

PAP smear Image Classification to Predict Urinary Cancer Using Artificial Neural Networks

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ABSTRACT

Cervical cancer ranks the fourth most common women cancers in less developed countries due to lack of skilled medical staffs and medical screening procedures. Cervical cancer occurs without any symptoms when compared to other cancers. The main aim of artificial neural networks is to supply right information at a right time. Hence we implement artificial neural techniques with collected data Analysis, to improve the life of an individual and to decrease the death rate of the society respectively.

Index Terms:

Cervical cancer; Dataset collected; Cervix detection; artificial neural techniques.

1.Introduction

Cervical cancer ranks the fourth most deadly cancer disease worldwide with 5,28,000 cases yearly mainly in less developed countries. These cancer disease occurs due to lack of skilled medical staffs and medical screening procedures. This cancer is a very challenging cancer among all the cancers because this occurs without any symptoms. It is the third most dangerous cancers among women. This cancer can be easily cured when it is detected at its early stage, and it can be identified by the physicians only through the diagnostics tests. Treatments will be given according to the stages identified correctly. There are about four stages which is proposed by IFOG (International Federation of Gynecology and Obstetrics). Stages of the cancer cells can be identified by the spreads of the tumors (or) other parts of the affected area. The basic symptoms of this cervical cancer includes, abnormal bleeding after menopause, unusual vaginal discharge, tiredness and weight loss, pain in the pelvis and abdomen and irritation while urinating. The main cause for this cervical cancer also includes the long term infections caused by human papillomavirus (HPV) infections. Cancer cells and tumor cells are developed due to the presence of abnormal cells in the wall of the cervix region.

When the researchers focused on this problem they identified that cervical cancer occurs for those women who smoke regularly because they have a weak immune system and for those who are infected with HIV and also for those who have undergone some organ transplant, these people are infected with the higher rate of disease. Women were aged between 30 and 69. Gynecologists easily identify swelling around the womb by physical examination (or) pap smear tests.

Depending upon the severity of the tissues other methods such as ultrasound, MRI scans, x ray and CT scans (computed tomography) are used to identify the cancer cells in the deeper areas.

Once the cancer cells are identified treatment will be given based on the stages, the following table represents the main stages, and the stages are sub divided into STG IA, STG IB, STG IA1, STG IA2, STG IB1, STG IB2, STG IIA, STG IIA1, STG IIA2, STG IIB, STG IIIA, STG IIIB, STG IVA, STG IVB.

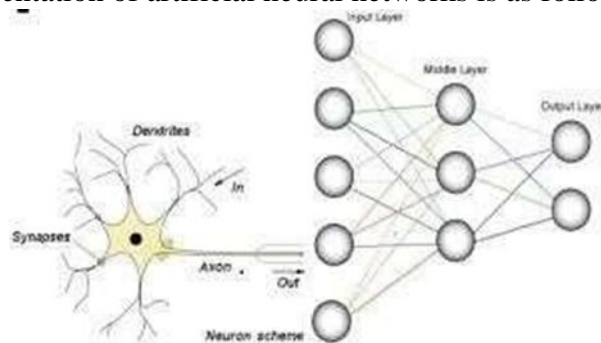
STAGES (STG)	ILLUSTRATION
STG I	Cancer cells start growing and those tissues will reach the cervix lining.
STG II	Cancer cells spreads to the nearby areas of vagina and cervix and cells present only in the pelvic region.
STG III	Cells spread till pelvic walls causes swelling in the kidney regions.
STG IV	Spreads to bladder and goes till it reaches the lymph nodes.

Table 1: Stages of cancer cells.

In addition to this manual methods cervical cancers can also be detected using wireless sensor networks and machine learning techniques and also it is used to examine the infections. In ML techniques specifically we use artificial neural networks(ANN) algorithms to predict the cancer rate easily with the data samples collected. In this implementation, we enhance algorithms which combines each data samples with the terms. It provide high precise user rate with the accuracy of 90% [5] accurate results.[31]

Experimental results show that compared with the results of common manual methods, the following are the recent works submitted.

The diagrammatic representation of artificial neural networks is as follows,



The objectives of the paper are

1. Decrease the death rate of women dying because of this cervical cancer.
2. Provide accurate results for the infected patients.
3. Analyze the patients reports by the Experts gynecologist in order to identify the severity of the disease.
4. Here we identify the stages of the cancer for proper treatment.

2. Related Works

[1] R. D. Aldian, E. Purwanti and M. A. Bustomi, Applied Computing Based Artificial Neural Network for Classification of Cervical Cancer, pp. 4–7, (2013) this study is used to classify the normal and abnormal cells automatically by using computation based artificial neural

network methods and also this method gives high superiority for processing and data saving and this provides the accuracy rate of 80% to predict the cancer rate.

[2] A. S. Phatak and B. P. A., Classification of Mr Images of Cervical Cancer Using SVM and ANN Engineering, issue 2277, (2015) this study is used to identify the cancer infected patients and then classify them into normal , abnormal and dangerous cells by using artificial neural network techniques , this method is easier to detect the cancer cells than the manual method detection and the accuracy rate of this study provides 80% for this disease and also this method provides higher accuracy rate than other methods.

