International Research Journal of Engineering and Management Studies(IRJEMS)
Volume: 03 Issue: 03 | March -2019 e-ISSN: 2395-0126

Bone tumor detection from MRI images using machine learning

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Abstract - Cancer is a uncontrollable division of abnormal cells, which is spread over the parts of the body. Bone tumor is one of the types of cancer. Bone cancer is a malicious and malignant disease, caused due to uncontrolled division of cells in the bone. The most threatening and customarily occurred cancer is bone cancer. Earlier the detection of bone cancer is most challenging problem. The ultimate goal of this paper is to perform an investigation on the bone cancer images to find out the presence of tumor and its accurate size. In this research we are comparing K-means and fuzzy C-Means clustering techniques to detect the precision tumor part in the bone. In this research initially image undergoes into the segmentation process. k-means and Fuzzy C-Means algorithms are then applied to detect the accurate tumor part in the bone and also its size. In this research is fully employed MATLAB as a programming tool for the process of loading an image and to perform image segmentation.

KeyWords: Tumor, fuzzy C means algorithm, K-means algorithm, image segmentation.

1.INTRODUCTION

Cancer is a group of diseases involving abnormal cell growth with the potential to invade or spread to other parts of the body. These contrast with benign tumors, which do not spread. Possible signs and symptoms include a lump, abnormal bleeding, prolonged cough, unexplained weight loss and a change in bowel movements.

stages of cancer are as follows:

Stage 0	Cancer cells that are still in the location where they started and have not spread.
Stage 1	Localized cancer that has spread into nearby tissues. It has not yet spread to lymph nodes or other areas.
Stage 2	Cancer has spread to a regional area or into nearby tissues or lymph nodes.
Stage 3	More advanced regional spread than Stage 2.
Stage 4	Cancer has spread to distant parts of the body. This stage is often referred to as metastatic cancer, or a cancer that has spread to other areas of the body.

1.1 Types of bone tumors

Thought there are many types of bone tumors the most common types are

- Benign tumor
- Malignant tumor

Types of benign bone tumors :

1. Osteoma
2. Osteoid osteoma
3. Osteochondroma
4. Osteoblastoma
5. Enchondroma
6. Giant cell tumor of the bone
7. Aneurysmal bone cyst
8. Fibrous dysplasia of the bone

Types of malignant primary bone tumors :

1. Osteosarcoma
2. Chondrosarcoma
3. Ewing's sarcoma
4. Malignant fibrous histiocytoma
5. FIbro sarcoma
6. other sarcomas

2. METHODOLOGY

In this paper a method is introduced to detect bone cancer by using machine learning algorithm. The main objective is to detect the size of the tumor present in the bone. Most of the times it happens that in methods of tumor detection the images obtained contains a greater noise factor which restrict the area to operate as it does not give the exact location of tumor and the affected tissues. Hence in this paper a novel approach have been proposed which will comprised of the number of stages which will ultimately lead to the proper detection of enchondroma tumor i.e. bone tumor.

A simple flow chart for the proposed system as follows:

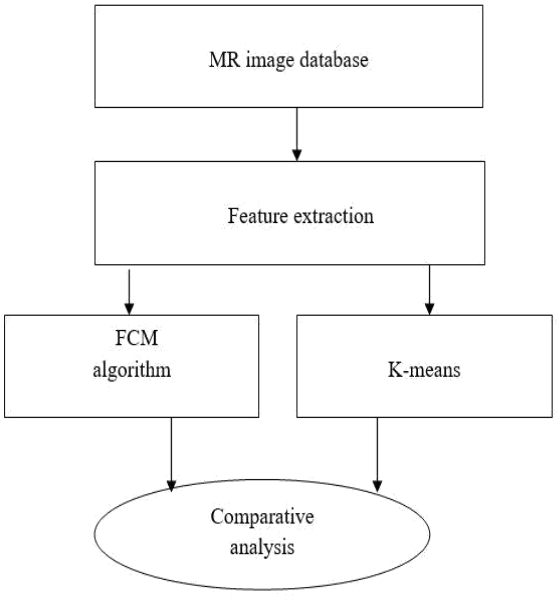

Fig 2.1:proposed methodology

2.1 ALGORITHM:

An algorithm is proposed to calculate the area of the tumor present in the bone which is as follows:

Step 1: Start the process.

Step 2: Get the MRI scan image input in JPEG format.

Step 3: Check whether the input image is in required format and move to if not display error message.

Step 4: If image is in RGB format convert it into grey Scale else move to next step.

