

# A Survey on Medical Image Segmentation

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**Abstract:** *Image segmentation may be a method of partition of a picture into completely different objects. there's a major distinction between image sweetening and segmentation. In image sweetening method is to boost the given image quality with relation to image look (brightness, contrast, texture). In this segmentation method, the actual portion of a image is highlighted in keeping with the matter outlined. Here during this paper we have a tendency to see the performance of the varied algorithms for various pictures. Medical image process desires continuous enhancements in terms of techniques and applications to assist improve quality of services in health care business. The techniques used for interpolation, image registration, compression, diagnosis area unit to be improved to be abreast with growing demands within the business and rising technologies bearing on mobile computing and cloud computing. the combination of medical instrumentation and applications with wearable devices is additionally promising space for more analysis. This paper provides helpful insights into the sphere of medical image process and tries to outline the longer term scope of labour.*

**Keywords:** Medical image processing (MIP), medical diagnosis, MIP methods and applications

## 1. Introduction

Medical image segmentation refers to the method of partitioning discovered image knowledge to a serial of non overlapping regions. These regions denote completely different human tissue structures and apply appropriate method for accuracy of clinical identification. Generally the fundamental theory of image segmentation could be a method of partitioning a digital image into multiple segments. The goal of segmentation is to alter and alter the illustration of a picture into one thing that's additional meaning and easier to investigate. there's sizable amount of applications like content-based visual data retrieval (CBVIR) system for looking of digital pictures in giant databases. In Object detection, police investigation instances of linguistics objects of a definite category (such as humans, buildings, road, forest) in a very automatic face recognition system could be a pc application for mechanically distinctive or edificatory someone from a digital image. Fingerprint recognition refers to the machine-controlled technique of edificatory a match between 2 human fingerprints, for clinical functions is employed to form a picture to reveal, diagnose or examine the a part of anatomy. Growing interest in health care domain has made-up method for innovative approaches for diagnosing and clinical practices. Since health is taken into account to be wealth, the care business has been try to use innovative medical procedures and treatment practices plus technologies in computations, harnessing advances in hardware resources. preciseness in unwellness identification and accuracy in clinical practices and improvement in progressive instrumentality is that the ever-ending necessity within the health care business. This has crystal rectifier to numerous best practices that area unit clinically verified. However, additional must be through with ever-growing medical knowledge, known as huge knowledge currently days, so as to find hidden information from the info.

### 1.1 Edge Detection Method

Edge detection is one in all the elemental steps in image process, image analysis, image pattern recognition, and pc

vision techniques. typically edge refers to a boundary between 2 regions during a image. Region boundaries and edges area unit closely connected, since there's typically a pointy adjustment in intensity at the region boundaries. the aim of victimisation edge detectors to spot the points during a digital image at that the image brightness changes sharply or, a lot of formally, has discontinuities. Discontinuities of intensity constituent see either line edge, step edge or ramp edge. If the sting detection step is productive, the following task of deciphering the knowledge contents within the original image might thus be considerably simplified. Edge detection may be a elementary tool in image process, machine vision and pc vision, notably within the areas of feature detection and have extraction. There area unit 2 main strategies for edge detection like search-based and zero-crossing primarily based. The search-based strategies police investigation position and direction of edges by estimating gradient magnitude victimisation 1st order spinoff methodology. In zero-crossing primarily based strategies, edge smoothness is calculable by applying Laplacian operator. the foremost common issues of edge-based segmentation is to seek out a approach real border exists.

### 1.2 Region-Based Segmentation Method

Region-based segmentation may be a technique for crucial the region directly. Region based mostly strategies ar strong as a result of, Regions cowl additional pixels than edges and so have additional info on the market so as to characterize image region. Once sleuthing a section, use texture that isn't simple once handling edges. Region growing techniques ar usually higher in clangourous pictures wherever edges ar tough to discover.

#### A. Region split and merge algorithmic rule / Watershed algorithmic rule

- 1) The given image is divided in to four unconnected
- 2) Regions. for instance  $P(R_i) = \text{false}$ . if all pixels have totally different grey levels in an exceedingly region.
- 3) The Partition method is continual till to induce no additional partition.

