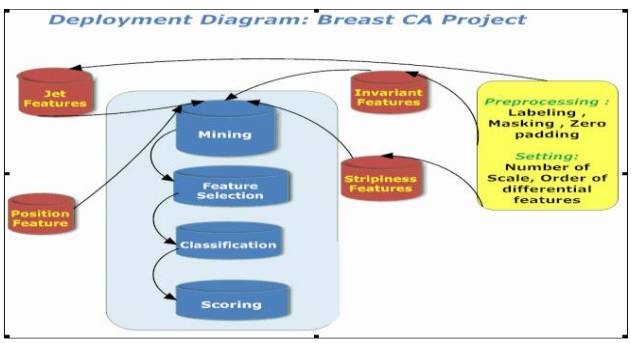
Background

- There are several computerized approaches to investigate mammograms ranging from threshold techniques and wedge based techniques, features of the image with radiologist grading of mammography eg Polynomial invariants, unsupervised clustering, N jet features etc.

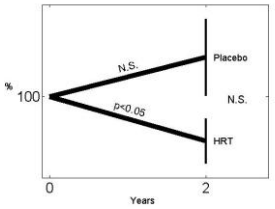
Approach and Methods

- Automatic assessment of mammogram adequacy and quality. This includes pre-processing such as improving spatial resolution restoration, artifact removal such as pectoral muscle. (Statistical shape based techniques)
- Developing registration method developement to facilitate accurate comparison of extracted local features on temporal mammograms.
- Investigation and implementation of novel and consistent techniques to extract localized changes (features) based on texture and shape from successive mammograms of women undergoing HRT .
- Identification of local image structure that relate to breast cancer risk.
- Development of an efficient feature mining and classification technique in order to discover the different measures indicating breast cancer risk.

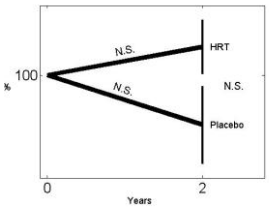
Results



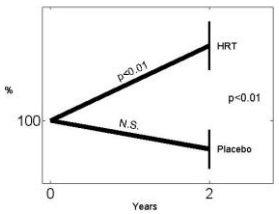
Deployment diagram of Breast cancer project



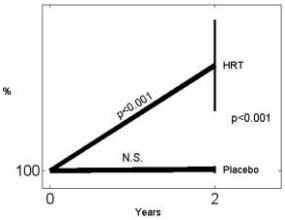
Fractal dimension



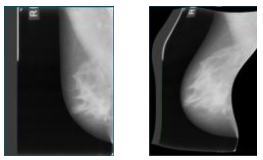
Lacunarity



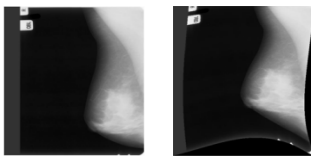
Our measure



BIRADS



Intensity based registration



Landmark based Registration

Conclusions

- We introduced a supervised methodology based on a general statistical machine learning framework, using Hessian based features, capable of differentiating different effect specific structure change in breast.
- We also showed that our scale space based feature can distinguish between cancer and control mammograms as effective as radiologist assisted measure.

Selected Publications

- J. Raundahl et al, "Quantifyingeffect-specific mammographic density," in Medical Image Computing and Computer-Assisted Intervention MICCAI 2007, vol. 4792. , October 2007, pp. 580–587.
- G. Karemore et al, "Fractal Dimension and Lacunarity analysis of mammographic patterns in assessing breast cancer risk related to HRT treated population: A Longitudinal and Cross-sectional study", SPIE Proceedings, 2009, Volume 10 (2) ,2009, USA.
- G. Karemore et al, "Automatic consistent registration framework for Temporal mammogram: In application to breast cancer risk assessment due to HRT", IJCARS, 4(1), 2009