Step 5: Find the edge of the grayscale image.

Step 6: Calculate the number of white points in the image.

Step 7: Calculate the size of the tumor using the formula.

Step 8: Display the size and stage of tumor.

Step 9: Stop the program.

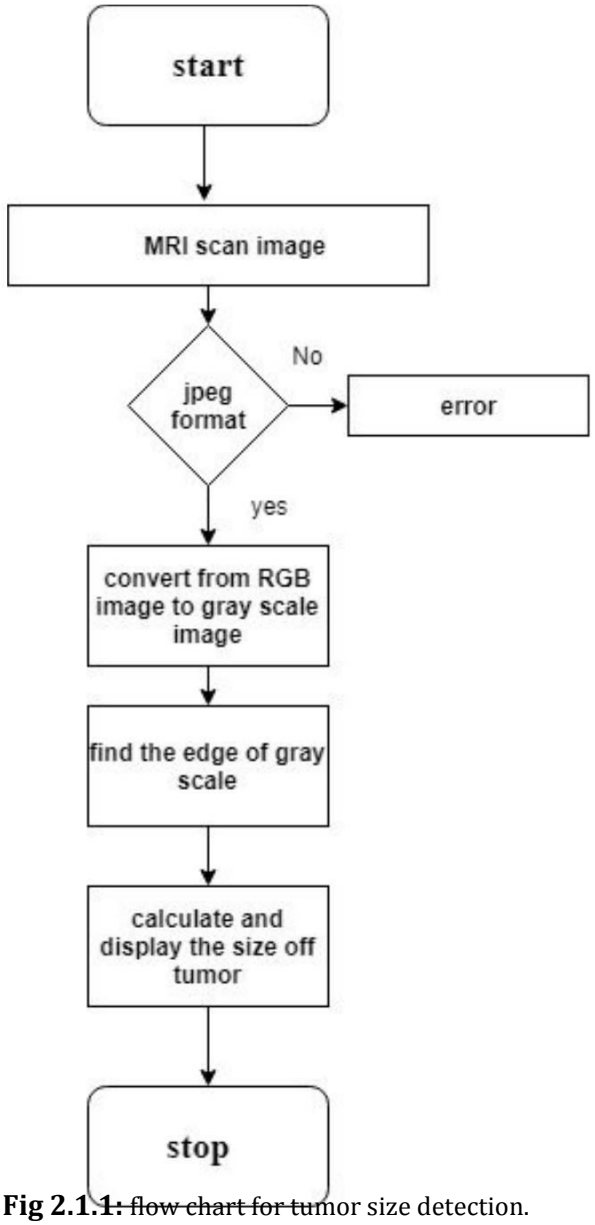

Fig 2.1.1: flow chart for tumor size detection.

3. CONCLUSION

In this paper we presented the work on bone tumor detection from MRI images using machine learning The main goal of this paper is to find out the accurate size of tumor in bone that leads to bone cancer. In this we discussed about image segmentation and K-Means & Fuzzy C-means algorithms to perform the clustering on bone image to find out the tumor. By comparing both the results we can prove that Fuzzy C-Means algorithm giving more accurate results than K-Means algorithm and we can also determine the size of the tumor.

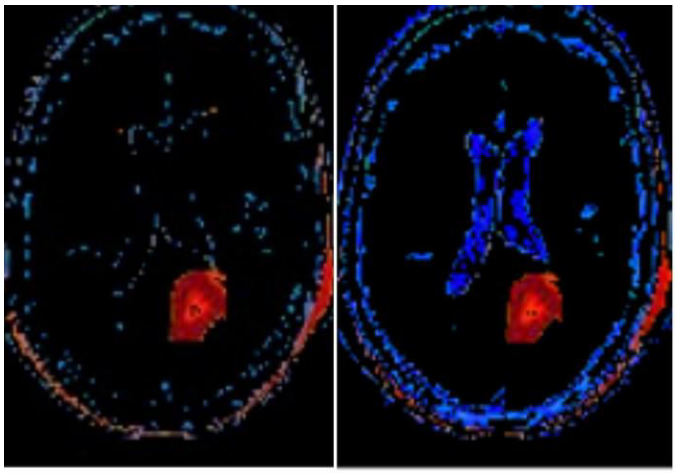

Fig 3.1: comparison between segmented image of k-means and FCM

PARAMETER	K-MEAN	FCM
Area	4.1992	5.3716

Table 3.1: comparison of size of tumors using k-means and FCM

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