

Chapter 40

Computer Aided Diagnosis System for Breast Cancer Detection

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ABSTRACT

Management of breast cancer in elder patients is challenging due to a lack of good quality evidence regarding the role of adjuvant chemotherapy. Mammograms can depict most of the significant changes of breast disease. The primary radiographic signs of breast cancer are masses (its density, site, shape, borders), spicular lesions and calcification content. The basic idea is to convert the mammogram image and convert into 3-D matrix. Obtained matrix is used to convert the mammogram into binary image. Several techniques like detecting cell, filling gaps, dilating gaps, removing border, smoothing the objects, finding structures & extracting large objects have been used. Finally finding the granulometry of tissues in an Image without explicitly segmenting (detecting) each object. Compared to existing multiscale enhancement approaches, images processed with this method appear more familiar to radiologists and naturally close to the original mammogram.

INTRODUCTION

One of the biggest risk factors for the development of breast cancer is age. The median age for breast cancer diagnosis is approximately 60 years, and over 40% of all breast cancers diagnosed are in women aged 65 years or older. Health informatics is a relatively new sub-specialty of medicine which uses information technology to manage clinical information. There is space for growth in the local health

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informatics scene, since only few public and private hospitals have significant health management systems in place. Only rare government hospitals are computerized in our country (India). In that very rare hospitals are with this upcoming awareness, the field of health informatics is very relevant to the Indian market as per National Cancer Institute, Surveillance, Epidemiology and End Results Program: breast cancer incidence and mortality. It is very strongly felt and believed that the research involvement in this study addresses a portion of health informatics

Artificial Intelligence (AI) is a branch of computer science that focuses on emulating the portions of human brain working that makes decisions, with the help of software. In short, a machine that takes decisions can be built using Artificial Intelligence. In the last decade the technology has improved a lot and the AI has entered our world with the widest use of technology. Expert system (ES) is not only helping us, but also acting as a human being with full of knowledge and gives us advice in those areas, where it is impossible to have many of the humans to do the same thing.

AI in medicine is based on the construction of AI programs that perform the diagnosis and makes some therapy recommendations. The medical applications are developed based on their programming methods, which are purely statistical and probabilistic methods. Today, the importance of diagnosis is a task requiring remote support in routine clinical situations which receives equal emphasis on other clinical tasks. A medical expert system in order to detect disease has to be first fed with information from experts, in our case doctors. The information collected from various doctors are gathered, stores and fed into the computer system through program.

The breast cancer is related to the elderly section of the society. Further, these cases of breast cancer are currently under intense exploration globally and their management is still a challenge to the medical community. Breast cancer ranks second to lung cancer and is the most common form of malignancy in women. There are about one million breast cancer cases in women coming into light each year worldwide. One out of every ten women is said to be subjected to this disease in her lifetime. It is a pernicious disease that is causing large numbers of deaths not only in developed countries like the United States of America, United Kingdom and Canada but also in the underdeveloped and developing countries including India. Christoyianni et al. (2002) mentioned that the chance that breast cancer will be responsible for a woman's death is about 1 in 35 (about 3%), although breast cancer has very high incidence and death rate, the cause of breast cancer is still unknown. Therefore, early detection is the first crucial step towards treating breast cancer. It plays a key role in breast cancer diagnosis and treatment.

Mammogram, an x-ray picture of the breast is used to check presence of breast cancer in women. For standard mammograms, the film is fed into a machine which converts the image into a digital signal that is then analyzed by the computer. Alternatively, the technology can be applied to digital mammograms. The computer then displays the image on a video screen with markers pointing to areas it "thinks" the radiologist should check closely.

BACKGROUND

Cancer continues to be a significant public health problem in the world. Elderly population of the society has this problem and it is prevalent all over the world. The proposed group of diseases is both, a medical as well as a social challenge and its management still needs to be improved markedly.

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