A NOVEL CONVOLUTIONAL NEURAL NETWORK APPROACH TO IMPROVE PRECISION IN BREAST CANCER DETECTION COMPARING WITH RANDOMIZED BASED ALGORITHM

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Abstract

Aim: The Objective of the work is to predict the Accuracy of Breast Cancer Prediction Using convolutional Neural Networks Comparative with a Randomized Based Algorithm.
Material and Methods: Accuracy and Loss are performed with a dataset from the Github library. The total sample size is 48. The two groups' Convolutional Neural Network (N=24), Randomized Based Algorithm (N=24) Randomized Based Algorithm (RBA) were proposed by predicting the accuracy (95.80%) of Breast Cancer Prediction compared with the Convolutional Neural Network.
Results: The Result proved that the Randomized Based Algorithm with Better accuracy than the Convolutional Neural Network. The convolutional Neural Network appears significantly better than the Randomized Based Algorithm ($P<0.05$).
Discussion and Conclusion: The Result proved that the Randomized Based Algorithm helps predict Breast Cancer Prediction and gives more accuracy.

Keywords: Breast Cancer, Randomized Based Algorithm, Novel Convolutional Neural Network, Machine Learning Algorithm, Accuracy.

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1. Introduction

Breast cancer typically starts in your milk-producing glands (Leong 2021), alternatively, the ducts that take it to the nipple. It may enlarge in your breast and spread to adjacent lymph nodes or to other organs through your bloodstream ((Rasul et al. 2021). Your skin or chest wall may become infected by cancer as it spreads to the tissue surrounding your breast (Liu et al. 2021).

Different types of breast cancer grow and spread at different rates. Some take years to spread beyond your breast, while others grow and spread quickly ((Li, Lu, and Shih 2021). Using the TNM system, the "T" plus a letter or number (0 to 4) is used to describe the size and location of the tumor. Tumor size is measured in centimeters (cm). A centimeter is roughly equal to the width of a standard pen or pencil. In its beginning phases, bosom disease ordinarily doesn't cause torment and may show no recognizable side effects ((Rajaneesh 2021). As disease advances, signs and side effects can remember an irregularity or thickening for or close to the bosom; an adjustment of the size or state of the bosom; areola release, delicacy, or withdrawal turning internal and skin bothering, dimpling, redness, or texture ((Bartlett 2010). In any case, these progressions can happen as a component of a wide range of conditions. Having at least one of these side effects doesn't imply that an individual has the bosom disease. Now and again, carcinogenic cells can attack encompassing bosom tissue. In these cases, the condition is known as obtrusive bosom disease. Now and again, cancers spread to different pieces of the body. Assuming bosom malignant growth spreads, harmful cells most frequently show up in the bones, liver, lungs, or cerebrum ((Salem Abdull 2011). Tumors that begin at one site and then spread to other areas of the body are called metastatic cancers.(Venu and Appavu 2021; Gudipaneni et al. 2020; Sivasamy, Venugopal, and Espinoza-González 2020; Sathish et al. 2020; Reddy et al. 2020; Sathish and Karthick 2020; Benin et al. 2020; Nalini, Selvaraj, and Kumar 2020)

Our team has extensive knowledge and research experience that has translated into high quality publications (K. Mohan et al. 2022; Vivek et al. 2022; Sathish et al. 2022; Kotteeswaran et al. 2022; Yaashikaa, Keerthana Devi, and Senthil Kumar 2022; Yaashikaa, Senthil Kumar, and Karishma 2022; Saravanan et al. 2022; Jayabal et al. 2022; Krishnan et al. 2022; Jayakodi et al. 2022; H. Mohan et al. 2022). .In a prior study, the randomized-based algorithm's (RBA) efficiency gain for data retrieval was not appropriately taken into account to boost accuracy. To solve this problem, a novel convolutional neural network is used in machine learning to speed up secured data retrieval.

