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Retraction

Retracted: Apprehending the Effect of Internet of Things (IoT) Enables Big Data Processing through Multinetwork in Supporting High-Quality Food Products to Reduce Breast Cancer

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Manipulated or compromised peer review

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

In addition, our investigation has also shown that one or more of the following human-subject reporting requirements has not been met in this article: ethical approval by an Institutional Review Board (IRB) committee or equivalent, patient/participant consent to participate, and/or agreement to publish patient/participant details (where relevant).

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] S. K. Shukla, B. M. Kumar, D. Sinha et al., "Apprehending the Effect of Internet of Things (IoT) Enables Big Data Processing through Multinetwork in Supporting High-Quality Food Products to Reduce Breast Cancer," *Journal of Food Quality*, vol. 2022, Article ID 2275517, 12 pages, 2022.

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Research Article

Apprehending the Effect of Internet of Things (IoT) Enables Big Data Processing through Multinetwork in Supporting High-Quality Food Products to Reduce Breast Cancer

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Medical science in recent times has witnessed the large implications of AI-based IoT approaches that made the clinical process easier than before. However, effective IoT technologies can connect as well as exchange necessary clinical data with other healthcare systems and devices conducted across the vast Internet facilities. With the help of IoT-enabled big data processing technologies, physicians can measure accurate weight, blood pressure, and daily symptoms related to spreading breast cancer cases across the globe. Utilizing IoT is essential for providing proper medical assistance, treatment, and detection at the initial stages within the healthcare environment regulated by the facilities of the Internet of Things. The implementation of IoT-based big data processes food products for supporting the detection and prevention of breast cancer. The study supports in making a critical analysis on the role of IoT in the big data mainly in cancer detection and increasing the quality of food products. The study's main scope is to employ IoT-enabled big data processing to aid in the identification of breast cancer. However, the research is mainly focused on studying the assistance offered to healthcare professionals and others in identifying the disease effectively. The overall research study is going to investigate the role of IoT in the early detection of breast cancer symptoms. A total of 20 women were studied and certain factors have been identified which are the early symptoms of breast cancer and can potentially cause breast cancer. These include age, family history, breast density, and breast temperature (independent variables). A dependent variable has been selected: probability of breast cancer occurrence. After that, linear regression analysis has been carried out to understand how the independent variables impact the dependent variable. Findings showed that age, family history of cancer, breast density, and breast temperature are some measurable factors for breast cancer detection. The work contributes to a critical investigation of the function of IoT in big data, specifically in cancer detection and improving food product quality. Age acceleration increases the risk of breast cancer development; breast temperature increases slightly during cancer formation, and breast density has a positive impact on cancer development. Lastly, this study has provided a future scope of using IoT in cancer detection and prevention.

1. Introduction

Today, medical image detection, identification of disease, and necessary treatment prediction have become a trendy topic in the global healthcare industry. However, scientists and physicians take the help of different machine learning approaches, transfer learning procedures, AI-based cloud computing systems, and the Internet of Things to make the process easier. Previously, medical practitioners faced several issues while detecting critical disease symptoms and predicting proper treatment procedures accurately. Jain and coresearchers think that the modern medical era has emphasized much concern related to the growing rate of breast cancer cases day by day [1]. Physicians can frequently employ proper IoT system technologies to increase the effectiveness of breast cancer diagnosis and classification, which may also assist healthcare providers in directing patients to a healthy diet and nutrition. By evaluating all patient data obtained from various IoT devices, physicians may quickly analyze disease symptoms and predict relevant treatment methods.

Although no particular meal is capable of avoiding or inducing breast cancer, a person's food habits might influence the probability of developing the disease and their general welfare. Researchers have identified that since the year 2007, death rates of women due to breast cancer have increased by 57% and are rapidly growing around the world [2]. Whereas no one diet may prevent or cause breast cancer, a person's eating habits can impact their risk of acquiring the illness as well as their overall health. As per the researchers, the use of the Internet of Things enabled big data processing through a multinetwork in the support of breast cancer, and as a result, there is a greater use of these tools and methods in the medical sector to improve diagnosis and patient care. Surveys and research have shown critical new cases of growing breast cancer in women who are younger than 50 years. On the other hand, the growth rate and death rate due to breast cancer have been traced to harm little in older women, approximately above 50 years old. From a survey conducted in 2013 and continued until 2018, researchers have concluded that the breast cancer death rate went up by 1–3% each year [3].

Physicians have identified through the beneficial utilization of IoT techniques that the cancer cells in the female breast slowly grow and resemble exactly like normal tissues of the breast. Today, Ratta and fellow researchers opine that with the help of IoT, the symptoms of breast cancer can be easily detected at the early stage to apply effective cure procedures [2]. Previously, breast cancer identification approaches revealed possible obstacles for both healthcare professionals and researchers. By assessing all patient data obtained from various IoT devices, physicians may quickly diagnose illness symptoms and predict relevant treatment methods.

Food and lifestyle influences the present generation in every aspect of their lives specifically for women as their hormones are highly regulated with their nutrition intake and influence their well-being. Hormonal imbalance leads to several disorders among women, including cancer, diabetes, etc. Breast cancer has been linked to nutrition and has been shown to affect its different treatment stages (before, during, and after). On the other hand, IoT allows doctors to be more careful while proactively connecting and communicating with breast cancer-affected patients. Besides, the Internet of Things also can be beneficial for doctors while collecting patients' history and relevant clinical data that can be stored in the cloud with AI approaches. From a survey conducted by the researchers of the UK, it has been proved that almost 75% of the healthcare professionals took the help of IoT [4]. To identify the best medical assistance and treatment procedures for breast cancer-affected patients, IoT can be highly useful in medical science. Jain thinks after analyzing all medical history and current patients' reports, physicians can conduct big data analysis from a vast IoT device for meeting the expected results [5]. Physicians can easily analyze disease symptoms and predict proper treatment procedures by evaluating all gathered patients' data from various IoT devices. Researchers have collected relevant medical data and substantial pieces of evidence that reflect various alarming enhancements in breast cancer incidents across the globe. Therefore, with regression analysis, they are going to investigate the various benefits of using IoT approaches in critical disease detection in this research paper, such as breast cancer.

