Detection of Cervical Cancer Using Gaussian Filter and Canny Edge Detection Algorithm

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Abstract - *Cervical Cancer is one of the deadliest cancers affecting the lives of women worldwide. Few concerns have arisen such as the shortage of skilled pathologists leading to increase in burden on them. This requires a requirement for proficient, and particular technique that analyze cervical disease without human intercession. In this paper, a computerized technique is produced for the detection of cervical disease utilizing image processing procedures. MATLAB image processing tools is utilized to separate feature from cytology image (bitmap picture record) that are utilized for segregating cells of cervical malignancy.*

Key Words: Image processing, Cervical Cancer, Gaussian Filter, Canny Edge Detection, Region of Interest (ROI).

1. INTRODUCTION

Cervical cancer growth in ladies is a standout amongst the most widely recognized tumors around the world, next just to bosom disease. Moderately aged ladies between the ages of 40-55 years are for the most part influenced by this malignancy. Consistently cervical is analyzed in around 500,000 ladies comprehensively and is in charge of in excess of 280,000 deaths yearly. These days there is a wide variety in the quantity of cervical malignancy cases over the globe. Hazard factors incorporate smoking, unprotected sex or having HIV disease, delayed utilization of anti-conception medication pills. In the western side, pervasiveness of this illness is steadily diminishing a result of the early identification through customary screening. 80% of the new cervical malignant growth cases happen in creating nations, similar to India, which reports around 1/4th of the world's instances of cervical disease every year.

The National Cancer Control Program (NCCP) figured and subsidized by the Ministry of Health, Government of India has worried upon the execution of network based cervical screening program in any event in select areas of each state. The NCCP has influenced arrangement for store to be given to every one of the states to execute the malignant growth control program that incorporates cervical disease screening exercises [2].

Cervical malignancy happens when anomalous cells in the cervix duplicate at a quicker rate and develop wild. The unusual changes that the cervical cells create change them to a pre-destructive state which is alluded to as 'Cervical Intraepithelial Neoplasia' (CIN). In view of its degree or power, these progressions are delegated second rate CIN and high evaluation CIN. This malignant growth is brought about by an infection called Human Papilloma Virus (HPV).

Two famous screening tests which help in the early discovery of cervical disease or avert cervical malignancy are: (i) Pap test (or Pap smear)- searches for pre-disease cell changes on the cervix. (ii) HPV test-searches for the HPV infection that causes the cell change. Another mainstream screening technique is the Liquid Based Cytology (LBC). LBC is a method for getting ready cervical examples for examination and conclusion in the research center. Discovery rate is higher utilizing LBC than Pap test. Every one of these procedures are turned out to be tedious and might yield wrong outcomes [1].

2. EXISTING SYSTEMS

The very famous technique is the Papanicolaou smear (Pap) check where all women ought to take this test once in a year. A Pap smear, additionally known as a Pap, is a screening system for cervical cancer. It examines for the presence of precancerous or cancerous cells on the cervix. The cervix is the opening of the uterus. The health practitioner scrapes a small number of cells from the uterus of the cervix location to discover changes in the cervical cellular before they change into most cancer cells [1].

The LBC test is a cervical screening test is executed to discover any extraordinary changes within the cells of the cervix. The Pap smear test is the traditional check for cervical screening, but nowadays checking out the usage of liquid-primarily based cytology or LBC has turn out to be extra not unusual. The liquid-based cytology (LBC) test is used for detecting cervical most cancers, which uses 5% acetic acid within the biopsy of the cervical tissues which modify the Acetowhite (AW) region into a white shade, is a manner of diagnosing cervical cancerous cells [1].

HPV test can locate any of the high-risk kinds of HPV that are most usually located in cervical cancer. The HPV DNA check includes checking out cells collected from the cervix for infection with any of the varieties of HPV which are maximum in all likelihood to cause cervical cancer. This check can be a choice for ladies with age 30 and above, or for younger girls with a peculiar Pap test. The presence of any of those HPV sorts in a female for many years can result in cellular changes that need to be handled in order that cervical cancer does not arise. The HPV test is achieved at the identical time as the Pap check through the usage of a small soft brush to gather cervical cells which are sent to the laboratory, or the HPV testing pattern may be taken without delay from the Pap pattern [3].