2. Materials and Methods

The research work is carried out in the Machine Learning laboratory lab at Saveetha School of Engineering, Saveetha Institute of Medical and Technical Sciences, Chennai. The sample size has been calculated using the GPower software by comparing both of the controllers in Supervised learning. Two quantities of gatherings are chosen to look at the cycle and its outcome. In each group, 24 sets of samples and 48 samples in total are selected for this work. The pre-test power value is calculated using GPower 3.1 software (g power setting boundaries: measurable test distinction between two autonomous means, α=0.05, power=0.80, t-test value=20.680 Two algorithms (RBA and Novel Convolutional Neural Network Algorithm) are implemented using Technical Analysis software. In this work, no human and animal samples were used so no ethical approval is required.

Convolutional Neural Network

Breast cancer is regarded as a fairly frequent form of cancer in women and develops in breast cells. After lung cancer, breast cancer is the second most serious illness for women. In order to improve the automatic detection of breast cancer, this study proposes a novel convolutional neural network (CNN) technique that examines the hostile ductal carcinoma tissue zones in whole-slide images (WSIs). The proposed method for automatically detecting breast cancer using several Novel Convolutional Neural Network (CNN) designs is examined in this study and the outcomes are contrasted with those of machine learning (ML).

Randomized Based Algorithm

A randomized calculation is a strategy that involves a wellspring of haphazardness as a component of its rationale. It is regularly used to diminish either the running time, time intricacy memory utilized, or space intricacy, in a standard calculation. The calculation works by producing an irregular number, or, inside a predetermined scope of numbers, and going with choices in light of RR's worth.

The product device to assess CNN and RBA calculations is Colaboratory in Python programming language, The equipment setup incorporates an intel i7 processor with a Smash size of 8GB. The framework utilized was a 64-Bit Windows 10 working framework.

Statistical Analysis

For statistical implementation, the software to be used here is IBM SPSS V26. Statistical package for social sciences is used for calculating the statistical calculations such as mean, standard deviation, and also to plot the graphs, etc. The independent variables are labeled and the dependent variable is 'accuracy'. In SPSS, the dataset is prepared using 48 sample sizes for each group, and accuracy is given as the testing variable.

3. Results

Table 1 shows the simulation results of the proposed algorithm Novel Convolutional Neural Network and the existing system Randomized Based Algorithm Encryption were run at different times in the Colab with a sample size of 48. Table 2 represents the T-test comparison of both Novel Convolutional Neural Network and randomized-based algorithm. The mean Standard Deviation and Standard Error mean were calculated by taking an independent variable T-test among study groups. The Novel Convolutional Neural Network produces a significant difference from the Randomized Based Algorithm with a value of 0.712 and effect size-1.414. The mean accuracy of the Novel Convolutional Neural Network is 95.80% and the Randomized Based Algorithm is 94.44%. Table 3 represents the independent sample T-test with a confidence interval of 95% and a level of significance of 0.05. It shows the statistical significance P<0.05 -tailed. Figure 1 gives the comparison chart of Novel Convolutional Neural Network and Randomized Based alculation concerning mean exactness. The exactness in google assistant of the Novel Convolutional Neural Network is better than the Randomized Based Algorithm.

4. Discussion

According to the aforementioned research, the Novel Convolutional Neural Network has an accuracy of 95.80%, which is higher than that of the randomized-based algorithm's accuracy of 94.44%. Playing out a free example T-test reveals a statistically 2-tailed significant difference in accuracy between two calculations that is under 0.002 (P 0.05).