4) Merge the neighbourhood regions, if they need to share a similar component intensity. for instance  $P(R_i \cup R_j) = \text{true}$ . if 2 region share same grey level.

The prime advantage of this algorithmic rules are sometimes less advanced, and straightforward to seek out region for object detection

### B. Watershed algorithmic rule

A watershed may be a basin-like landform outlined by highpoints and ridgelines that descend into lower elevations and stream valleys. Watershed algorithmic rule may be a region based mostly segmentation techniques image that uses image morphology. Watershed algorithmic rule is associate degree repetitious adaptational threshold algorithmic rule.

- 1) Check the consistent and inconsistent between try of regions.
- 2) For every region in segmentation, check the worth of predicate P with its neighboring regions.
- 3) Merge the pairs of neighboring regions whose predicate of P is true.

The prime advantage of this algorithm, which provides connected elements and previous info may be implemented by mistreatment markers. the most disadvantage of this algorithm is fragmentation and over fragmentation problem.



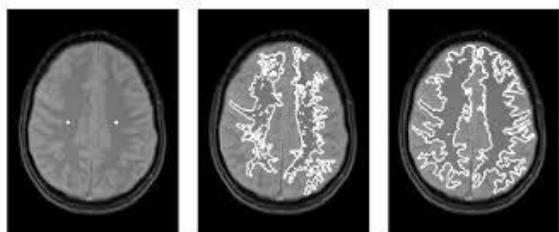
**Figure 2:** Shows an example of watershed method.

### Region growing algorithmic rule

A simple approach to image segmentation is to start out from some pixels (seeds) representing distinct image regions and to grow them, till they cowl the complete image. For region growing, have to be compelled to follow a rule describing a growth mechanism and a rule checking the homogeneity of the regions when every growth step.

- 1) Choose a collection of seed points, those that have sure grey level vary.
- 2) Grow regions solely as long because the component that has same property. (intensity, grey value)
- 3) The higher than method is continual till to grow no additional region.

The advantages of region growing technique are the construct is easy, solely tiny variety of seed purpose enough to grow region. By mistreatment this technique we are able to properly separate the regions that have a similar properties and supply original pictures with have clear edges. The disadvantage of this technique is, it consume high computation power and tough to seek out sensible start line.



**Figure 3:** An example process of region growing method

## 2. Related Work on Medical Image Segmentation

There exist a few approaches that, similarly to our solution, try to solve the problem on the Medical Image Segmentation. Since health is considered to be wealth, the healthcare industry has been striving to use innovative medical procedures and treatment practices coupled with technologies in computations, harnessing advances in hardware resources. Precision in disease diagnosis and accuracy in clinical practices and improvement in state-of-the-art equipment is the ever-ending necessity in the health care industry. Our survey is totally based on the client side protection and many techniques which are implemented by the authors some are as follows:

### 1) Title: Survey on Medical Image Segmentation Algorithms

**Author:** P.Elayaraja, M.Suganthi

**Publication Year:** 2014 IJARC

**Method:** The simplest technique of image segmentation is named the threshold technique. Threshold creates binary pictures from grey level ones by turning all pels below some threshold to zero and every one pixel on top of some threshold to at least one. The key of this technique is to pick the edge price or values once multiple-levels area unit elect. In pc vision and image process, Otsu's technique is employed to mechanically perform bar graph shape-based image threshold, the reduction of a gray level image to a binary image.

**Finding:** In Medical image segmentation is a crucial task to find and establish the regions denote totally different human tissue structures. In this paper a comparative study has been performed on the present strategies for the image segmentation. The Segmented image results of varied algorithms square measure compared with a color and intensity options. It has been determined that the Derivate technique yields fruitful results only the complexness is a smaller amount, the complexness of the image may be thought-about on the colored objects. The Watershed formula technique additionally suffers from the downside of no distinct segmentation within the pictures with complexness. The region growing technique additionally suffers from the downside of no distinct segmentation within the pictures with complexness. The Otsu's technique is not appropriate for multichannel pictures. The kmean cluster approach additionally fails to realize a high degree of accuracy for segmentation and same is that the case with the Dennis Gabor filters technique. Thus, we are able to conclude that color driven approach combined with the feel options yieldshelpful results beneath kind quantity of complexness.

