IMAGE ENHANCEMENT USING VARIOUS IMAGE SEGMENTATION TECHNIQUES.

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Abstract: Color Image can be improved by various image enhancement techniques. It includes different types of processing on the image like image segmentation, clustering, smoothing, etc. The Input for the system is color image. This image gets converted into horizontal and vertical shape histogram. Then cluster formation is done using hill climbing technique and k means clustering. K Means clustering consider colour intensity as criteria. Sequential probability ratio test checks similar characteristics between different regions. Merging of these regions follows dynamic region merging algorithm. Depending on similar properties partitions are merged. The output is enhanced segmented image. Nearest neighbour graph technique is helpful to speed up the above process. This improved image is useful in the field of medical as well as security purpose.

Index Terms **- SPRT, DRM, NNG.**

I. INTRODUCTION

Image segmentation is nothing but to divide the image into number of pieces [1] that have similar features, group the meaningful pieces for the convenience of perceiving. Segmentation modifies the given image into many regions which are enlarge representation of data, where region is group of connected pixels with similar properties. The final aim of segmentation is to obtain the image into more meaningful and easier image to analyze**.**

In the proposed paper plane color image is considered the input for process. The image is made of different colors. Considering some similar features of image, it gets converted into regions using hill climbing technique. Color clusters of similar features are formed using K means clustering segmentation techniques. The final operation in this process is to recover the given image. This can possible using Sequential probability ratio test, nearest neighbour and dynamic region merging algorithm. The SPRT test considers some predicate to observe the consistency. After checking the consistency nearest neighbor graph and dynamic region merging algorithm is used for better segmented output image. With the help of mentioned algorithm the neighbouring regions are progressively merge.

There are various image segmentation methods[2] like K-means (KM) [8] Clustering Methods, Histogram-Based Methods, Edge Detection Methods, Region Growing Methods, Model based, set level Methods, Graph Partitioning Methods, Watershed Transformation, Neural Networks Segmentation, and Multi-scale Segmentation. Relay Level set method [9], [10].

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II. LITERATURE REVIEW

In the field of image segmentation huge research is done in last some years. Image segmentation is divide the image into subparts. Some of the methods of image segmentation discuss in detail as follows

A) Threshold segmentation: It is famous technique of image segmentation as it is easy to use. This divide the input image mainly into two exact different parts where one with segment value as positive and second is with the segment value as negative. The predicate is set for the image regions, and then segmentation of all regions is done according to the dimension. It can also use horizontal and vertical Histogram techniques to partition the image. [11]

B) Edge segmentation: In this method the operation starts from outer region to inner region. First identify the edges of the image. Then process these outer edges so that only boundaries of the regions is visible, with this identify the object with this technique considering edge as criteria. It is generally used to identify these objects

. [3]- [5]

C) Region based segmentation: Here similarity between neighboring regions is observed. The most similar regions are then merge. This Process continues up to last region merging. [12]- [15]

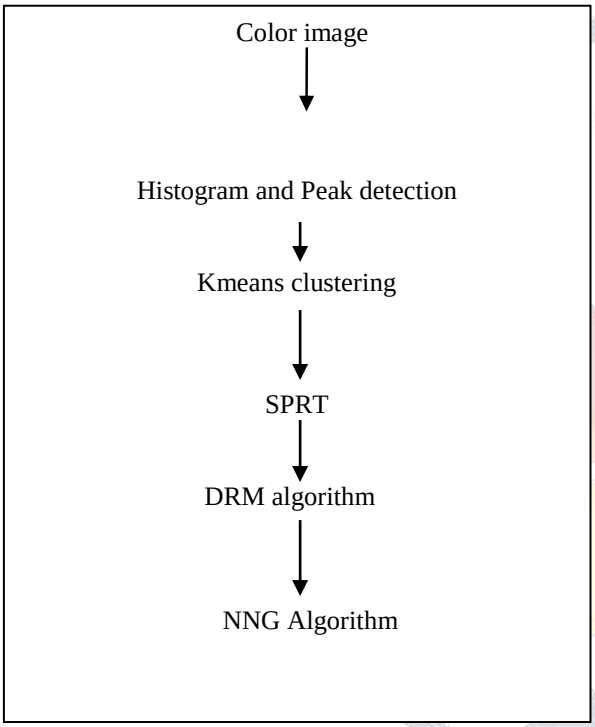
D) Clustering techniques: clustering is one of most famous techniques in segmentation. Clusters are group of similar type of elements. K-means algorithm is famous example of clustering. [7] [8]

