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 School of Computing - Research Methods CIS 4011-N

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# Introduction

In modern society 1 in 8 women are suffering from breast cancer which is not easy to detect due to a lack of extensive research. Anyway, Neural networks came into sight. This framework detects cancer in its early stages by clustering the models and performing them under many experimental conditions and analyzing their responses & categorizing them.

This framework detects cancer in its early stages by detecting the women showing similar expressions under various ranges of experimental conditions clustered together.

The goal of this research is to detect various stages of breast cancer with neural networks and how efficiently Neural networks analyze the early stages of Cancer.

# Research Question

The major objectives of this research are:

1. How can breast cancer be detected using Neural networks?

2. How efficiently can neural networks detect breast cancer?

# Keywords

* Neural Network
* Breast Cancer
* Machine Learning
* Detection
* Efficiency

# Table of synonyms

|  |  |  |  |
| --- | --- | --- | --- |
| **Detection** | Identification | Observation | Spotting |
| **Efficiency** | Effectiveness |  |  |
| **Robustness** | Hardiness | Power | Strength |
| **Diagnosis** | Recognition | Identification | Discovery |
| **Clustering** | Group | Assemble | Collect |
| **Framework** | Body | Structure | Skeleton |

# Database Search

I have considered these three databases to get the related information as the topic of my interest is the advancement of technology in Health Care.

**ACM:** This digital library consists of comprehensive databases of full-text research articles.

**IEEE:** This database provides access to highly cited literature both in scientific and technical fields.

**Science Direct:** This library provides targeted recommendations based on our research.

## 5.1. ACM

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S. No** | **Questions** | **Keywords** | **Filters** | **Results** | **Observations** |
| 1. | What seemed to be published on Neural Network for Breast Cancer? | “Neural Network” and “Breast Cancer” | No Filters | Total = 527 | Good start for the research. Too many results from Proceedings, Newsletters, Journals, Content types, Magazines, and books need more refinement. |
| 2. | How crucial a role does machine learning in Neural networks for breast cancer. | “Neural Network” and “Breast Cancer” and “Machine Learning” | Machine Learning. | Total = 421 | Too many results, searching needs to be filtered based on the latest year. |
| 3. | How Neural networks and Machine Learning can detect Breast cancer? | “Neural Network” and “Breast Cancer” and “Machine Learning” and “Detection” | “Detection” | Total = 166 | Too many results, searching needs to be filtered based on the latest year. |
| 4. | What current peer-reviewed work has been published on Neural Network for Breast Cancer. | “Neural Network” and “Breast Cancer” and “Machine Learning” and “Detection” | Published between 2010 and 2022 | Total = 153 | Most related research conferences still need to be filtered based on Efficiency. |
| 5. | How Efficiently does a neural network can detect Breast Cancer | “Detection” and “Efficiency” | “Efficiency” | Total = 85 | So far good research still needs to be refined based on Content-type. |
| 6. | How Efficiently does a neural network can detect Breast Cancer | “Neural Network” and “Breast Cancer” and “Machine Learning” and “Detection” and “Efficiency” | “Research Articles” and “Journals” | Total = 11 | Found Journals that are more suitable for the research |

## 5.2. IEEE Database

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S. No** | **Questions** | **Keywords** | **Filters** | **Results** | **Observations** |
| 1. | What seemed to be published on Neural Network for Breast Cancer? | “Neural Network” and “Breast Cancer” | No Filters | Total = 951 | Good start for the research. Too many results from conferences, Journals, Early Access Articles, Magazines, and books need more refinement. |
| 2. | What current peer-reviewed work has been published on Neural Network for Breast Cancer. | “Neural Network” and “Breast Cancer” | Published between 2000 and 2022 | Total = 876 | Too many results and searching need to be filtered based on publication topics. |
| 3. | What are the related publication topics on Neural Network for Breast Cancer? | “Neural Network” and “Breast Cancer” | Publication topic: cancer, medical image processing, neural nets, learning (AI), medical computing, patient diagnosis. | Total = 790 | Too many results and searching need to be filtered based on adding a Keyword “Machine Learning”. |
| 4. | How crucial a role does machine learning in Neural networks for breast cancer? | “Neural Network” and “Breast Cancer” and “Machine Learning” | Machine Learning. | Total = 197 | Too many results, searching needs to be filtered based on the latest year. |
| 5. | How Neural networks and Machine Learning can detect Breast cancer? | “Neural Network” and “Breast Cancer” and “Machine Learning” and “Detection” | “Detection” | Total = 398 | Too many results, searching needs to be filtered based on the latest year. |
| 6. | What current peer-reviewed work has been published on Neural Network for Breast Cancer? | “Neural Network” and “Breast Cancer” and “Machine Learning” and “Detection” | Published between 2010 and 2022 | Total = 321 | Most related research conferences still need to be filtered based on Efficiency. |
| 7. | How Efficiently does a neural network can detect Breast Cancer | "Neural Network" and "Breast Cancer" and "Machine Learning" and "Detection" and "Efficiency” | “Efficiency” | Total = 15 | Found Journals and Conferences which are relevant to the research but need to filtered with Journals. |
| 8. | Among the results how many of them are Journals? | "Neural Network" and "Breast Cancer" and "Machine Learning" and "Detection" and "Efficiency” | “Journals” | Total = 4 | Found Journals that are more relevant to my research. |

