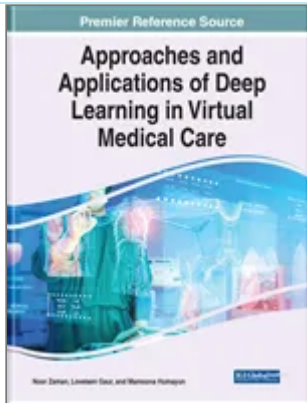


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Optimized Breast Cancer Premature Detection Method With Computational Segmentation: A Systematic Review Mapping

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Abstract

Breast cancer is the most common cancer in women aged 59 to 69 years old. Studies have shown that early detection and treatment of breast cancer increases the chances of survival significantly. They also demonstrated that detecting small lesions early improves forecasting and results in a significant reduction in death cases. The most effective screening diagnostic technique in this case is mammography. However, interpretation of mammograms is difficult due to small differences in tissue densities within mammographic images. This is especially true for dense breasts, and this study suggests that screening mammography is more effective in fatty breast tissue than in dense breast tissue. This study focuses on breast cancer diagnosis as well as identifying risk factors and their assessments of breast cancer as well as premature detection of breast cancer by analyzing 3D MRI mammography methods and segmentation of mammographic images using machine learning.

Chapter Preview

Introduction

Top

When the healthy cells grow abnormally in the breast and continue to accumulate resulting in a mass or lumps called tumor. The tumor is categorizing as benign and malignant. A benign tumor cannot spread in the other part of the body but possibly grow but the malignant tumor can quickly grow and spread throughout the body. Breast cancer can expand in other parts of the body through arteries or lymph vessels known as metastasis. The study covers both non-invasive and invasive cancers, as well as Premature stages of breast cancer to localize cancer in the breast, which include I, II, and III. These stages describe how cancer has progressed, including how much it has grown and where it has spread. Despite the fact that breast cancer spreads prematurely to lymph nodes, it can also migrate to other parts of the body such as the bones, lungs, liver, and brain, which is known as metastatic or stage IV breast cancer. While it depends on the condition of breast cancer, normally it is not often considered the relationship of lymph nodes comes to stage IV breast cancer. It depends on different types of breast cancer which are based on the cells that exist in the breast to become cancerous. Breast cancer can have started in any area of the breast, a breast consists of three major parts including (1) lobules, (2) ducts, and (3) connective tissue. The lobules indicate the glands which produce milk, ducts are the tube that brings milk to the nipples and associated with tissues containing fibrous and fatty tissues surround and holds everything together. Normally breast cancer starts in the lobules or ducts. Breast cancer can metastasis, or spread outside of the breast, through lymphatic and blood channels to other regions of the body. Table 1 depicts the various kinds of breast cancer and their associated breast diseases.

Table 1. Breast malignant tumors

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Types of Breast Cancer	Ratio of growth
In Situ Carcinoma	15-30%
Ductal Carcinoma in Situ	80%
Lobular Carcinoma in Situ	20%
Invasive Carcinoma	70-85%
Ductal Carcinoma(General Type)	79%
Lobular Carcinoma	10%
Tubular Cribriform Carcinoma	6%
Mucinous Carcinoma	2%
Medullary Carcinoma	2%
Papillary Carcinoma	1%

Invasive and non-invasive breast cancers are also possible. Non-invasive breast cancer does not expand beyond the milk ducts or lobules in the breast, whereas invasive breast cancer spreads to distant organs and tissues. Ductal carcinoma and lobular carcinoma are cancers that begin in the ducts or lobes. Other types of breast cancer, such as invasive ductal carcinoma, can spread outside the ducts and into other regions of the breast tissue. The other type of breast cancer is invasive lobular carcinoma, which can migrate from the lobules to the adjacent breast tissues, allowing the cancer cells to migrate to other parts of the body. Ductal carcinoma is frequently developing cancer in the breast from the beginning of the cell that contour the milk ducts. In the end, ductal carcinoma in situ (DCIS) cannot spread to another part of the body but it affects only the duct due to non-invasive cancer

Multi-Grading and Staging of Breast Cancer

The irregular shape of cancer cells and tissues is depicted in the breast cancer classification. Breast cancer is classified in this stage based on the types, grades, and stages of the disease. Table 1 defines and categorizes various types, grades, and stages of cancer, as well as various ranges:

- Grade I (Low-grade): Normal cells and tissues are similar to cancer cells and tissues. These cancers are well-differentiated, according to research.
- Grade II (Low-grade): Cells and tissues are irregular and slightly different, but they are considered low grade.
- Grade III (High-grade): Cancer cells and tissues are frequently abnormal. These cancers are well-known for being difficult to distinguish because they no longer have an architectural shape or theme.