The critical aim of the study is to use the IoT-enabled big data processing in Supporting Breast Cancer detection, the research is more confined in understanding the support provided to medical practitioners and others in detecting the disease in an effective manner. Through medical history and current patient reports, physicians can analyze large data from a powerful IoT device to achieve expected results [5]. Physicians can easily analyze disease symptoms and predict appropriate treatment procedures by evaluating all patient data collected from different IoT devices. The suggested study revealed that IoT gadgets rely on Internet services to function, posing a risk to users' privacy and security. When attackers acquire access to the user's smart Fitbit or other IoT devices, they obtain access to the user's whole home network. As a result, the security system must be upgraded before it can be made adaptable. The researchers collected relevant medical data and baseline data that reflect several worrying improvements in breast cancer cases worldwide. Therefore, regression analysis reveals several benefits of using IoT methods to diagnose critical diseases in this research work, such as breast cancer. Physicians may assess the exact weight, blood pressure, and daily symptoms associated with the spread of breast cancer cases throughout the world using IoT-enabled big data processing technology. By evaluating all patient data obtained from the various IoT devices, physicians may quickly analyze disease symptoms and predict relevant treatment methods.

When the researchers trained and developed the proposed regression analysis system, the researchers used an IoT support classifier to classify the presence of both types of tumors in women. Physicians tend to use appropriate IoT system methods to improve the efficiency of detection and classification of breast cancer, which can further help direct healthcare professionals to recommend quality diet and

nutrition to the patients. On the other hand, using the retrospective selection of the IoT function, the researchers focused on analyzing and interpreting machine learning algorithms to better evaluate data sets for breast cancer. Chowdhury and colleagues believe that exercise and regression analysis methods have been used effectively to measure the performance of clinical classifiers in predicting the treatment of breast cancer.

2. Literature Review

According to Salvi and KAdam, nowadays, the demand for accurate medical image recognition, disease detection, and treatment prediction has increased compared to the past few years with various applied technological help [6]. Besides applying the various benefits of machine learning, transfer learning, cloud computing, and AI approaches, physicians now tend to apply numerous Internet of Things (IoT) technologies for addressing different real-time clinical challenges. However, a growing trend for applying IoT techniques among healthcare professionals has been seen to be increased by around 17% than before [7]. Medical disease detection and proper prediction of treatment procedures were not easy jobs for medical practitioners in the past few decades. Today, this entire process has become easier with the growing implementation of IoT technologies over medical disease detection. On the contrary, around 13% of people remained neutral regarding the burning issue. Apart from this, the rest 8% of medical practitioners have supported the traditional methods of treatment without applying any artificial intelligent devices [8]. With the growing cases of breast cancer around the world, doctors thus placed their positive opinions about applying the benefits of IoT tools in disease detection. The researchers have mentioned that the application of Internet of Things (IoT)-enabled big data processing through multinetwork in Supporting Breast Cancer; hence, there is an increased usage of these tools and technologies in the medical field for enhancing the detection and servicing patients effectively.

A survey conducted in 2019 across the UK reflected the fact that new cases of breast cancer are growing rapidly by 3% per year. Chiu and coresearchers think that by applying proper IoT technologies in healthcare practices, various spreading cases of breast cancer infections can be detected easily in recent times [9]. Today, proper detection of critical diseases in patients seems to be the utmost requirement for healthcare experts. The primary aim of the IoT technical system is to identify the proper symptoms of breast cancer and detect the causes of disease. On the other hand, using IoT tools, necessary treatment predictions also can be performed without any hindrances. Scientists have come to know that IoT technical systems can at once reduce the error rates in detecting breast cancer symptoms (Figure 1) in female patients by almost 79.45% [10]. Effective use of IoT-based technology can easily monitor cancer patients. In contrast to that, proper use of IoT approaches also can timely detect potential cancer-related symptoms and issues at the initial early stages, thereby giving doctors a chance to prevent further progression with the help of proper medication and nourishment. Physicians have focused much on using the proper methods of IoT for proper treatment procedures regarding cancer-diagnosed patients and undertaking necessary clinical decisions for measuring posttreatment facilities to patients. Sometimes, Zahir opines breast cancer can be traced after appearing fatal symptoms, but physicians have also identified such cases of breast cancer without any symptoms [11]. This is why doctors have decided to take the help of proper IoT technologies to process breast cancer screening frequently.

Breast cancer in women is a growing issue across the globe that is increasing by leaps and bounds and causing amplified death rates. Physicians have also identified numerous increasing cases of breast cancer that need to be treated if detected at an early stage. From past evidence, it has been recognized that around 53% of early breast cancer cases can be cured if proper IoT methods can be applied at the initial stages. IDC has become so developed that this can invade the lymph vessels and systemic circulation, causing the cancer to spread to different parts of the body [12]. It has been detected that the stages of breast cancer grow slowly in a woman's body and gradually come to a fatal stage that, in most cases, are the reasons for patients' death. After conducting a proper diagnosis of breast cancer patients, medical professionals have suggested that the cancer growth can be spotted based on the subtype of breast cancer symptoms. On the other hand, the proper utilization of IoT tools also can help medical practitioners to measure the contribution and secretion rate of estrogen receptors that can be highlighted in cancer subtypes. However, special monitoring and screening of breast cancer-affected patients through proper IoT tools reflect that after 57 days, 36% of the tumors remained neutral in size. On the other hand, around 64% of breast cancer tumors grow rapidly [13]. For this reason, applying proper IoT procedures in detecting breast cancer symptoms has been easier now to avoid critical conditions (Figure 2). Effective use of IoT-based data analytics technology facilitates the tracking of cancer patients. However, with the proper use of IoT methods, early cancer-related symptoms and potential problems can also be detected at a very early stage. Physicians have placed great emphasis on applying appropriate IoT methods to appropriate treatment procedures for cancer patients and making the necessary clinical decisions to measure posttreatment facilities.