## 5.3. Science Direct

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S. no** | **Questions** | **Keywords** | **Filters** | **Results** | **Observations** |
| 1. | What seemed to be published on Neural Network for Breast Cancer? | “Neural Network” and “Breast Cancer” | No Filters | Total = 7709 | Good start for the research. Too many results from Proceedings, Newsletters, Journals, Content types, Magazines, and books need more refinement. |
| 2. | What current peer-reviewed work has been published on Neural Network for Breast Cancer. | “Neural Network” and “Breast Cancer” | Published between 2000 and 2022 | Total = 7295 | Too many results and searching need to be filtered based on publication topics. |
| 3. | How crucial a role does machine learning in Neural networks for breast cancer. | “Neural Network” and “Breast Cancer” and “Machine Learning” | Machine Learning. | Total = 4311 | Too many results, searching needs to be filtered based on the latest year. |
| 4. | How Neural networks and Machine Learning can detect Breast cancer? | “Neural Network” and “Breast Cancer” and “Machine Learning” and “Detection” | “Detection” | Total = 2815 | Too many results, searching needs to be filtered based on the latest year. |
| 5. | What current peer-reviewed work has been published on Neural Network for Breast Cancer. | “Neural Network” and “Breast Cancer” and “Machine Learning” and “Detection” | Published between 2010 and 2022 | Total = 2623 | Most related research conferences still need to be filtered based on Efficiency. |
| 6. | How Efficiently does a neural network can detect Breast Cancer | “Detection” and “Efficiency” | “Efficiency” | Total = 1328 | So far good research still needs to be refined based on Analyse. |
| 7. | What a Neural Network will Analyse Breast Cancer | “Detection” and “Efficiency” and “Analyse” | “Analyse” | Total = 1310 | So far good research still needs to be refined based on Content-type. |
| 8. | What is the related publication title on Neural Network for Breast Cancer? | “Neural Network” and “Breast Cancer” | Publication topic: Computers in Biology & Medicine, Medical Image Analysis, Artificial Intelligence in medicine, Neural Networks. | Total = 117 | Too many results and searching need to be filtered based on adding a Keyword "Machine Learning". |
| 9. | How Efficiently does a neural network can detect Breast Cancer | “Neural Network” and “Breast Cancer” and “Machine Learning” and “Detection” and “Efficiency” | “Subject Area” and “Article type” | Total = 12 | Found Articles that are more relevant to the research |

# 6. Inclusion and Exclusion Process

* The inclusion process identifies the reliable, Consistent information which is relevant to the current research study.
* The exclusion process identifies the subject which disqualifies prospective from inclusion in the research study.

