A survey on breast lesion segmentation in Ultra-Sound images and its assessment: A survey

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Abstract

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Introduction

sec:intro

- Narrow to the need of accurate delineations
- What is reviewed and what is not
- Article Objectives
- similar works
- paper structure

sec:intro:to_delinations

the need of accurate delineations

1. breast cancer kills
2. screening is needed for early detection
3. Health from images is like any other visual inspection
   - Radiologic diagnisis error rates are similar to any other human visual inspection manning2005perception [1]
   - Utilization of computers to aid the Radiologists during the diagnosis process giger2008anniversary [2]
4. Advantage of Ultra-Sound (US)
5. Breast Imaging-Reporting and Data System (BI-RADS)
6. need of accurate delineations

Breast cancer is the leading cause of cancer deaths among females worldwide cancerStatisti [3]. Nevertheless, death by breast cancer are highly reduced when early treated. Thus, to run a chance of surviving breast cancer, it is uttermost important the early detection of malignant tumors. This has motivated the establishment of Breast Screening PolicyBreast Screening Policies (BSPs) to facilitate this breast cancer detection at an early stage. Despite X-ray Digital Mammography (DM) is considered the gold standard technique for BSP, other screening techniques like US and Magnetic Resonance Imaging are being investigated to overcome DM limitations due to tissue superposition which can either mimic or obscure malignant pathology, and avoid X-ray radiation all together.

Medical imaging contributes to its early detection through screening programs, non-invasive diagnosis, follow-up, and similar procedures. Despite Breast Ultra-Sound (BUS) imaging not being the imaging modality of reference for breast cancer screening smith2003american [4], US imaging has more discriminative power when compared with other image modalities to visually differentiate benign from malignant solid lesions Stavros:1995p12392 [5]. In this manner, US screening is estimated to be able to reduce between $65 \sim 85\%$ of unnecessary biopsies, in favour of a less traumatic short-term screening follow-up using BUS images. As the standard for assessing these BUS images, the American College of Radiology (ACR) proposes the BI-RADS lexicon for BUS images piradsus [6]. This US BI-RADS lexicon is a set of standard markers that characterizes the lesions encoding the visual cues found in BUS images and facilitates their analysis. Further details regarding the US BI-RADS lexicon descriptors proposed by the ACR, can be found in Sect. sec:methodApp ??, where visual cues of BUS images and breast structures are discussed to define feature descriptors.

The incorporation of US in screening policies and the emergence of clinical standards to assess image like the US BI-RADS lexicon, encourage the development of Computer Aided Diagnosis (CAD) systems using US to be applied to breast cancer diagnosis. However, this clinical assessment using lexicon is not directly applicable to CAD systems. Shortcomings like the location and explicit delineation of the lesions need to be addressed, since those tasks are intrinsically carried out by the radiologists during their visual assessment of the images to infer the lexicon representation of the lesions.

sec:intro:what_is_reviewed

What is reviewed

sec:intro:article_objective

Article objective

sec:intro:analysis_of_the_methods

Todo list

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