Internet of Things is a beneficial technical strategy used in clinical sectors through which breast cancer cause and symptom detection can be highly supported by global physicians. Proper IoT applications also help doctors in the screening process of abnormal temperature in patients with breast cancer. In contrast, a modified algorithm consisting of REF can be hugely used for selecting a proper IoT classifier that has been properly trained as well as tested frequently on selected cases of growing breast cancer issues [14]. According to the researchers, the use of the Internet of Things (IoT) enabled big data processing through a multinetwork in the treatment of breast cancer, and as a result, there is a greater use of these tools and methods in the medical sector to improve diagnosis and patient care.

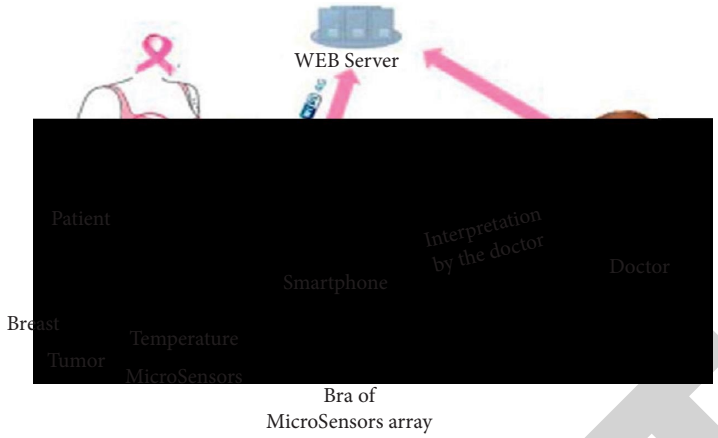

Figure 1: Proper detection of breast cancer steps via IoT methods [11].

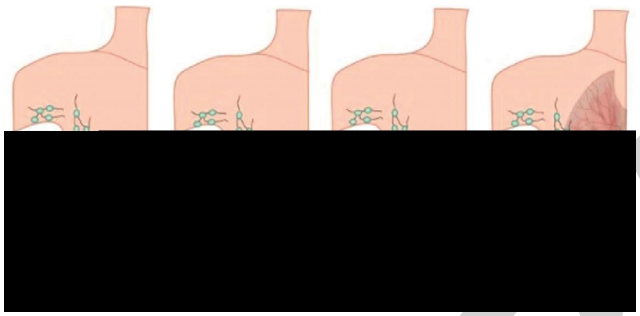

Figure 2: Detection of breast cancer stages by applying IoT [13].

Apart from this, the performance of the regression model needs to be also checked and compared with the subset while achieving a classifier toward performing the optimal detection performance. Researchers have conducted the proposed regression model on the utilization of IoT systems that can be highly used for detection as well as diagnosis of growing breast cancer cases worldwide. Furthermore, the regression analysis method of identifying IoT's role in detecting breast cancer also can be easily incorporated in the practice of healthcare diagnosis (Figure 3). It has been shown that the stages of breast cancer develop slowly in the woman's body and gradually reach the lethal stage, which in most cases causes the patients to die. After a correct diagnosis of breast cancer patients, the doctors suggested that the development of cancer can be detected based on the subtype of breast cancer symptoms. Therefore, the introduction of a new IoT-based tool for processing big data to improve data usage and early detection of deadly diseases will help patients recover faster, augmented by controlled and regulated dietary nutrition.

There is a large wealth of information suggesting that the nutritional diet has a significant impact on cancer patients. One can find many notable references in the prior art mentioning what should be taken and what else should be avoided when diagnosed with a breast tumor. Modern medical science has witnessed the effective and accurate use of IoT in breast cancer diagnosis procedures. Padmavathy believes that the vast use of the Internet of Things has experienced various life-transition phases for the past few decades, which offer scope for evaluating both the past and current real-time data related to patients' care [15]. On the other hand, due to the advent and contributions of artificial intelligence, the necessary clinical data mining methods have become easier nowadays under the monitoring of IoT. The researchers have focused on applying the regression analysis method to diagnose breast cancer effectively. Numerous surveys and medical reports have stated that most of the women across Canada, the UK, and Australia suffered from this fatal breast cancer disease. Therefore, the previous detection of breast cancer reflected potential challenges for both healthcare experts as well as researchers. To solve the long-lasting issue regarding proper detection of breast cancer, researchers in this research paper have proposed an IoT-based diagnostic procedure that can be effectively evaluated by the regression method. [2] IoT is a contemporary computer technology invention that focuses on connecting real and virtual objects. Such a technological approach in patient care is necessary for clinical experts while classifying both benign and malignant breast tumors among women patients across the globe (Figure 4).

Researchers while forming and developing the proposed regression analysis system utilized a classifier for IoT support to classify the presence of both types of tumors in females. Physicians tend to apply proper methods of IoT systems to improve the performance of detection and classification of breast cancer diseases. On the other hand, by applying a recursive selection of IoT features, researchers focused on analyzing and interpreting machine learning algorithms for more suitable evaluation of breast cancer datasets. Chowdhury and coresearchers studied both the training as well as testing methods in regression analysis that have been applied effectively for measuring the performance of clinical classifiers regarding breast cancer treatment prediction [16]. On the contrary, by applying a matrix of performance evolution, the overall practice of the medical classifier can be checked and used for supporting the detection of breast cancer more easily. From various survey results and