### 2) Title: Analysis of Medical Image Processing and its Applications in Healthcare Industry.

**Author:** G.Anil Kumar, Prof.Nistala V.E.S.Murthy

**Publication Year:** 2014 IJCTA

**Method:** At a broader level it is understood that medical image processing has promising consequences in leveraging quality practices in clinical practices. State of the art equipment and technologies are available these days and there is quest for excelling in medical diagnosis and treatment with utmost quality. Towards this various technologies came into existence. Though the corporate

hospitals do not disclose their proprietary methods, in this paper, we focused on the available methods in the literature. The evolution of techniques and applications in medical image processing has made the professions in the domain to have more effective practices. Some techniques pertaining to interpolation, image registration, diagnosing lung cancer, breast cancer, heart ailments were known in the literature. Data mining techniques and image mining techniques were also found in the literature which improved the quality of services in the health care domain.

**Findings:** In this paper author studied medical image processing in health care domain for valuable insights into the subject. The analysis of medical image processing, its applications in healthcare industry are presented in this paper. Medical image processing has revealed significant growth in harnessing new technologies and processing capabilities. It is capable of leveraging the power of GPGPU platforms, cloud computing and other technologies. Medical image processing is also involved in data mining and image mining in order to improve quality of services in hospitals. Usage of hand held devices, cloud computing and wearable computing is witnessed which reflects the progress being made in usage of emerging technologies for diagnosis and clinical practices.

### **3) Title: Design and Development of Hybrid Genetic Classifier Model for Prediction of Diabetes**

**Author:** E.Sreedevi and Prof.M.Padmavathamma

**Publication Year:** 2016 IJMTER

**Method:** The diabetes dataset has been divided into training and testing datasets and were arranged by normalizing the instances of the data. By taking different distance metrics like Manhattan Distance Method, Euclidean Distance Method, Chebychev Distance Method, and Minkowski Distance Method along with existing distance method proposed by Cătălin Stoean as fitness function in Genetic Algorithm the analysis has been made. From the above said distance metrics Minkowski distance is getting more accuracy when compared to others. Hence for the proposed algorithm, we are using Minkowski distance method as fitness function. **Finding:** This paper surveyed policy and technology issues in third party web tracking as of early 2012. The field is rapidly changing; new announcements, questions, and research results appear by the week.

**Findings:** In this paper, a Hybrid Genetic Classifier Model has been proposed to the problem of diabetes diagnosis. Feature Selection method is applied to the dataset for selection of best features removing redundant features. This study has implemented Hybrid Genetic Algorithm by using Minkowski distance method as fitness function to classify the diabetes dataset. The proposed model runs iteratively by the HGCM and generates two rules for the prediction of diabetes.

### **4) Title: Segmentation and Object Recognition using Edge Detection Techniques**

**Author:** Y.Ramadevi, T.Sridevi, B.Poornima, B.Kalyani

**Publication Year:** IJCSIT 2010

**Method:** A genetic algorithm consists of three major operations: selection, crossover, and mutation. The selection evaluates each individual and keeps only the fittest ones in the population. In addition to those fittest individuals, some less fit ones could be selected according to a small

probability. The others are removed from the current population. The crossover recombines two individuals to have new ones which might be better. The mutation operator induces changes in a small number of chromosomes units. Its purpose is to maintain the population diversified enough during the optimization process.

**Findings:** Implementation of the techniques was done on different images. Colored images were converted into gray scale image and then segmentation and recognition methods were applied. A sample grey scale image is considered for segmentation and object recognition using Sobel, Prewitt, Roberts, Canny, LoG, EM algorithm, OSTU algorithm and Genetic Algorithm.