E) Matching: In this method set the ideal object, and search for other object which having same feature as that of the ideal object. Locating the objects is possible with this type. This type of segmentation is known as matching.

OVERVIEW OF THE SYSTEM

- Color image is input for this system. Color clusters are formed using k means clustering method. Auto clustering approach is helpful here. The plane color image is converted into horizontal and vertical histogram.
- Then hill climbing technique is used for detecting the peak points, in short peak detection is possible using histogram and hill climbing technique.
- Then form the actual clusters with the help of K-means clustering algorithm. Here clusters are made of various regions.
- Check similarity between these regions. This similarity of the region is calculated by sequential probability ratio test, which depend on the two fix assumptions. Right assumption and wrong assumption. Then sort the data into two different groups.
- Finally
- apply principal of nearest neighbor graph and dynamic region merging which gives automatic image segmentation. At this step actual merging is possible, Output of the DRM algorithm is enhanced segmented image.

III. FLOW OF THE SYSTEM



This is the technique which is applied to plane color image color image is converted into histogram. There are two approaches of histogram techniques, horizontal histogram and vertical histogram. With the help of hill climbing technique histogram of the color image helps to detect the peaks.

K MEANS CLUSTERING

K means clustering popular techniques used to form the color clusters. As mention above once the peaks in hill climbing process are detected then actual clustering starts. Here number of peaks will be equal to number of clusters.

The K means clustering algorithm works as follows. Construct a partition of n documents into a set of K clusters.

- Input: An image and the number K.
- Output: K number of clusters..
- Select K random docs {S1,S2,…..SK} as peaks
- Form Clusters based on centroids and its distance to neighboring objects.
- This process is continuing up to stopping criteria.

CONSISTENCY TEST (SPRT)

This test checks homogenous features in the image. The homogenous property deals with two conditions: right condition and wrong condition. The condition in which similarity regions are considered, it is known as right condition and condition

considering the dissimilarity is known as the wrong condition. For right condition combine the regions. This is explaining as follows:

Here consider two assumptions to check if the regions are homogenous or not.

- Result=right, It works on valid hypothesis similar regions are merged.
- Result=wrong, if neighboring regions are not similar then hypothesis is known as alternative hypotheses.

The algorithm for consistency test is as below

- Set λ_1
- Choose $\lambda_2=1$, $\alpha=0.05$, $\beta=0.05$
- $A = \log(1-\beta/\alpha)$, $B = \log\beta(1-\alpha)$
- Choose the k pixels of neighboring regions.
- The predicate cue x is calculated which require $P0(x/\theta_0)$, $P1(x/\theta_1)$
- This value is calculated as
  $P_0(x|\theta_0) = \lambda_1 \exp(-(I_b - I_{a+b})^T S_I^{-1}(I_b - I_{a+b}))$
  $P_1(x|\theta_1) = 1 - \lambda_2 \exp(-(I_b - I_a)^T S_I^{-1}(I_b - I_a))$
- Calculate $\delta = \delta + \log(P_0(x|\theta_0)/(P_1(x|\theta_1)$
  If $\delta >= A$, then regions are consistent.
  If $\delta >= B$, then regions are not consistent