In the existing system, the accuracy for the Novel Convolutional Neural Network and the randomized-based algorithm is 95.80% and 94.44% respectively ((Carley and Kulkarni 2018). This analysis is the paper to make use of machine learning to predict breast cancer. The randomized-based algorithm was executed with a precision level of 94.44% ((Song et al. 2021). Novel Convolutional Neural Network combined with Randomized Based Algorithm ((Abbas et al. 2021) and predicts a time consumption of 78 w% Breast Cancer is one of the most commonly diagnosed cancer types in women and automatically classifies breast cancer histopathological image ((M. Chen et al. 2021). Research endeavors have revealed with expanding affirmation that the randomized-based algorithm has greater accurate diagnosis ability ((J. Chen et al. 2020). Using a prediction of breast cancer analysis to compare the algorithms of Novel Convolutional Neural Network and Randomized Based Algorithm of accuracy (95.80% and 94.44%). The attributes mainly concentrated on decreasing the time consumption of women ((Shapiro 2021). Novel Convolutional Neural Networks are compared with Randomized Based Algorithms that are discussed in previous research articles ((Song et al. 2021). Machine learning algorithms in cancer diagnosis aim to have a trained algorithm that can properly identify the type and degree of cancer a patient has based on their gene expression levels, assisting the doctor in treating it ((Cui et al. 2021). The restriction of the proposed work is that one of the characteristics of the understudy dataset is utilized for anticipating the authorized student's access to view data in the cloud but the time consumption value of authorized students is high. In feature work, if the dataset has credits like the impact of cancer there might be a chance to improve the time consumption of authorized students.

5. Conclusion

The work involves a convolutional Neural Network(CNN) algorithm to find the stock secured data retrieval with reducing time to be proved with better accuracy of 95.80% when compared to Randomized Based Algorithm accuracy is 94.44% for predicting reducing time.

Declaration

Conflicts of interest

No conflicts of interest in this manuscript.

Author's Contributions

Author SV was involved in data collection, data analysis, and manuscript writing, Author RSK was involved in conceptualization, data validation and critical review manuscript.

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Tables and Figures

Table 1. Predicted Accuracy of Breast Cancer Prediction for 48 different sample sizes.

GROUP	Algorithms	Average accuracy
1	Novel Convolutional Neural Network	95.80%
2	Randomized Based Algorithm	94.44%

Table 2. Statistical analysis of Novel Convolutional Neural Network and Randomized Based Algorithm. Mean accuracy, Standard deviation, and standard error values are obtained for 48 sample datasets.

	Algorithms	N	Mean	Std.Deviation	Std.Error Mean
Accuracy	Novel Convolutional Neural Network	24	95.4450	.24896	.05082
	Randomized Based Algorithm	24	94.2421	.13866	.02830

Table 3. Independent sample T-test with a confidence interval at 95% and level of significance as 0.05. It shows the statistical significance of P<0.05 2-tailed.

	Levene's Test for Equality of Variances		T-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Differences	Std.Error Differences	95% Confidence Interval of the Differences Lower | Upper	
Equal Variances assumed	13.622	.001	20.680	46	.000	1.20292	.05817	1.08583	1.32001
Equal Variances not assumed			20.680	36.016	.000	1.20292	.05817	1.08495	1.32089

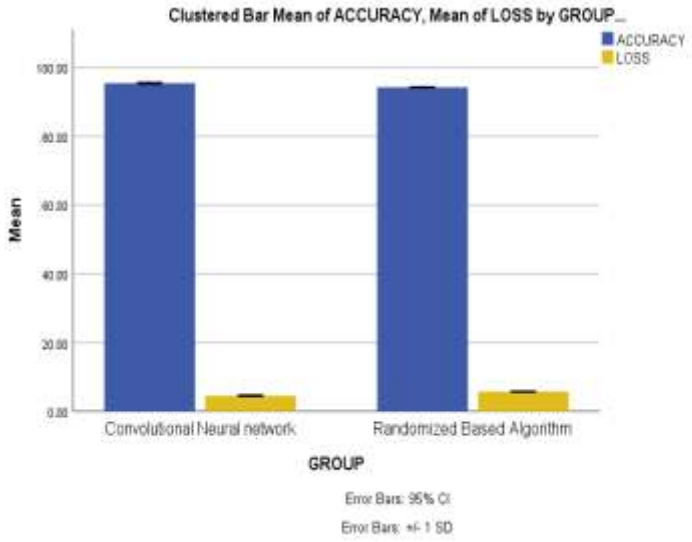

Fig 1. Comparison of Novel Convolutional Neural Network and Randomized Based Calculation concerning means and precision. The mean precision of the Novel Convolutional Neural Network is better than the Randomized Based Algorithm. X-axis: Novel Convolutional Neural Network vs Randomized Based Algorithm, Y-axis: Mean accuracy. Error Bar ± 1SD.