### **5) Title: Medical Image Segmentation**

**Author:** Prof. Dinesh D. Patil, Ms. Sonal G. Deore

**Publication Year:** IJCSMC 2013

**Method:** There is a general segmentation problem as how to segment an image into homogeneous segments such that after combining two neighbours it gives a heterogeneous segment. There are many techniques for an error-free image partitions as histogram-based represents the simple probability distribution function of intensity values of any image. Edge based technique used to detect using differential filter in order of image gradient or Laplacian and then grouped them into contours represents the surface.

**Finding:** Image segmentation has a promising future as the universal segmentation algorithm and has become the focus of contemporary research. In spite of several decades of research up to now to the knowledge of authors, there is no universally accepted method for image segmentation, as the result of image segmentation is affected by lots of factors, such as: homogeneity of images, spatial characteristics of the image continuity, texture, image content.

### **6) Title: Study of Techniques used for Medical Image Segmentation and Computation of Statistical Test for Region Classification of Brain MRI.**

**Author:** Anamika Ahirwar

**Publication Year:** IJITC 2013

**Method:** A scheme is proposed which is based on SOM neural network for segmenting brain MRI. In this paper we apply the scheme only on three normal and three abnormal brain MRI images. This scheme segments the brain MRI into WM, GM and CSF regions. But if the image is abnormal our scheme segments the tumor region also. These regions could be regarded as segmentation outcomes reserving some semantic meaning.

**Finding:** This paper enhances to test the axial view images of the web database by using the scheme discussed in. This scheme automatically classifies the regions into WM, GM, CSF and tumor. Results of the extraction of regions of WM, GM, CSF and tumor of normal and abnormal brain. Test and compare the results of the brain MRI images from the database given on the web. Then further calculate the confusion matrix where each column of the matrix represents the instances in a predicted class and each row represents the instances in an actual class. There are total 49 images of axial view in which 29 are TP images, 08 cases are TN images, 01 case is FP images and 11 are FN images.

**7) Title: Application of Genetic Algorithm in Median Filtering.**

**Author:** Sandra Sovilj-Nikic

**Publishing:** PIMCSIT 2007

**Method:** Evolution programs are methods for solving optimization problems which based on the principles of Darwin's evolution theory, i.e. natural selection and survival of the fittest. The best known algorithms in this class include genetic algorithm, genetic programming, evolutionary programming, evolution strategies, classifier systems, and neural networks. All above mentioned algorithms are based on the same concept simulating the evolution of organisms of some population through selection, recombination and mutation process.

**Finding:** The performance of PBM filter is examined through comparison with competitive filters based on median filtering, including median filter (MED), CWM filter ( $\omega=3$ ) in recursive and non recursive design, fuzzy median filter, florencio & schafar, SDROM (state dependent rank order median) filter in recursive and non recursive design and non recursive PBM filter. The comparative SNR results of filtering the *Bridge* where  $p$  ranges from 10% to 30%. The PBM filter is trained assuming the corruption by 20% impulses, while the same type of noise is used in training and filtering.

**8) Title: Application of Genetic Algorithms in Machine learning.**

**Author:** Harsh Bhasin

**Publishing:** IJCSIT 2011

**Method:** The work proposed intends to find the fitness value of the rule with the help of reinforced learning algorithm. Reinforcement learning algorithms helps an agent to improve its performance by using the feedback it gets from the environment. In reinforcement learning the system receives feedback which makes it closer to supervised learning.

**Finding:** Computers analyse a position with the help of their chess knowledge. The more chess knowledge it has, the longer it takes for a single position to be evaluated, here is where genetic can be applied. The playing strength not only depends on the amount of knowledge, it also depends on the time it takes to evaluate a position, because less evaluation-time leads to deeper searches. If to each rule corresponding to a particular condition fitness value can be assigned then it becomes an apt case for applying Genetic Algorithm.

**9) Title: Medical Image Texture Segmentation Using range Filter**

**Author:** Amir Rajaei

**Publishing:** ITCSCP 2012

**Method:** Medical images contain strong speckle noise. To remove noise and smooth the images we have applied 2D adaptive noise removal using neighbourhood of size 3 by 3. Moreover, medical images suffer from "salt and paper" noise. We remove the existing 'salt and paper' noise using median filtering. Each output pixel contains the median value of 9 by 9 neighbourhoods surrounding the pixel of the input image. Further, It is well known that the content of medical images are inhomogeneous having weak boundaries. We use 2D order-statistic filtering by the 3rd order element in the sorted set of neighbours of size 3 by 3 in domain.