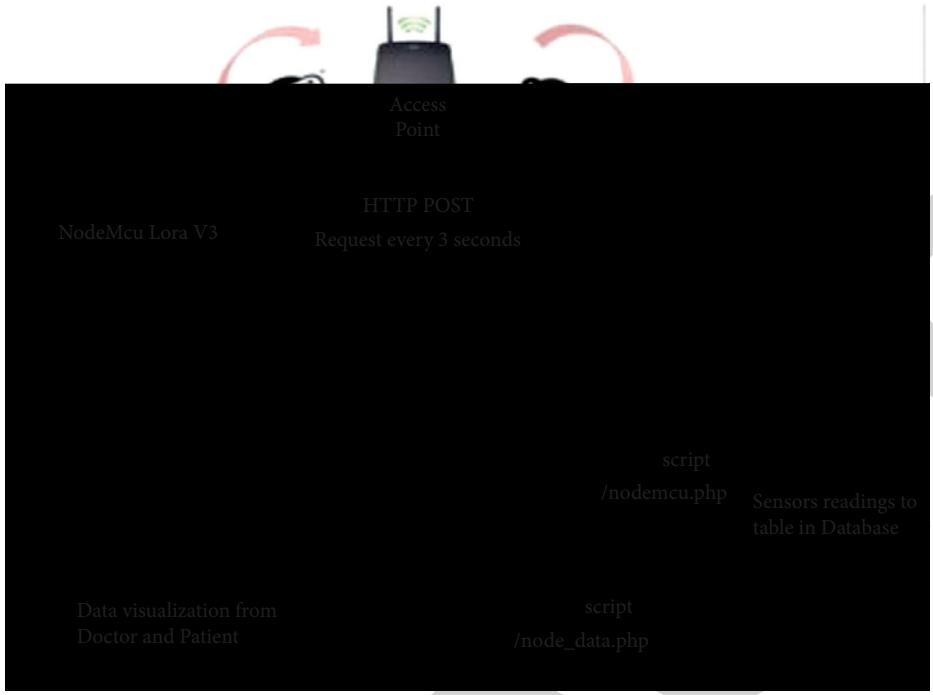

Figure 3: Various operations of IoT systems while detecting breast cancer symptoms [14].

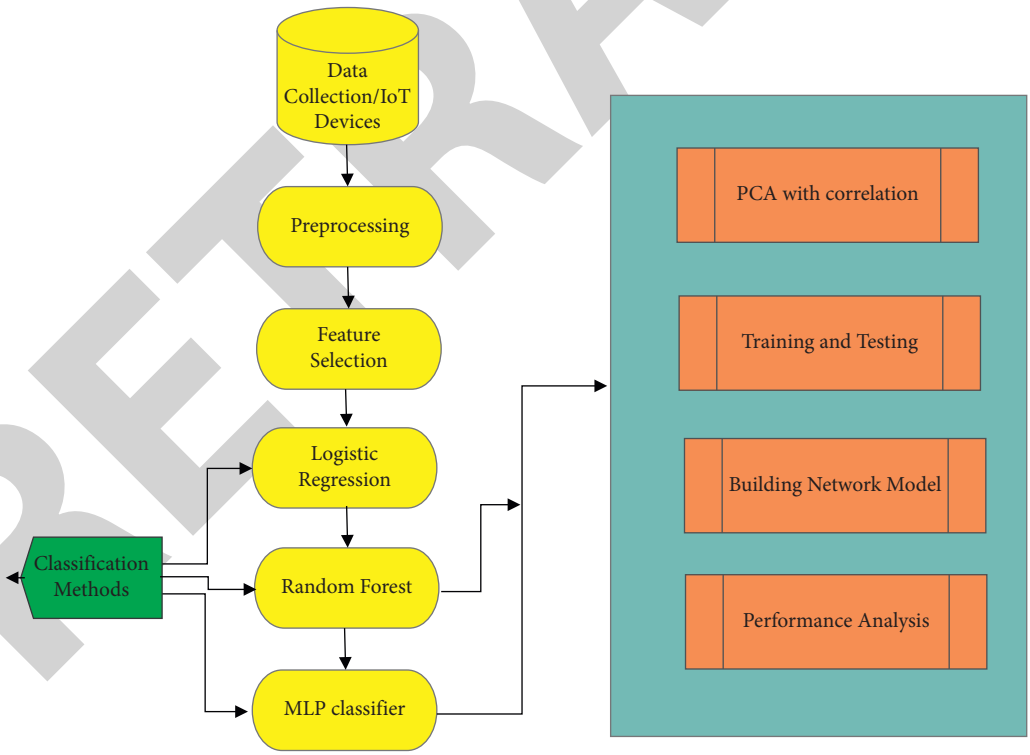

Figure 4: Stages of breast cancer detection using IoT systems [2].

experimental outcomes, researchers can effectively measure the performance of the IoT system by choosing more accurate recursive features and algorithms. The researchers implemented the proposed regression model for the use of IoT systems that can be widely used to detect and diagnose the increasing incidence of breast cancer worldwide. In addition, a regression analysis method to determine the role of IoT in the detection of breast cancer can be easily integrated into diagnostic care practices. Using a retrospective selection of IoT features based on big data analytics, the researchers focused on analyzing and interpreting machine learning algorithms to better evaluate breast cancer data sets.

Colleagues [16] believe that exercise as well as regression analysis methods have been used effectively to measure the performance of clinical classifiers in predicting the treatment of breast cancer.

Today, the application of IoT approaches pushes the process of critical disease recognition smoothly and more efficiently. Researchers for that reason have suggested investigating the contributions of IoT in the breast cancer detection process (Figure 5) in the entire research paper through the regression analysis model. On the other hand, the growing issues of breast cancer and its effects can be highly detected through this proper IoT system to efficiently detect breast cancer at the initial stage. Besides, physicians need to take proper help of the IoT systems for processing patient recovery and care treatment to be more effective for the symptoms of breast cancer. Early cancer detection can thereby be easily monitored and regulated with the help of dietary supplements. Scientists also emphasized the vast use of IoT bars that can be highly beneficial for mitigating the risks of breast cancer issues by continuous screening and monitoring. Researchers think that the implementation of IoT measures would be highly reliable in all fields of healthcare toward offering more beneficial patient care facilities for growing breast cancer cases globally. In this study, the analysis showed that cancer cells had slightly higher temperatures than normal cells. Therefore, it can be said that the sensors for detecting breast cancer can detect the temperature difference in the breast cancer cells, which means that the cancer can be diagnosed. In addition, other factors are responsible.

