Chapter 10

A Survey on Female Breast Cancer:
Computer–Aided Diagnosis Using Digital Breast Tomosynthesis

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ABSTRACT

The mortality rate of breast cancer can be effectively reduced by early diagnosis. Imaging modalities are used to diagnose through computer for women breast cancer. Digital mammography is the best imaging model for breast cancer screening technique and diagnosis. Digital breast tomosynthesis (DBT), a three-dimensional (3-D) mammography, is an advanced form of breast imaging where multiple images of the breast from different angles are captured and reconstructed (synthesized) into a three-dimensional image set. This chapter discusses the research work carried out on the computer diagnosis of women breast cancer through digital breast tomosynthesis and concludes with further improvement in the computer-aided diagnosis.

INTRODUCTION

Cancer is a deadly disease, which can start in any internal organ; slowly it spreads to the entire body and the patient dies. Each year American Cancer Society publish more number of new cancer cases and deaths caused by it. For the year 2015-2016,

they forecast 1,658,370 new cancer cases and 589,430 cancer deaths only in the United States. Therefore, it is expected that the Statistics will be very high for the entire world (Siegel, 2015). Among all types of cancer, breast cancer is the Second leading cause of death in the United States. Current solutions to diagnosing cancer are not adequate due to less promising computer technology and high false negative results.

Breast cancer found in Indian females based on age factor is 25 women's for 1,00,000 women's and the mortality rate is 12 women's for 1,00,000 women's. Statistical Data analysed from latest National Cancer Registries and the report is based on age and mortality factor. The age is adjusted based on the incidence rate of carcinoma of the breast which was found as high as 41 per 100,000 women in Delhi, followed by Chennai (37.9), Bangalore (34.4) and Thiruvananthapuram District (33.7). A statistically significant increase in age adjusted rate over time (1982–2014) in all the places namely Bangalore (annual percentage change: 2.84%), Barshi (1.87%), Bhopal (2.00%), Chennai (2.44%), Delhi (1.44%) and Mumbai (1.42%) was observed. Mortality-to-incidence ratio was found to be as high as 66 in rural registries whereas as low as 8 in urban registries. Young age is found as a major risk factor for breast cancer in Indian women. Breast cancer projection for India during time periods 2020 suggests the number to go as high as 1797900. Better health awareness and availability of breast cancer screening programmes and treatment facilities would cause a favourable and positive clinical picture in the country. The statistics of women breast cancer in India of different age groups are shown in Figure 1.

Breast cancer is two types: non-invasive breast cancer and invasive breast cancer are shown in Figure 2. Non-invasive breast cancer does not invade or spread to other cells. Invasive breast cancer breaks the wall of the tissue and spread all over the breast; it very common type breast cancer (Williams, 2007). The following figure shows healthy milk ducts, non-invasive cancer milk duct, and invasive milk duct.

The chapter introduced the overview of Breast Cancer in Introduction section. The imaging modalities used for Breast Cancer is discussed in section ii such as Ultrasound, Magnetic Resonance Imaging, Digital Mammography and Breast Tomosynthesis. Section iii discuss the most important breast cancer lesions such as micro-calcification, masses, architecture distortion and bilateral symmetry. Nowadays, computer aided diagnosis plays a vital role and their significance and functionalities are discussed in section iv. Researchers carried out a mass volume of work in this field and their highlights are specified in section v. The paper finally concludes with the future direction of breast cancer diagnosis.

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