[3] N. Ganesan, Application of Neural Networks in Diagnosing Cancer Disease Using Demographic Data, vol. 1(26), pp. 76–85, (2010) this study comprises about artificial intelligence techniques particularly artificial neural network techniques, these methods have been applied to both pre clinic and post clinic diagnosis. Here it is predicted with the demographic datas and these does not provides accurate results for cervical cancer and this technique is mainly used for lung cancer in emergency cases.

[4] P. J. G. Lisboa, A Review of Evidence of Health Benefit from Artificial Neural Networks in Medical Intervention, vol. 15, (2002) the review of this is to access the artificial neural network techniques for diagnosing and analyzing the randommised data for controlled clinical trials. The role of neural networks uses decision support system arising from parallel developments in statistics and artificial intelligence. This study provides less accurate results when compared to other studies about cervical cancer.[32]

[5] Twelfth International Multi-Conference on Information Processing-2016 (IMCIP2016) Classification of Cervical Cancer using Artificial Neural Networks M. Anousouya Devi ,S.Ravi , J. Vaishnavi and S. Punitha School of Engineering and Technology, Pondicherry University, Pondicherry, India ,this study uses artificial neural networks(ANN) to easy classification of normal and dangerous cells with collected data sets given and this [33] provides accurate results of 90% other than pap smear tests and liquid cytology based(LCB) test. Here various algorithms of neural networks is used for easy accuracy.

[6] Bighnaraj Naik , A survey on machine learning techniques it is used to learn about the role of machine learning in various data mining tasks which is very helpful in classifying the data.[34]

[7] Bae Cho, effectively apply to multiclass classification systems. It is integrated with naïve bayes and it gives more accuracy for artificial neural networks. This methods is followed to achieve good accuracy.

[8] M. A. Flores, C. Ramirez and V. M. Castan o, Image processing and neural networks for early detection of changes Micai, pp 632-641,(2014) this study shows us about machine learning techniques specifically ANN which is very [35] helpful in predicting the cancer cells easily.

[9] W. Xiaoning, Z. Jianwei, X. Yue, W. Wanpeng and L. Minchao, LCT Image Recognition for Cervical Cells Based on Neural Network, pp. 1479–1483, (2012). This paper is used to recognize the cancer caused cells based on the concepts of neural networks which gives more accuracy than other manual methods.

[10] M. Kusy, B. Obrzut and J. Kluska, Application of Gene Expression Programming and Neural Networks to Predict Adverse Events of Radical Hysterectomy in Cervical Cancer Patients, vol. 51(12), pp. 1357–65, (2013). this article is used to compare the gene expression programming (GEP) methods in prediction of cervical cancer patients and this layer was compared with multilayer perceptron(MLP) with the accuracy of 71.95%

3. Results & Discussion

In this paper the classifiers are trained and tested with normal and abnormal cells. This minimizes the empirical risk for achieving the good results. This project also provides the data cleaning(detecting,(or)correcting the corrupt or inaccurate records from the data sets and refers to identifying incomplete, inaccurate or irrelevant parts of the data and then modifying the data) process which will be very useful in identifying the cancer caused patients. It makes the entire process to improve its standard and reduce the risk rate. The following are the list of algorithms which is used for high performance of results,

SI. NO	AUTHOR	TITLE	ALGORIHM	MERITS
1.	R.D.Aldian,E. Purwanti and M.A.Bustomi	AppliedComputing Based Artificial Neural Network for Classification of Cervical Cancer, pp. 4-7, 2013	Computation based artificial neural networks	Success rate of cancer prediction is 80%.
2.	A. S. Phatak and B. P. A.,	Classification Mr Images of CervicalCancer UsingSVM and ANN Engg. issue 2277, 2015	Artificial neural networks	Classify the normal and abnormal cells with accuracy of 85%
3.	N. Ganesan	Application of Neural Networks in Diagnosing Cancer Disease Using Demographi c Data, vol. 1(26), pp. 785, 2010	Artificial intelligence specifically ANN	Cost effective and easy to use with less accuracy.
4.	P.J.G.Lisboa	A review of evidence of health benefits from ANN,2002	Parallel development with statistics and AI	Easily effective with less accuracy.
5.	Anousouya Devi,S.R avi , J. Vaishnavi andS.punitha	Twelfth International MultiConference on classification of cervical cancer using ANN,2016	Artificial neural networks	Easy and accurate results of 90%

Table 2 : Overview of related works with its accuracy and algorithms.

With the results of the above table here, we use artificial neural networks(ANN) for classifying the normal, abnormal and dangerous cells with the collected data samples and also this provides

results in the graph format which is used for easy understanding of the stages and risk rate. this system is more efficient than other methods.

4 Conclusion

This system provides accurate results of classifying the normal, abnormal and dangerous cells by applying the artificial neural networks(ANN) techniques for the collected data sets. While applying these algorithms this provides the accuracy rate of 90% [5]. This system is very helpful for the society in identifying the patients with the cervical cancer because this cancer occurs without any symptoms. Cervical cancer ranks the fourth dangerous disease and it occurs for the women within the age of 30 to 69.this system reduces the risk rate and the death rate caused due to cervical cancer is decreased. Several ANN techniques are used for accurate results based on the performance of the algorithm. Our experimental system provides more precise results than other manual screening methods such as pap smear tests and this system is cost effective for the society and it is very helpful the each and every individuals

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