**Finding:** In this paper, ImageCLEF2010 database is used for segmentation of medical images. Experiments are conducted on different medical imaging modalities having different sizes. The medical imaging modalities are nine in number namely, Compute Tomography (CT), Magnetic Resonance (MR), Ultrasound (US), Nuclear Medicine (NM), Xr-Angio, Positron Emission Tomography (PET), PET-CT, Micro and X-ray. Medical images include various anatomical structures and image orientation.

**10) Title: A Framework for Medical Image Classification Using Soft Set.**

**Author:** Saima Anwar Lashari

**Publishing:** ICEEI 2013

**Method:** The proposed framework for medical image classification consisting of six phases namely: data acquisition, data pre-processing, data partition, soft set classifier, data analysis and performance evolution. For each experimental setup, the dataset will be divided into two parts, a training set and testing set. In this way test set identification will be classification accuracy for medical image classification. It is expected that obtained results will have general applicability for wide image classification applications. Figure 2 pictorially illustrates the process map.

**Finding:** Current research in medical image classification mainly focuses on the use of efficient data mining algorithms and visualization techniques. Meanwhile, the major objective of current studies strives towards improving the accuracy, precision and computational speeds of classification methods, as well as reducing the amount of manual interaction. Therefore, this paper presents appraisal of the existing and conventional methods for the classification of medical images. Thus, current medical classification approaches have been reviewed with an emphasis placed on the different classification methods for medical imaging applications.

**11) Title: Medical and Natural Image Segmentation Algorithm using M-F based Optimization Model and Modified Fuzzy Clustering: A Novel Approach.**

**Author:** Bingquan Huo

**Publishing:** IJSPPIPR 2015

**Method:** Gray image pixel gray discontinuity and similarity of these two characteristics at the same time, the gray image segmentation is generally determined according to these two features. Boundary pixel gray value in the image area can produce jumping which has no continuity, and regional internal pixel has similarity. Then on the basis of regional pixel gray discontinuity produced a series of image segmentation method based on edge detection, based on the similarity of pixel gray level in the area of produced a series of image segmentation method based on region.

**Finding:** M-L model is proposed for medical image segmentation. Fuzzy clustering segmentation is one of the good methods of segmentation of MR images. It is very suitable for processing things inherent uncertainty, and is not sensitive to noise, its use of the multivalve logic to describe complex system, can more accurately for image segmentation and it converts the binary logic of mathematics into continuous valued logic and make it more close to people's way of thinking. However, in practice, fuzzy clustering technology still exist some problems to be further research.

**12) Title: Research Review For Digital Image Segmentation Techniques**

**Author:** Ashraf A. Aly

**Publishing IJCSIT 2011**

**Method:** The extracted information from the training set provides important cues of the structures such as intensity, position and shape, which can be valuable complementary information for the segmentation of test images. Active appearance models (AAM) are statistical models of the shape of structures.

**Finding:** In the proposed technique each method has its suitable application fields, and researchers should combine the application background and practical requirements to design proper algorithms. Accuracy, complexity, efficiency and interactivity of a segmentation method should all be the considered factors.

**13) Title: Analysis on the Different Image Segmentation Techniques.**

**Author:** Sujata Saini

**Publishing IJICT 2014**

**Method:** Flooding process starts in which water effuses out of the minimum grey value. When flooding across two minimum converges then a dam is built to identify the boundary across them. This method is essentially an edge based technique. The original watershed algorithm was susceptible to over segmentation so a modified marker-controlled based watershed algorithm was proposed by Beucher. Watershed algorithm produces over-segmentation because of noise or textured patterns. The application of watershed algorithm on remote sensing imageries is relatively recent than other models.