3. Research Methodology

Over the decades, scientists and physicians were working to spot the actual use of IoT in critical disease detection so that the necessary treatments can be applied timely, that could include various tumor therapies and suitably devised nourishments appropriate to the stage of cancer diagnosed. Effects of different nutritional components (such as carbohydrates, protein, vitamins, alcohol, and fiber) have been studied intensively in the preexisting literature suggesting a correlation between the type of diet and breast cancer treatment and prevention [17]. Doctors are increasingly using appropriate IoT systems to enhance the identification and categorization of breast cancer disorders. According to the investigators, the deployment of Internet of Things (IoT) allowed large data processing via various networks in Supporting Breast Cancer; therefore, there is also an expanded use of these tools and technologies in the medical area for strengthening detection and efficiently supporting patients. This study has conducted a regression analysis process to investigate the contributions of IoT in medical anomaly detection. Several ML algorithms related to IoT-based regulation for evaluating better breast cancer detection rates are investigated in this study. However, while processing a regression analysis model, much focus has been given to analyzing various practices of linear regression decision tree along with the J48 algorithm related to IoT technology for examining the accuracy in the outcomes of

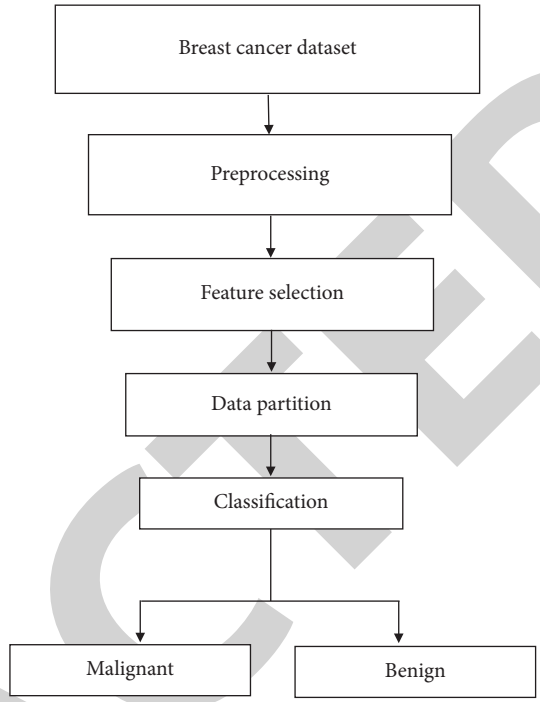

Figure 5: Framework of breast cancer detection by using IoT [16].

ML algorithms. [18] The importance of health in one's life cannot be overstated. It is a condition in which an individual's emotional, physiological, and social well-being is in sync with their physiology.

Moreover, all factors have been analyzed minutely related to the detection of regression analysis performance for breast cancer easy detection as well.

Researchers have conducted effective primary methods of quantitative data collection. All primary parameters gathered by the researchers regarding the use of IoT in breast cancer detection were the physical activities of patients with breast cancer. IoT helps clinicians to be more cautious when interacting and talking with breast cancer patients in a preventive manner. Furthermore, doctors may benefit from the Internet of Things by collecting patients' records and pertinent clinical data, which would then be saved in the cloud using AI technologies.

Apart from this, various biometric parameters have also been collected by the researchers while conducting the overall research study, such as vital checking, measurements of blood pressures and heart rate, blood, body weight, and effective tracking of other symptoms related to breast cancer disease. Naja and coresearchers opine that the screening and monitoring of abnormal body temperature of patients having breast cancer also need to be analyzed minutely through the regression analysis model [19]. In this article, the researcher looks at numerous machine learning methods connected to IoT-based regulation to evaluate improved breast cancer detection rates. However, while processing a regression analysis model, researchers have concentrated their efforts on studying various techniques of linear regression, decision trees, and J48 algorithms associated with IoT technologies to assess the efficiency of ML algorithms' outputs.

Through the overall regression analysis, researchers have considered effective ANOVA techniques for investigating the impact of IoT in better detection of breast cancer. On the contrary, various descriptive statistical analyses, as well as relevant coefficient values, have been also analyzed and compared to reach the desired outcome. The source states that cancer sometimes raises the body temperature and frequent fever can be observed along with other symptoms. This eventually raises the temperature of the chest. However, it has not been determined whether the temperature of the cancer cell differs from the temperature of normal cells.

All independent variables related to the particular topic have been closely analyzed by the researchers in the research study. Important independent variables determined by the researchers are previous breast cancer history and records of the patients, proper age, and the density of breast as well as the breast temperature to understand the overall analysis. Researchers have conducted a survey study among 20 women who are associated with new cases of breast cancer both directly and indirectly. After the evaluation of survey outcomes, researchers have come to know that all independent variables can offer aid to the IoT system for detecting disease symptoms at early stages. Various other factors also have been analyzed in the research study regarding sensor-based disease detection and utilization of the family history of the patients with breast cancer.

The linear regression evaluation was conducted by the researchers using the software IBM SPSS version 26 for comprehending the performance rate of various IoT-based breast cancer detection factors. Apart from this, enormous studies and results also have been analyzed and observed to detect the disease detection and prediction rate. For that reason, this research has successfully analyzed the importance between two necessary variables related to healthcare toward concentrating more on specific attributes regarding early detection of breast cancer. The importance of the p value has been effectively analyzed, where a p value below 0.05 ($p < 0.05$) reflects the statistical significance related to the topic. However, the overall analysis also helps researchers to understand the significance of the Pearson correlation value that is almost near to ±1. The negative value in the analysis shows the actual relationship that is at once negatively correlated. From the entire analysis, it can be considered that all these factors are firmly and effectively correlated. Furthermore, in order to check the validity and accuracy of secondary research, researchers also show genuine interest in conducting a secondary analysis. Moreover, by selecting valid articles, books, medical reports, and journals of the past 5 years to understand the importance of IoT in breast cancer detection more easily and effectively. Figure 6 shows the flowchart of the work done.

