



## A Brief Review on Various Image Segmentation Techniques

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### ABSTRACT:

Image processing is a set of techniques operated in an image in order to get high quality image or to obtain some useful information from it. Nowadays, image processing is one of the rapid growing technologies. The image segmentation is considered as most important step in image processing. Image segmentation is a process of dividing an image into multiple segments which make its analysis and processing easier. Segmentation is done in two phases. In the first phase the image is decomposed into various parts for further analysis and in the second phase, a change of representation is performed to make it more meaningful. The image segmentation has varied applications in the field of medical imaging for disease diagnosis. A number of algorithms and techniques has been developed so far to segment and analyze images. This paper deals with a comparative study of various image segmentation algorithms with their pros and cons.

Key Terms: Image processing, Image segmentation

### INTRODUCTION

Image segmentation is an important topic in the field of digital image processing. Image segmentation has got role in segmentation of medical images. Medical images played an important role in assisting health care. This provides health care access patients for treatment in the field of medical imaging. But it is difficult to implement proper segmentation because of facing some problem like size of brain, head, leg, type of disease etc for detecting the bone cancer. So, to solve these problems, we need different algorithm to segment these image to acquire accurate results. Earlier the detection of bone cancer is most challenging problem. The review papers in India and outside countries given the importance of image segmentation techniques and summary on the bone cancer images to find out the tumour also.

### REVIEWS ON IMAGE SEGMENTATION TECHNIQUES

[1] Amanpreet Kaur (2014) on "A review paper on image segmentation and its various techniques in image processing" studied on different approaches to implement segmentation like threshold, clustering and transform methods etc and discussed about the image segmentation and the various techniques of it and image engineering. These techniques are applicable in different fields like medical imaging, object recognition, pattern recognition etc. This study proven that, **image segmentation** is have important role and future in image processing in all fields including **detection of diseases**. [2] Prabhakar Avunuri1, Prashanti Siramset (2013) on "Efficient way to detect Bone cancer using image segmentation" investigated on the bone cancer images to find out the tumour of individuals. This research compared two clustering techniques such as KMeans and fuzzy C-Means techniques to detect the precise precision tumour part in the bone. algorithms to perform the clustering on bone image to find out the tumour. This study compared both the results and proven that Fuzzy C-Means algorithm giving more accurate results than **K-Means algorithm**.

[3] Muhammad Waseem Khan (2014) on "A survey- Image segmentation techniques" studied on the image segmentation techniques which has been developed by these researchers in order to make images smooth and easy to evaluate. A literature review of basic image segmentation techniques from last five years taken and it was found that there was no perfect method for image segmentation. Result of image segmentation is depends on many factors, i.e., pixel color, texture, intensity, similarity of images, image content, and problem domain. So, it is **not possible to consider a single method** for all type of images nor all methods can perform well for a particular type of image. So it is advisable to use **hybrid solution** consists of multiple methods for image segmentation problem. [4] Ashraf A. Aly, Safaai Bin Deris2, Nazar Zaki (2011) on "Research review for digital segmentation techniques" focused on the segmentation. This study discussed the main tendency of each algorithm with their applications, advantages and disadvantages. This study is useful for determining the appropriate use of the image segmentation methods for improving their accuracy. Accuracy, complexity, efficiency and interactivity of a segmentation method will be the considered factors to combine the application background and practical requirements. **Sodesigning proper algorithms** is the only solution for improving the accuracy.

[5] Song Yuheng, Yan Hao(2017) on *“Image segmentation algorithms overview”* analyses and summarizes the algorithms of image segmentation, and compares the advantages and disadvantages of different algorithms. It was found that. The combination of multiple segmentation methods with the combination of these algorithms can be done to bring more efficiency. Due to the diversity and uncertainty of the image, different algorithms on the basis of multi-feature fusion can be done to achieve better segmentation effect. Threshold selection in threshold segmentation and the selection of **K-means algorithm** will be useful to bring more efficiency.[6] Waseem Khan (2013) on *“Image Segmentation Techniques: A Survey”* studied on various image segmentation techniques and evaluates them and presents the issues related to those techniques.. This study found that a hybrid solution for image segmentation consists of two or more techniques is being the best approach to solve the problem of image segmentation

[7] Asuntha A, Andy Srinivasan (2018) on *“Bone cancer detection using artificial neural network”* studied on the most challenging tasks in clinical diagnosis as cancer classification. This paper uses the image processing techniques to detect the tumor and classify cancer using **Artificial Neural Network algorithm for MR images** of different patients. The proposed methodology uses preprocessing techniques such as filtering and gray conversion and other image processing techniques like edge detection, morphological operation, segmentation, feature extraction and classification are done for the detection of bone cancer. The classification of benign and malignant cancer was done based on extracted feature values. It was found that a systematic approach such as preprocessing, edge detection, morphological operation, segmentation and then feature extraction are used to train up the neural network and test the neural network. This proposed system will be able to detect the bone cancer from CT scan images.

[8] Sravanthi Vallaboju, P. W. C. Prasad, Abeer Alsadoon, Manoranjan Paul, Amr Elchouemin (2017) on *“Bioinformatics Image Based Decision Support System for Bone Cancer Detection”* indicates that by using **eigenvalues and eigenvectors**, the processing time can be decreased by implementing normalization on improving detection accuracy of bone cancer. This paper investigates the viability of using texture based magnetic resonance imaging (MRI) to locate different clusters and classify areas for determining bone cancer. This segmentation and classification processes are carried out by using eigenvalues and eigenvectors. This study also found that a non-automated framework methods have some limitations through false detection values need more processing time to detect the cancer.