|  |  |  |  |
| --- | --- | --- | --- |
| **S. No:** | **Title of research paper** | **Include/Exclude** | **Reason** |
| 1. | “Cytology Image Analysis Techniques Toward Automation: Systematically Revisited.” | **x** | This article is not relevant to my research as it discusses cytology. |
| 2. | “Images in space and Time: Real Big data in Health Care” | **x** | This research paper is excluded as it discusses the importance of big data in health care. |
| 3. | “Nature Inspired Multiobjective Epistasis Elucidation from Genome-Wide Association Studies” | **x** | This article discusses breast Cancer but there is no discussion of neural networks. |
| 4 | “[Ultrasound Medical Imaging Techniques: A Survey](https://dl.acm.org/doi/10.1145/3447243)” | **✔** | This paper is important to study the techniques to find breast cancer using neural networks. |
| 5. | “Natural Language Processing for EHR-Based Computational Phenotyping” | **x** | Most of the paper is relevant to Neural networks and there is no relevant discussion of breast cancer. |
| 6. | “Privacy-preserving Time-series Medical Images Analysis Using a Hybrid Deep Learning Framework” | **✔** | The research approach used was relevant and tested. |
| 7. | “Hello AI”: Uncovering the Onboarding Needs of Medical Practitioners for Human- AI collaborative Decision-Making“ | **✔** | This research paper discusses Neural networks for breast cancer. |
| 8. | “Data-Driven Optimization of order Admission Policies in a Digital Print Factory“ | **x** | The Paper doesn't concentrate more on my research. |
| 9. | “A Language-Independent Network to Analyze the Impact of Covid-19 on the World Via Sentiment Analysis“ | **x** | No primary research was conducted in the study. |
| 10. | “Machine Learning-based Cyber Attacks Targeting on Controlled Information: A Survey“ | **x** | Suitable for my research topic but the conclusion is not relevant to my research. |
| 11. | “Emote-Controlled: Obtaining Implicit Viewer Feedback Through Emote-based Sentiment Analysis on Comments of Popular Twitch.tv Channels“ | **x** | The paper is not relevant to the research topic. |
| 12. | “Breast Cancer Detection Using Extreme Learning Machine Based on Feature Fusion with CNN Deep Features” | **✔** | This paper is suitable for my research as it states about the detection of breast cancer as it discusses breast cancer detection using the feature fusion method in CNN. |
| 13. | “Breast Cancer Image Classification via Multi-Network Features and Dual-Network Orthogonal Low-Rank Learning” | **✔** | Classification of images based on histology by combining using Deep Neural Network which is quite relevant to my research. |
| 14. | “WDCCNet: Weighted Double-Classifier Constraint Neural Network for Mammographic Image Classification” | **✔** | Using the Mammograph technique to detect breast cancer at early stages is what this paper discusses and is quite relevant to my research. |
| 15. | “Bi-Modal Transfer Learning for Classifying Breast Cancers Via Combined B-Mode and Ultrasound Strain Imaging” | **x** | This paper discusses the detection of cancer using B-mode. |
| 16. | “[Convolutional](https://www.sciencedirect.com/science/article/pii/S0010482521000421) neural networks for breast cancer detection in mammography: A Survey“ | **✔** | The advancement of detecting breast cancer using Neural networks is what this paper is about. |
| 17. | “[Artificial](https://www.sciencedirect.com/science/article/pii/S0010482522000130) intelligence for breast cancer Analysis: Trends & directions” | **x** | This is a very good paper detecting breast cancer using deep algorithms which is quite deviating from my research topic. |
| 18. | “Machine learning in medical applications: A review of state-of-the-art methods“ | **x** | This paper is about the applications of Machine learning in Medical, Industrial fields which is not relevant to my research. |
| 19. | “[The](https://www.sciencedirect.com/science/article/pii/S0010482520304601) impact of pre-and post-image processing techniques on deep learning frameworks: A comprehensive review for digital pathology image analysis“ | **✔** | This is a good research paper that is relevant to my research topic. |
| 20. | “A survey on applications of deep learning in microscopy analysis“ | **x** | Microscopy imaging analysis by using Neural networks is what this paper is about. |
| 21. | “[Wrist](https://www.sciencedirect.com/science/article/pii/S0010482522001044) pulse signal acquisition and analysis for digital diagnosis: A review“ | **x** | Pulse diagnosis and its role in health care are what this paper is about. Hence, it’s not suitable for my research |
| 22. | “[Survey](https://www.sciencedirect.com/science/article/pii/S0010482518301318) on deep learning for radiotherapy “ | **x** | The complexity of radiotherapy which is now easy by deep learning using Neural networks is what this research paper is about. |
| 23. | “[Deep](https://www.sciencedirect.com/science/article/pii/S0933365719302635) learning in generating radiology reports: A survey“ | ✔ | This paper is so my research topic. |
| 24. | “Artificial reports techniques for prediction of drug synergy in malignant diseases: Past, Present, Future.“ | **x** | This paper is not related to my research topic. |
| 25. | “[Quantitative](https://www.sciencedirect.com/science/article/pii/S0010482521008398) measurements of zebrafish heart rate and heart rate variability: A survey between 1990-2020“ | **x** | This paper is not related to my research topic. |
| 26. | “[In](https://www.sciencedirect.com/science/article/pii/S0010482521006454) Silico methods and tools for drug discovery“ | **x** | This paper is about drug discovery strategies which are not my research topic. |
| 27. | “[Automated](https://www.sciencedirect.com/science/article/pii/S0010482517303888) localization and segmentation techniques for B-mode ultrasound images: A review” | **x** | This paper is not related to my research topic. |

Included = 9  
Excluded = 18

# Limitations And Conclusions:

The key challenge faced in the literature search during the initial database search is tried to limit the articles to a good number was hard work at times, and a number of the articles were not relevant, as they talked about only breast cancer and the detection of breast cancer using old methods when I was in searching of detection of breast cancer using Neural Network relevant information. Out of three databases Science Direct is difficult to work with, no matter how specific I was using filters it was hard to get down the number to hundreds.

Found relevant journals and articles which are useful to improve the accuracy of detecting breast cancer using Neural networks in the early stages.  
  
In Conclusion, Neural Network techniques may improve the accuracy and robustness of breast cancer diagnosis techniques. The neural network worked much better than other traditional techniques. The implementation comprises of mixing various methodologies (e.g., Mammograph techniques) to increase robustness and performance.

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