4. Analysis and Interpretation

This section will interpret the outputs of the regression analysis. In the regression ANOVA, descriptive statistics and coefficient values have been considered as well for an extensive justification.

The independent variables selected are cancer history, age, breast density, and temperature of the breast. The dependent variable is the probability of breast cancer occurrence (Table 1). The study was done on 20 women to understand whether these independent variables can help the IoT devices for early detection or not. Other factors are required to be considered apparently; however, this study has been conducted on the factors that can be measured by using sensors and IoT devices.

The linear regression analysis has been conducted at a 95% confidence level, and Table 2 shows the results.

Table 2 shows the R square value of the entire regression model, which is 0.758. It suggests that the model fits to the variables by 69.3% and the rest 30.7% output can be excluded. More specifically, the whole model is 69.3% accurate when the study was carried out on 20 women of different ages, family history, breast densities, and so on. Table 1 does not signify other values that are required for an in-depth analysis. Therefore, the research needs to consider coefficient and descriptive values as well (in Tables 3–5).

Table 3 shows that women's age is statistically significant with the occurrence of breast cancer ($p < 0.01$). Moreover, the t-value is +3.905, which shows the rejection of the null hypothesis. Here, the null hypothesis is age that does not have any relationship with the occurrence of breast cancer in women. However, as the t-value is more than 3, the alternative hypothesis is true, and age has a significant impact on the occurrence of breast cancer. The number of cancer histories in the family did not show any significant relationship with the occurrence of breast cancer. However, the t-value here is positive (0.295), which suggests that cancer history has a positive chance that women will develop breast cancer. Moreover, from Table 4, it is observed that the mean probability of breast cancer occurrence is 1.7455%, and the family history of cancer is 2.25 in number, which suggests that when the family history has more than two cancer cases, the occurrence of breast cancer increases by 1.4555% (other factors are responsible as well). The analysis showed that breast density is not statistically significant with cancer occurrence probability ($p > 0.6$). Moreover, the t-value here is negative (−0.476), which suggests the breast cancer risk increases with a decrease in breast density. Lastly, the analysis of breast temperature showed that breast cancer increases the temperature of the breast slightly. The relationship is not statistically significant ($p > 0.1$); however, the positive t-value (1.609) indicates that when breast cancer occurs, the temperature of the breast slightly increases.

Table 4 shows the value of the descriptive statistics, where it is observed that women aged between 14 and 48 have chances of breast cancer occurrence of about 0.01–6.10%. The number of family histories is ranging between 1 and 4. Therefore, when more than four cancer cases can be observed in family history, the probability of breast cancer will exceed 6.10%. The breast cancer density is ranging between 2.1 and 32.4. The study provided a negative relationship between breast density and the probability of breast cancer. The maximum temperature of the breast has been observed is 43°C and the minimum temperature is 34 degrees Celsius.

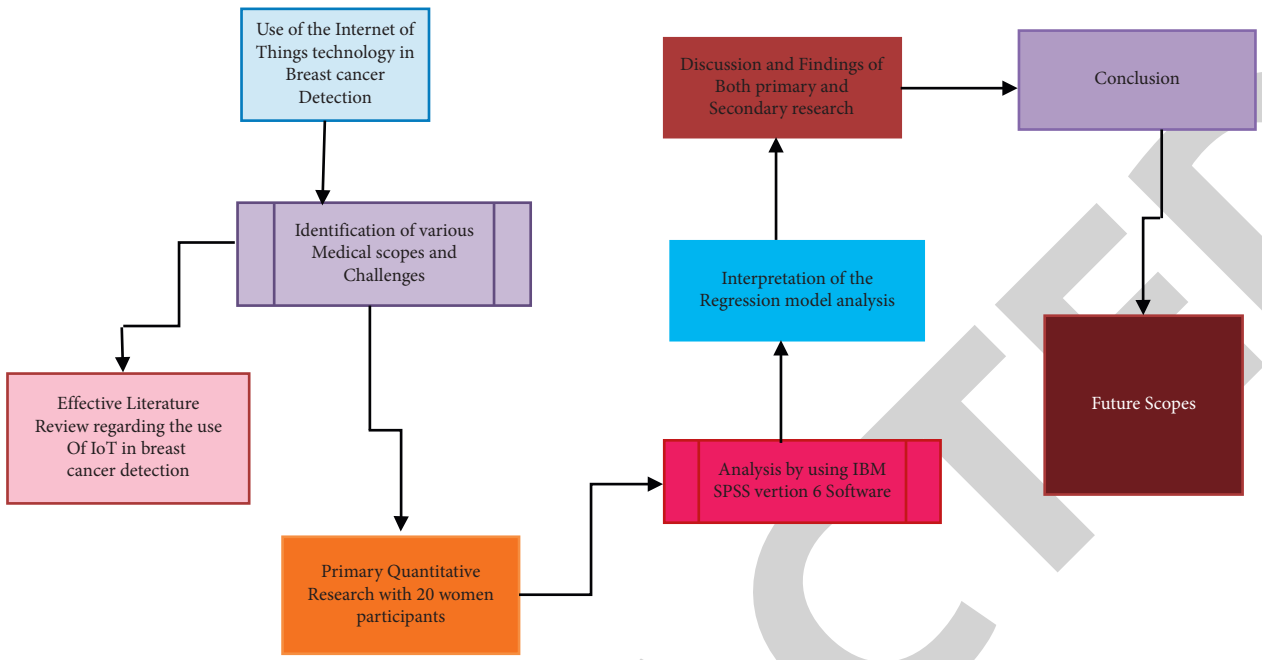

Figure 6: Flowchart of the research.

