Available online at www.elixirpublishers.com (Elixir International Journal)

Electrical Engineering

Elixir Elec. Engg. 90 (2016) 37733-37734

ISSN: 2229-712X

Cancer Diagnosis using Artificial Intelligence

Priyanka Sharma, Raj Kumar Gupta, Shubham Sharma and Prankur Rawat

Department of Electronics and Instrumentation, Galgotias College of Engineering and Technology, New Delhi, India.

ARTICLE INFO

Article history:

Received: 29 April 2015;

Received in revised form:

8 January 2016;

Accepted: 14 January 2016;

Keywords

Tumor, Artificial Intelligence,
Prewitt Operator,
Sobel Operator,
Roberts Cross Operator.

ABSTRACT

The proposed work gives a method of cancer diagnosis using artificial intelligence. The method involves the use of MRI images which are processed and segmented before the display of the tumor portion. The tumor portion will be having a denser background as compared to the general image; this has been set up in our algorithm. Some image enhancement and noise reductions are done to enhance the image quality, after that some morphological operations are applied to detect the tumor in the image.

Introduction

Cancer is a term used for diseases in which abnormal cells divide without control and are able to invade other tissues. Cancer cells can spread to other parts of the body through the blood and lymph systems. Cancer is not just one disease but many diseases. There are more than 100 different types of cancer. Most cancers are named for the organ or type of cell in which they start - for example, cancer that begins in the colon is called colon cancer; cancer that begins in melanocytes of the skin is called melanoma. Thus tumor is nothing but an unwanted growth of cells. The treatment of cancer has to be restricted to the problem area. Any kind of error in the correct detection may lead to the destroying of healthy cells.

Various methods have been proposed for the detection of cancer. Malathi A. and SantraA. K used fuzzy logics to detect the possibility of cancer in persons. In their algorithm variables were defined for various activities (age, sex, smoking habits, etc) to determine the risk of cancer in an individual. When these factors were nearly same the output could cause error. [1] Sayali D.Gahukar et al. used fuzzy, segmentation and converted the image into fuzzy data domain to detect the tumor cells. More accuracy by segmentation of images but the speed was comparatively slow as the algorithm was bulky. [2] Zhang et al. proposed Hidden Markov Random Field (HMRF) model to achieve brain MR image segmentation in unsupervised framework. The segmentation greatly depends upon the proper choice of initial model parameters. [3] Ahmed et al. proposed a modified fuzzy c-means algorithm for bias field estimation and segmentation of MRI data. The method proved to be faster but the technique is limited to a single feature input. [4] Ramadan M. Ramo proposed methods for high speed tumor detection Gray – Scale Images, image smoothening etc. Artificial detection (snake algorithm) is based upon certain inputs. [5]

PROPOSED METHODOLOGY

The MRI (image) is processed and then feature extraction is done before the tumor region detection for further study (Fig. 1). The processing involves gray scale of image and filtering it and then enhancing it following which the segmentation of the image is done and finally the output tumor region is highlighted successfully (Fig. 2).

Prewitt operator, Sobel operator and Roberts Cross operators are used along with fuzzy logic to determine the more intense nature and extract the particular area of target more efficiently. An algorithm is designed that uses the above technologies and gray white scale, RGB scale to determine the "tumor" successfully and at a decent pace.

RESULT

Prewitt operator in simple terms, calculates the gradient of the image intensity at each point, giving the direction of the largest possible increase from light to dark and the rate of change in that direction. Thus it helps us to select the area with maximum dense clotting and thereby increasing the possibility of “tumor" at that place. Integrated filtering of the image in the horizontal and vertical direction takes place, results therefore shows how "abruptly" or "smoothly" the image changes at that point and therefore how likely it is that part of the image represents an edge.

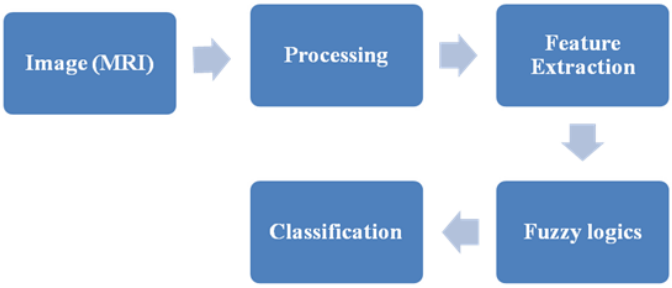


Fig 1. Steps used for Cancer Diagnosis

Sobel operator is based on convolving the image with a small, separable, and integer valued filter in horizontal and vertical direction and is therefore relatively inexpensive in terms of computations. It uses the image intensity gradient function to depict the outputs, which may have irregularities in the image.

Roberts cross operator is to approximate the gradient of an image through discrete differentiation which is achieved by final sum of the squares of the differences between diagonally adjacent pixels. Fig. 3 shows the results achieved using above 3 operators.

Tele:

E-mail addresses: priya.32dec@gmail.com

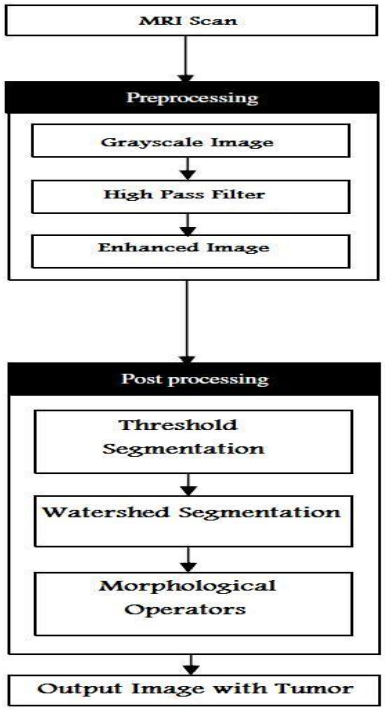
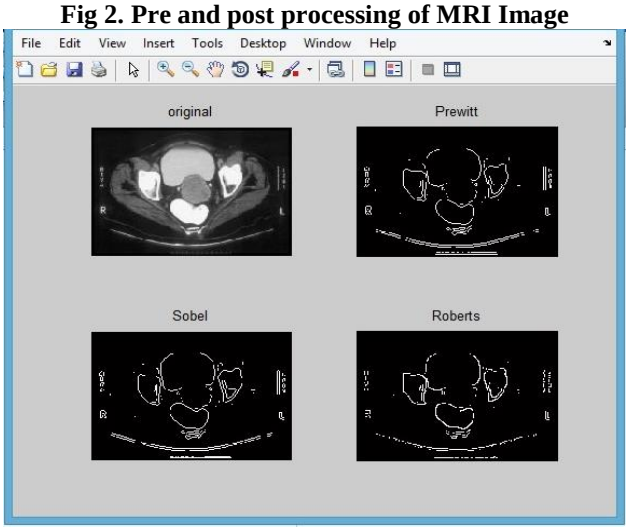


Fig 2. Pre and post processing of MRI Image



CONCLUSION

The proposed work aims to detect cancerous cells by the help of MRI scan images, and is moving in the right direction. Through MATLAB the images are segmented and analysis is done.

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