2.1 Limitations of Existing Systems

- ➤ The Pap smear test is all around expensive and just few experienced cytologists can conduct this test which may results in high false positive rates because of human mistakes

- ➤ The lower sensitivity, inefficient data gathering, and low possibility of precise examination are the significant disadvantages related with Pap smear test

- ➤ On LBC slides, nuclei regularly take on a progressively vesicular, fragile appearance. Also, the LBC example has less region of interest than Pap smears to help the human eye at the time of the screening procedure and tedious per unit area to survey. LBC test may cause epithelial cells round up and appear smaller

- ➤ The rounding up of cells cause the nucleus core-to-cytoplasmic proportion to be changed in the nucleus

- ➤ HPV tests may likewise be bound to recognize irregular cell changes that would have come back to ordinary all alone and never formed into disease

- ➤ Results may not be accessible immediately

- ➤ High unit cost

1.2 Proposed System

Cervical cancer is one of the deadliest cancers ever known. The main trouble with this cancer is that it cannot be detected because it doesn't show any signs and symptoms till the very last stage. This is also attributed to the most cancers itself and also to the dearth of pathologists available to screen the cancer. This needs a correct method that diagnoses cervical cancers without human intervention. The proposed system can come across cervical cancer by the use of image processing strategies. Image processing techniques are used to extract morphological features from cytology cell images (*bitmap image file*). The obtained features are used to make the system to distinguish among cancerous and non-cancerous cells [5].

3.1 Advantages of proposed system

- ➤ When compared to existing systems, clinicians can expect more effective results

- ➤ Reduces clinicians work

- ➤ Provides an easy way to Interact with the system
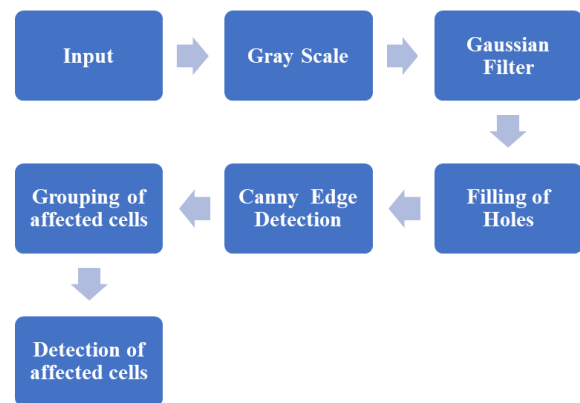
- ➤ Flexible

4. METHODOLOGY

Fig-1: Steps involved in the detection of cancerous cells.

4.1 Pre-processing

Firstly, the biological RGB cell image (bitmap image) is converted into gray-scale image [4]. A pre-processing technique is applied to gray-scale image to improve the quality of image and also to eliminate the useless information using Gaussian Filter.

4.2 Gaussian Filter

A Gaussian filter is rolled over the cytology image to smoothen the region of interest. Filter the image with isotropic Gaussian smoothing kernels of increasing standard deviations [5]. Gaussian filters are isotropic with the same standard deviation along both dimensions. An image can be filtered by an isotropic Gaussian filter by specifying a scalar value for sigma [5].

4.3 Canny Edge Detection algorithm

Edge function is used find edges in intensity image [5]. The Canny edge detection is a multi-stage algorithm which is used to detect a wide range of edges in cell images. The Canny edge technique is used to extract the abrupt changes

of affected cells and non- affected cells. This technique helps us to make the difference between affected and non-affected cells.

4.4 Morphological Operations

Morphological functions perform morphological operation on gray-scale image to detect the affected cells[5].

- ➢ **bridge** bridges previously unconnected pixels in the gray-scale image [5].
- ➢ **close** performs morphological closing operation (dilation operation followed by erosion) [5]**.**
- ➢ **open** performs morphological closing operation (erosion operation followed by dilation) [5].
- ➢ **erode** performs erosion using the structuring element [5].
- ➢ **imfill** morphological function fills image regions and holes [5].
- ➢ **imdilate** morphological function dilates the gray-scale image and returns the dilated image [5].

5. CONCLUSION

Cervical most cancers are screened manually by using the Pap smear test and LCB take a look at which does not deliver correct classification results in classifying the regular and unusual cervical cells in the cervix location of the uterus. The manually screened technique suffers from high fake price due to human errors and also cost effective to be achieved by using the skilled cytologist. in this paper, a method is achieved for the automated detection of cervical cancer using image processing techniques. The automated techniques are done to supply correct outcomes and to make powerful classification of normal and abnormal cells.

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