Table 1: Independent and dependent variables.

Variables entered/removed[a]			
Model	Variables entered	Variables removed	Method
1	Breast temperature (Celsius), age, number of cancer history, breast density (%)[b]		Enter

[a]Dependent variable: probability of breast cancer occurrence. [b]All requested variables were entered.

Table 2: Model summary results showing R square value.

Model summary[b]				
Model	R	R square	Adjusted R square	Std. error of the estimate
1	0.871[a]	0.758	0.693	1.02762

[a]Predictors: (constant), breast temperature (Celsius), age, number of cancer history, breast density (%). [b]Dependent variable: probability of breast cancer.

Table 3: Coefficient values of independent variables with relation to the dependent variable.

Coefficients[a]								
Model		Nonstandardized coefficients		Standardized coefficients	t	Sig.	95.0% confidence interval for B	
		B	Std. error	Beta			Lower bound	Upper bound
1	(Constant)	−8.721	3.880		−2.248	0.040	−16.991	−0.450
	Age	0.162	0.041	0.902	3.905	0.001	0.074	0.250
	Number of cancer history	0.111	0.376	0.058	0.295	0.772	−0.691	0.913
	Breast density (%)	−0.026	0.054	−0.144	−0.476	0.641	−0.142	0.090
	Breast temperature (Celsius)	0.157	0.097	0.222	1.609	0.128	−0.051	0.365

[a]Dependent variable: probability of breast cancer.

The entire analysis has found that age, cancer history, and breast temperature are related to the occurrence of breast cancer. Breast density and its impact on causing breast cancer have not been found significant.

The ANOVA Table 5 and Figure 7 suggest that the whole regression model is statistically significant ($p < 0.001$). Moreover, the F-value greater than 3.9 (11.738) also indicates the relationship between independent variables and the

Table 4: Descriptive statistics showing minimum, maximum, mean, variance, and standard deviation values.

Statistics						
		Age	Number of cancer history	Breast density (%)	Breast temperature (Celsius)	Probability of breast cancer
N	Valid	20	20	20	20	20
	Missing	0	0	0	0	0
Mean		27.80	2.25	12.830	38.55	1.7455
Std. deviation		10.340	0.967	10.3275	2.625	1.85562
Variance		106.905	0.934	106.657	6.892	3.443
Minimum		14	1	2.1	34	0.01
Maximum		48	4	32.4	43	6.10

Table 5: ANOVA regression output.

ANOVA[a]						
Model		Sum of squares	df	Mean square	F	Sig.
1	Regression	49.583	4	12.396	11.738	.000[b]
	Residual	15.840	15	1.056		
	Total	65.423	19			

[a]Dependent variable: probability of breast cancer. [b]Predictors: breast temperature (Celsius), age, number of cancer history, breast density (%).

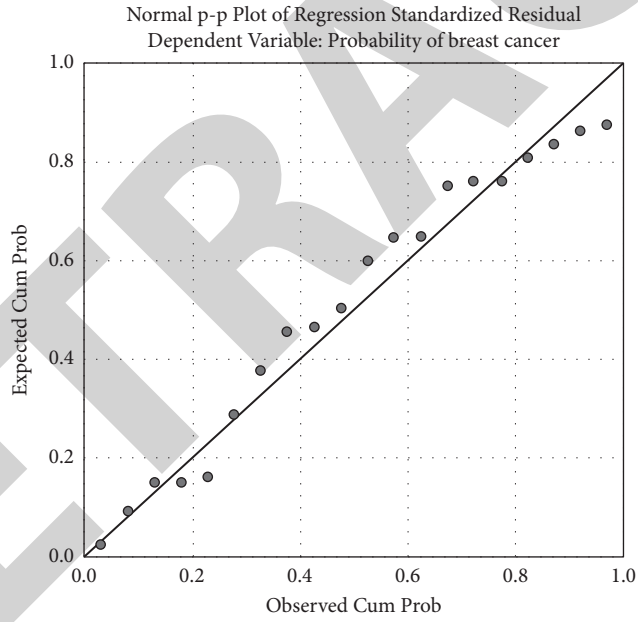

Figure 7: Scatter plot representation of regression model.

dependent variable is statistically significant. The histogram (Figure 8) shows that the model is centered and not skewed to any of those sides which indicate its symmetrical characteristics.

5. Discussion and Findings

The regression analysis and descriptive statistics have found that age, cancer history, and breast temperature are responsible for determining the probability of breast cancer occurrence. Therefore, the IoT devices need to determine these three factors mostly to identify and measure the chance of cancer occurrence. Several authors have highlighted this topic and determined the probability of breast cancer using other variables. Naja et al. have explained several parameters and measurable criteria based on which the probability is determined [19]. The authors have stated that ITbra has been invented which contains a sensor and detects the slight temperature alteration in the breast. Breast cancer cells may have a slightly increased temperature, which can be distinguished by the IoT sensors and will predict cancer [20]. This study effectively assessed the significance of two important healthcare factors to focus more on particular features connected with early identification of breast cancer. Physicians are increasingly using appropriate IoT systems to enhance the identification and categorization of breast

