Instituto Superior Técnico

ISR

Report

State Of The Art Milestone

State Of The Art Essay: A First Approach

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1 Introduction

The Medical Imaging Multimodality Breast Cancer Diagnosis is a topic of great interest, it has been the subject of much work in the world of medicine, but few developments in terms of innovation in the computational world. An Application like this has a wide spectrum fields reference from surveillance based systems to medical application.

A vast majority of masses and calcifications can be accurately diagnosed from cytological features [1] of the cells that constitute them. However, the diagnostic accuracy depends on the training, experience, and many indefinite factors of interpretation of the medical expert in cytological evaluation.

There was, in fact, some developments in the past facing the classification system Computer-Based [2, 3] that assists in the diagnosis of breast cells based on visual assessment of characteristics of the cells. [4] A set of cytologic features, previously evaluated visually, are now replaced by digital ones, evaluated by image analysis. In this project we will compare the human precision in cytological diagnosis of breast cancer by digital image analysis accuracy combined with Computer-Based Machine Learn classification.

2 A User Interface Contextualisation

The first step in successfully analysing the digital image is to specify the exact location of each masses or calcifications nucleus. The image is projected onto a computer screen, and the clinical medical operator uses, preferentially, a mouse button that will trace a rough outline of each visible masses (Figure 1) nucleus. On the other hand, the clinical medical operator will mark with dots the calcification (Figure 2) nucleus of cells.

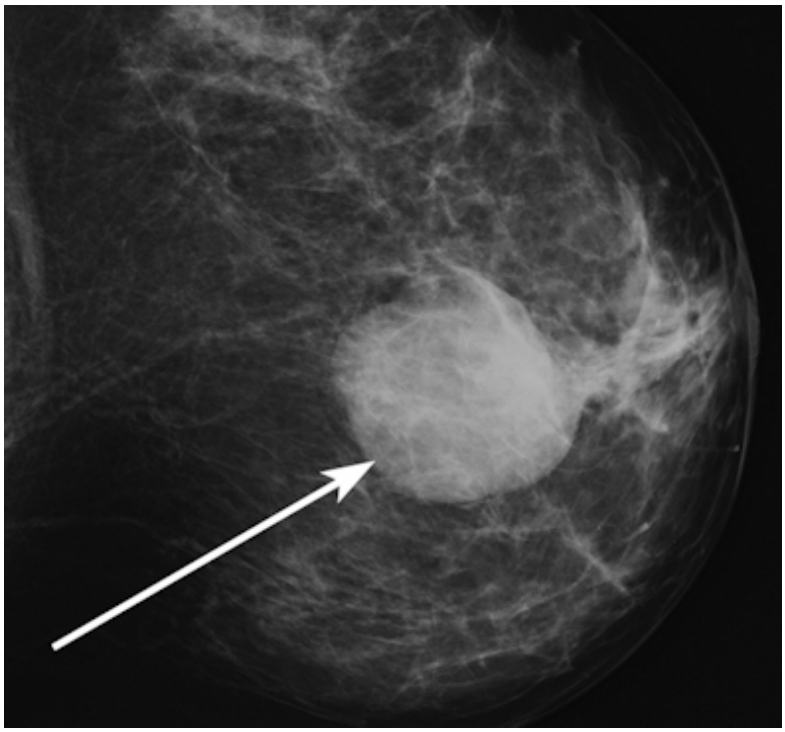

Figure 1: Mammographic image of a high-density mass (arrow)

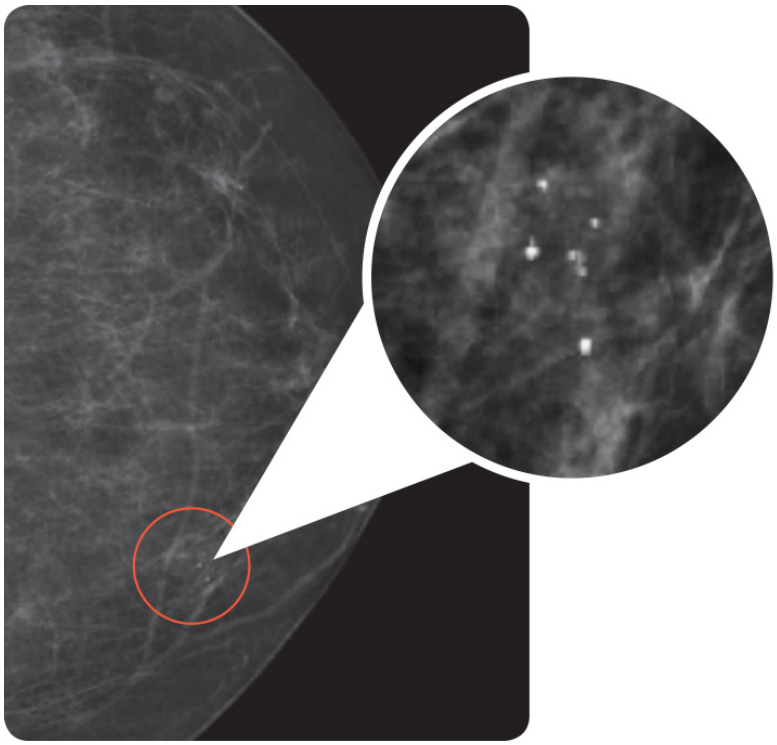

Figure 2: Mammogram – shows calcifications, an early sign of breast cancer

References

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[3] Mangasarian OL. Multi-surface method of pattern separation. *IEEE Transactions on Information Theory IT-14:801-807*, 1968.

[4] Wolberg WH, Mangasarian OL. Multisurface method of pattern separation for medical diagnosis applied to breast cytology. *Proceedings of the National Academy of Sciences, U.S.A. 87:9193-9196*, 1992.