**Finding:** segmentation approaches is defined. Throughout this study of the various techniques, we concluded out various facts:

- 1) First, the image segmentation is the crucial part of the image understanding/image processing model.
- 2) Second, the segmentation technique of the image could be used as per the required application or the usage as image is segmented on the basis of different features.
- 3) Third, the segmentation techniques are broadly categorized on the basis of detection of discontinuity and similarity of the image.
- 4) Fourth, Opting a single technique or method would not provide better optimized results.

**14) Title: Application of AI Techniques in Medical Image Segmentation and Novel Categorization of Available Methods and Tools**

**Author:** M. Rastgarpour

**Publishing IMECS 2011**

**Method:** The segmentation methods depend on modality and dimension of imaging because of the high dependency on factors like disease type and image features. Likewise, segmentation needs the image interpretation because of its dependency on the considered applications. So these dependencies result in a significant growth of literatures annually [2]. This abundance confuses novice researchers to get an overview. However categorization of the literatures can help the researchers to understand more easily and rapidly.

**Finding:** Recent advances in the techniques of AI like image processing, machine learning, fuzzy logic, pattern

recognition and knowledge-based analysis result in considering the special needs of MIA to enhancement of diagnosis information by computer. Since desired information about biological objects is related to fundamental features, it's necessary to apply the image processing methods for visualization and analysis of medical images. It's clear that image processing techniques can't provide efficient guidance alone to process the medical image accurate.

**15) Title: Various Image Segmentation Techniques**

**Author:** Dilpreet Kaur

**Publishing IJCSMC 2014**

**Method:** The edge detection techniques are well developed techniques of image processing on their own. The edge based segmentation methods are based on the rapid change of intensity value in an image because a single intensity value does not provide good information about edges. Edge detection techniques locate the edges where either the first derivative of intensity is greater than a particular threshold or the second derivative has zero crossings. In edge based segmentation methods, first of all the edges are detected and then are connected together to form the object boundaries to segment the required regions.

**Finding:** In this review of image segmentation techniques, various image segmentation techniques are detailed described and compared. These all techniques are suitable for many medical image applications. These techniques can be used for object recognition and detection. In medical images these can be used to detect cancer and in satellite images these can be used to detect roads and bridges. Thus it is clear that various methods are suitable for various types of image applications. But from the study it is clear that no single method is sufficient for every image type and no all methods are suitable for a particular image type. Due to the need of image segmentation in many applications, it has a challenging future.

**16) Title: Medical Image Segmentation using Genetic Algorithm**

**Author:** Divya Kaushik

**Publishing IJCA 2013**

**Method:** Genetic algorithms are based on natural selection discovered by Charles Darwin . They employ natural selection of fittest individuals as optimization problem solver. Optimization is performed through natural exchange of genetic material between parents. Offspring's are formed from parent genes. Fitness of offspring's is evaluated. The fittest individuals are allowed to breed only. In computer world, genetic material is replaced by strings of bits and natural selection replaced by fitness function. Mating of parents is represented by cross-over and mutation operations.

**Finding:** Image segmentation has a promising future as the universal segmentation algorithm. However, in spite of several decades of research, there is no universally accepted method for image segmentation, as the result of image segmentation is affected by lots of factors, such as: spatial characteristics of the image continuity, homogeneity of images, texture, image content. Thus there is no single method which can be considered good for neither all type of images nor all methods equally good for a particular type of image. Due to all above factors, image segmentation remains

a challenging problem in image processing and computer vision and is still a pending problem in the world.