[9] Synthia P.1 and K. Sujatha (2016) on *“A novel approach to detect bone cancer using K-Means clustering algorithm and edge detection method”* proposed an approach to detect bone tumour in MRI images. average filter and the bilateral filter are the pre-processing techniques are used to remove noise to smooth images. This study used mean intensity and tumour size using **k-means algorithm combined thresholding segmentation and edge detection** to get precise segmentation.

[10] Eftekhari Hossain, Md. Farhad Hossain and Mohammad Anisur Rahman (2018) on *“An Approach for the Detection and Classification of Tumor Cells from Bone MRI Using Wavelet Transform”* used a **wavelet-based segmentation method** for the detection of the bone tumor. This study used **k-nearest neighbour (KNN) classifier** for the classification of bone tumor into benign and malignant class. KNN classifier provides 92.50% accuracy in bone tumor classification. In future, the system can be developed to classify the not only benign or malignant tumor but also, the types of sarcomas like chondroma, Ewing sarcoma, and chondrosarcoma etc.

[11] Bendale Dhanashri Dilip, Dinesh Kumar Sahu (2017) on *“A Brief Review of Image Segmentation Based on Thresholding Technique”* used **thresholding based segmentation** method. Many image applications can be found on binary or gray image but almost none for color image segmentation techniques were used. This study used to separate the foreground from the background to change the representation of an image into meaningful one which enhance the quality and suitability for presenting the image. **Partition of image into different segments** according to their feature attribute bring more accuracy in detection process.[12] Shakuntala Satyawana, Surendra Kumar Agarwal (2016) on *“A Review Paper on Image Segmentation and Object Recognition Procedures”* has studied about segmentation techniques toward make simpler. Image segmentation is usually in use addicted to explanation near situated objects also margins (shape, curves, etc.) within pictures. image segmentation is needed to be monitored manually there is no such method which can detect the objects with precision.

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## FINDINGS

There is no single segmentation method which can be considered good for all type of images to detect the cancer with high accuracy. Most of the reviews tell that the integration of the two segmentation methods can overcome the drawbacks of each other and increase the overall accuracy in classification for detecting the cancer. There are many algorithms used for image segmentation, and some of them segmented an image based on the object while some can segment automatically. KNN classifier provides more accuracy in bone tumor classification. In future, the system can be developed to classify the not only benign or malignant tumor but also, the types of sarcomas like chondroma, Ewing sarcoma, and chondrosarcoma. Nowadays, no one can point out which the optimal solution is due to different constraints. Designing proper algorithms is the only solution for improving the accuracy.

Table1: Various types of segmentation used

Author	Title	Year	Segmentation
Amanpreet Kaur	A review paper on image segmentation and its various techniques in image processing	2014	threshold, clustering and transform methods
Prabhakar Avunuri1, PrashantiSiramset	Efficient way to detect Bone cancer using image segmentation	2013	tow clustering techniques
Muhammad Waseem Khan	A survey- Image segmentation techniques	2014	Hybrid method
Ashraf A. Aly, Safaai Bin Deris, NazarZaki	Research review for digital segmentation techniques	2011	Inverse dynamics method,Watersheds Method
Song Yuheng, Yan Hao	Image segmentation algorithms overview	2017	Region based, Edge detection, Clustering, Weakly-supervised learning in CNN
Waseem Khan	Image Segmentation Techniques: A Survey	2013	Edge based,Fuzzytheory,PDE,ANN
Asuntha A, Andy Srinivasan	Bone cancer detection using artificial neural network	2018	Superpixel
SravanthiVallaboju, P. W. C. Prasad, AbeerAlsadoon1, Manoranjan Paul, Amr Elchouemin	Bioinformatics Image Based Decision Support System for Bone Cancer Detection	2018	Eigenvalues and Eigenvectors
Sinthia P.1 and K. Sujatha	A novel approach to detect bone cancer using K-Means clustering algorithm and edge detection method	2016	Sobel edge-Means
Eftekhari Hossain, Md. Farhad Hossain and Mohammad AnisurRahaman	An Approach for the Detection and Classification of Tumor Cells from Bone MRI Using Wavelet Transform	2018	Wavelet-based
BendaleDhanashri Dilip1, Dinesh Kumar Sahu	A Brief Review of Image Segmentation Based on Thresholding Technique	2017	Thresholding based
Shakuntala Satyawana, Surendra Kumar Agarwal	A Review Paper on Image Segmentation and Object Recognition Procedures	2016	Edge based and region based

## CONCLUSION

Early detection and classification of the bone tumor have become needed to cure the patient. MRI bone cancer images are analyzed to detect the presence of bone cancer and to determine its stage based on the computations of mean intensity and tumour size using k-means algorithm.k-nearest neighbour (KNN) classifier is employed for the classification of bone tumor into benign and malignant class. KNN classifier provides accuracy in bone tumor classification. In addition to this, thresholding is also the simplest method of image segmentation. The local thresholding technique used region based segmentation process and used multiple thresholds for the process of segmentation will help to detect the disease with precision. Segmentation and classification processes are also carried out by using eigenvalues and eigenvectors. Artificial Neural Network algorithm will also drastically reduce the time required for detection and classification of cancer. So it is observed that a hybrid solution for image segmentation consists of two or more techniques is being the best approach to solve the problem of image segmentation to detect the cancer at an early stage.

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