- Grade IV (High-grade): These undifferentiated tumors produce the rarest cells. They are of the highest grade and generally develop and spread faster than lower grade cancers.
- Stage 0: None-growth cancer.
- Stages 1 to 3: Primary cancer spread only to surrounding tissues.
- Stage 4: Cancer has extent to distant parts of the body.

The stages of breast cancer are described in table.2 to demonstrate the various subtypes and stages of breast cancer. It displays the survival rates' mortalities.

Table 2. Stages of breast cancer

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Stages	Grades	Types of Breast Cancer	Survival Rate
0	Low Grade-I	Ductal Carcinoma or Lobular Carcinoma in Situ	92%
I	Low Grade-I	Invasive Carcinoma 2cm or less in size without nodal involvement and no distance metastasis	87%
II	Low Grade-II	Invasive Carcinoma less than 5cm without nodal involvement but movable axillary nodes and no distance metastasis	75%
III	High Grade-I	Invasive Carcinoma less than 5cm with nodal involvement and fixed axillary nodes	46%
IV	High Grade-II	Any form of breast cancer with distance metastasis	13%

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Soobia Saeed, Noor Zaman Jhanjhi, Mehmood Naqvi, Mamoonah Humyun, Muneer Ahmad, Loveleen Gaur

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Smita Das, Swanirbhar Majumder

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Chapter 4 **\$37.50**

Application of Deep Learning in Epilepsy: A Catalyst in Better Diagnosis of Epileptic Seizures and Prevention (/chapter/application-of-deep-learning-in-epilepsy/298107) (pages 81-98)

Gauri Sharma

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Rohit Rastogi, Sheelu Sagar, Neeti Tandon, Bhavna Singh, T. Rajeshwari

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Deep Learning (/chapter/deep-learning/298109) (pages 127-167)

Khalid A. Al Afandy, Hicham Omara, Mohamed Lazaar, Mohammed Al Achhab

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Chapter 7

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A Systematic Mapping Study of Low-Grade Tumor of Brain Cancer and CSF Fluid Detecting in MRI Images Through Multi-Algorithm Techniques (/chapter/a-systematic-mapping-study-of-low-grade-tumor-of-brain-cancer-and-csf-fluid-detecting-in-mri-images-through-multi-algorithm-techniques/298110) (pages 168-201)

Soobia Saeed, Habibullah Bin Haroon, Noor Zaman Jhanjhi, Mehmood Naqvi, Muneer Ahmad

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Chapter 8

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Optimized Hybrid Prediction Method for Lung Metastases (/chapter/optimized-hybrid-prediction-method-for-lung-metastases/298111) (pages 202-221)

Soobia Saeed, Afnizanfaizal Abdullah, Noor Zaman Jhanjhi, Mehmood Naqvi, Muneer Ahmad

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Chapter 9

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Virtual Technical Aids to Help People With Dysgraphia (/chapter/virtual-technical-aids-to-help-people-with-dysgraphia/298112) (pages 222-235)

Navirah Kamal, Pragati Sharma, Rangana Das, Vipul Goyal, Richa Gupta

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Chapter 10

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A Systematic Mapping Study of Low-Grade Tumor of Brain Cancer and CSF Fluid Detecting Approaches and Parameters (/chapter/a-systematic-mapping-study-of-low-grade-tumor-of-brain-cancer-and-csf-fluid-detecting-approaches-and-parameters/298113) (pages 236-259)

Soobia Saeed, Habibullah Bin Haroon, Mehmood Naqvi, Noor Zaman Jhanjhi, Muneer Ahmad, Loveleen Gaur

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