Author & Journal	Pub. Year	Techniques	Purpose	Advantages	Disadvantages
Divya Kaushik, IJCA[1]	2013	Genetic algorithm	Brief idea of various segmentation methodologies	Medical image analysis	Further improvements can be achieved by incorporating as much prior information as possible.
Ramadass sudhir, IISTE[2]	2011	Image mining techniques	Survey on various image mining techniques.	Expansion of data mining.	Investigation of hidden relationships among images.
G. Anil kumar, IJCTA[3]	2014	Study of medical image processing in healthcare domain.	Processing the present state of the art of medical image processing	Improve quality of service in health care industry	Lot of research is left unattended which encourage researcher to focus on.
E. sreedevi, IJRS[4]	2015	Minkowski Distance Method	Threshold genetic algorithm diagnosing diabetes.	Detection of diabetes.	Accuracy can be modified by changing method
Pro. Dinesh D. Patil, IJCSMC[5]	2013	Edge based technique	universally accepted Method for image segmentation, as the result of image segmentation is affected by lots of factors	homogeneity of images	Method can be improved on basis of edge detection.
Anamika Ahrwar, IJITC[6]	2013	SOM neural network for segmenting brain MRI	Enhances to test the axial view images of the web database by using the scheme discussed in	Automatically classifies the regions into WM, GM, CSF and tumor	Results of the brain MRI images can be more clearer.
Sovilj-Nikic, PIMCSIT[7]	2007	The principles of Darwin's evolution theory	To implement recursive and non recursive design, fuzzy median filter.	Performance of PBM filter is examined through comparison with competitive filters.	Median filter can be improved.
Harsh Bhasin, IJCSIT[8]	2011	Reinforcement learning algorithms	To find the fitness value of the rule.	Computers analyse a position with the help of their chess knowledge.	In future it can be improved applying Genetic Algorithm.
Amir Rajaei, ITCSCP[9]	2012	Applied 2D adaptive noise removal using neighbourhood.	To remove noise and smooth the images.	Micro and X-ray. Medical images include various anatomical structures and image orientation.	Noise and smooth the images can be improved.
Saima Anwar Lashari, ICEEI[10]	2013	Data mining algorithms and visualization techniques.	Towards improving the accuracy, precision and computational speeds.	Experimental setup, the dataset will be divided into two parts, a training set and testing set.	Data mining algorithms and visualization technique can be improved.
Bingquan Huo IJSPIPPR[11]	2015	Gray image pixel gray discontinuity and similarity of these two characteristics at the same time	M-L model is proposed for medical image segmentation	converts the binary logic of mathematics into continuous valued logic	fuzzy clustering technology still exist some problems to be further research
Ashraf A. Aly IJCSIT[12]	2011	The extracted information from the training set provides important cues of the structures	researchers should combine the application background	practical requirements to design proper algorithms	Accuracy, complexity, efficiency and interactivity can be improved
Sujata Saini IJICT[13]	2014	Flooding process starts in which water effuses out of the minimum grey value	segmentation approaches is defined	This method is essentially an edge based technique	Watershed algorithm produces over-segmentation because of noise or textured patterns it can also be improved.
M. Rastgarpour IMECS[14]	2011	The segmentation methods depend on modality and dimension	High dependency on factors like disease type and image features	Recent advances in the techniques of AI like image processing, machine learning.	Image processing techniques can't provide efficient guidance alone to process the medical image accurate
Dilpreet Kaur IJCSMC[15]	2014	The edge based segmentation methods are based on the rapid change of intensity value	Edge detection techniques locate the edges	Medical images these can be used to detect cancer and in satellite images these can be used to detect roads and bridges.	Due to the need of image segmentation in many applications, it has a challenging future.
Divya Kaushik IJCA[16]	2013	Genetic algorithms are based on natural selection discovered	Optimization is performed through natural exchange of genetic material between parents	Image segmentation has a promising future as the universal segmentation algorithm.	Image processing and computer vision and is still a pending problem in the world.

### 3. Conclusion

In this study, the summary of assorted segmentation methodologies applied for digital image process is explained in short. The study conjointly reviews the analysis on varied analysis methodologies applied for image segmentation and varied analysis problems during this field of study. This study aims to supply a straightforward guide to the research worker for those applied their analysis study within the image segmentation. Image segmentation incorporates a promising future because the universal segmentation algorithmic rule and has become the main focus of latest analysis. In spite of many decades of analysis up to currently to the information of authors, there's no universally accepted technique for image segmentation, because the results of image segmentation is littered with various factors, such as: homogeneity of pictures, spacial characteristics of the image continuity, texture, image content. therefore there's no single technique which might be thought of smart for neither all sort of pictures nor all strategies equally smart for a specific sort of image. because of all higher than factors, image segmentation remains a difficult drawback in image process and laptop vision and continues to be a unfinished drawback within the world.

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