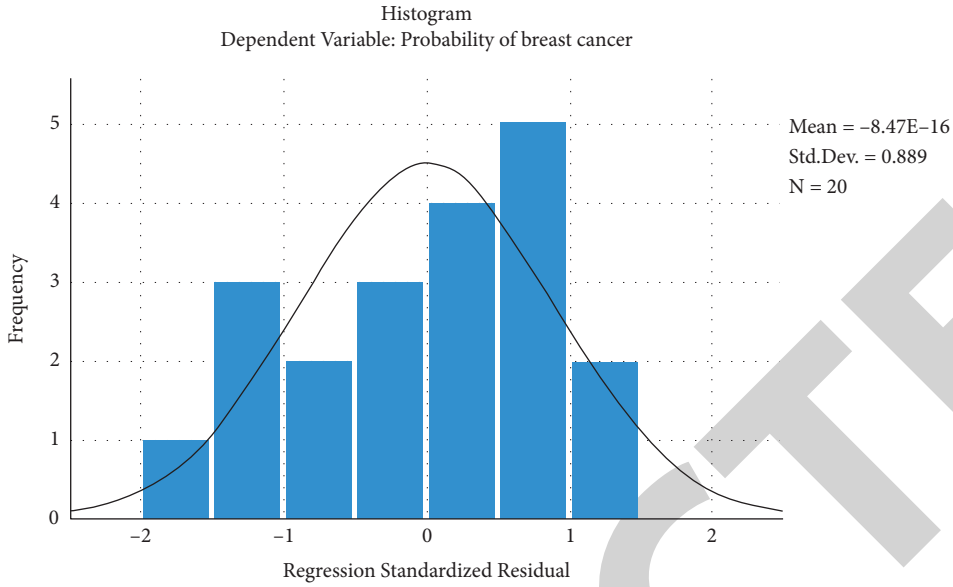

Figure 8: Histogram representation of regression model.

cancer disorders. The current study found that breast cancer increases breast temperature and the result can be justified using the evidence from http://breastcancer.org [21]. The source states that cancer sometimes increases the body temperature and frequent fevers are observed along with other symptoms. This ultimately increases the temperature of the breast. However, the cancer cell has any difference in temperature from that of the normal cells has not been identified. In this study, the analysis found that cancer cells have a slightly greater temperature than normal cells. Therefore, it can be stated that the sensors for breast cancer detection can identify the temperature difference in breast cancer cells, which will enable the device to diagnose cancer. Moreover, other factors are also responsible. For example, exercising the lipid composition of cells, chemical constituents, blood pressure, and heart rate are responsible for manipulating body temperature [22–24]. Therefore, IoT devices need to measure these factors simultaneously for an effective determination.

Findings from the CDC government showed that increased breast density increases the probability of breast cancer development [25]. The study states that dense breasts have greater fatty tissue and connective tissue which brings an improper determination of breast cancer by mammogram. Contrarily, this study found dense breasts reduce the chance of breast cancer. However, this is probably a false outcome because Destounis and colleagues showed that the dense tissue in the breast is more prone to breast cancer and the denser the breast, the more the breast is prone to cancer [26, 27].

The analysis found that the number of cancer histories is related to the occurrence of breast cancer in future. Armstrong and coresearchers have found similar results and interpreted that a previous family history of cancer has a probability of causing breast cancer in the future [28, 29]. The final identification of this study is age and its relation with the occurrence of breast cancer. When age increases, the chance of cancer also increases. It suggests that an increase in age reduces the immunity power of the human body, and then, the body's defense system cannot destroy the cancer cells effectively [30, 31]. A similar study was carried out by Kresovich and coworkers which showed an acceleration of age is directly related to the occurrence of breast cancer [32]. Existing literature does hint to a connection between dietary food and breast cancer, but it requires more concept proof and comprehensive studies to cement this bridge [33].

Therefore, it can be stated that the IoT devices need to determine the probability of breast cancer by considering these factors. Considering these factors only is not enough as there are other reasons also responsible for changing the body's temperature balance, and so on.

6. Conclusion

The study has described the application of IoT devices and how the IoT device can function to detect breast cancer. Available studies showed that special sensors are placed inside a bra (ItBra) which determines the breast temperature. Cancer cells probably have slightly different temperatures than normal cells which are detected by the sensors. However, strong evidence for this idea has not been found. The current study has found that breast cancer increases the breast temperature slightly, which can be detected by the IoT devices. Primary quantitative research has been carried out where 20 women of different ages and family histories were examined to understand their risk of developing breast cancer. The study obtained true positive and false negative tests. True positive tests are "age acceleration increases the chance of breast cancer occurrence;" "breast cancer increases the temperature of the breast" and "women with a family history of cancer are at higher risk of developing cancer." These are considered true positives as similar evidence has been found by the researchers. However, breast density and

its relation to cancer occurrence gave false negative results. Available studies and CDC suggested that dense breasts are more prone to developing cancer; whereas the current study showed breast density is inversely proportional to cancer development. Thus, this finding can be excluded and overall, the study is 69.3% accurate when the entire linear regression model is considered. There are various strategies and treatments mentioned in the literature that can help positively diagnosed individuals. Food and dietary supplements can help reduce the risk of cancer progression in those individuals. It may not be a permanent cure for this disease, but can definitely help provide a better quality of life. Age is responsible for developing cancer because the acceleration of age weakens the body's immune system, which ultimately allows the cancer cells to grow freely. Therefore, the IoT devices need to consider these abovementioned factors along with other essential factors for effective detection of cancer.

7. Future Scope

The future of IoT is not limited to monitoring, detection, and treatment of breast cancer. The future of IoT in the healthcare system can be extended to providing efficient and accurate medication along with balanced nourishment; "Ambient Assisted Living" or AAA; assisting disabled persons and medical implants. The medication can be related to breast cancer as well. The IoT devices can be developed to an extent that will show the recommended medication for the early prevention of breast cancer and other cancers. Apart from this, several preventive measures are there which can be provided through IoT devices to prevent the occurrence of breast cancer. For example, assisting humans in exercising, changing diet plans, regular blood tests, mammography, and many more for who are at higher risk of breast cancer. It will ultimately help individuals to prevent cancer in later life and improve Quality-of-Life.

Available studies showed that IoT devices work using Internet services, and it ultimately poses a threat to the privacy and security of the users. When the attackers gain access to the smart Fitbit or other IoT devices, the attacker can gain access to the entire home network of the user. Therefore, the security system needs to be improved before making it versatile.

Data Availability

The data shall be made available on request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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