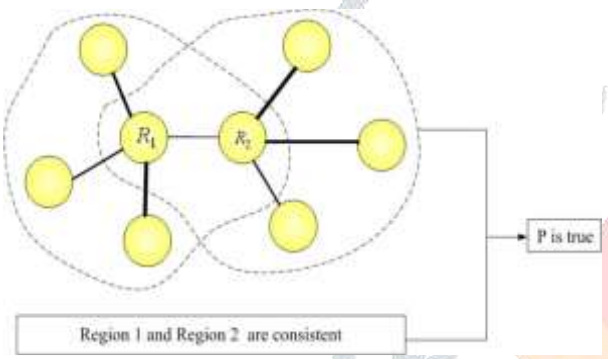


Fig 2.Consistency test

NEAREST NEIGHBOR GRAPH

Once the consistency of the regions is check, start grouping the color clusters. With the help of NNG scanning very small part of image is possible, so it becomes very fast and efficient [17].

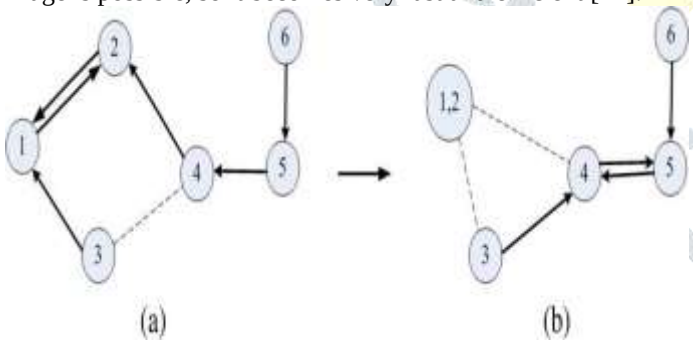


Fig 3.NNG Process

- Most similar pair of regions is connected by an edge with the minimum weight.
- Consider minimum weight=minimum dissimilarity=maximum similarity

DYNAMIC REGION MERGING ALGORITHM

There are different algorithms to merge the data. Though NNG is used at the initial stage, DRM is use at final step to merge the data because with the help of DRM we get better, fine and automatic segmentation. A region predicate always checks or compare with the description of adjacent region; if both are same; merge them into a larger region. Otherwise regions are mention as different regions. We cannot combine such regions.. If any region cannot merge with any of its adjacent neighbor, then at that point we have to stop as all the possible regions are already merged This algorithm is conducted like discrete system. The segmentation in this algorithm is not overflow and not underflow. It is optimum. The DRM algorithm works as follows:

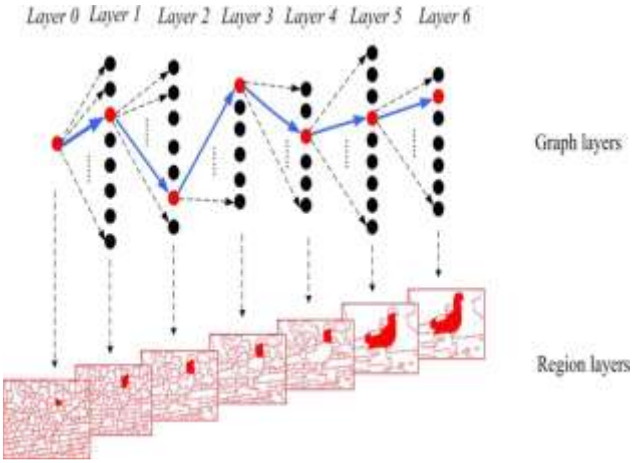


Fig 4.Dynamic region merging process

Dynamic region merging process works on the principal of the shortest path the corresponding image regions of each label layer. Starting from lower layer 0, (which is in red) we can obtain new label from (in red) its closest neighbor. The two merged regions are labeled the same name. The merged final output images are very useful as they give us detail and enlarge explanation of data; specifically in security and military applications. The alternative to the DRM algorithm are mean shift algorithm [16] as well as graph based algorithm [14]

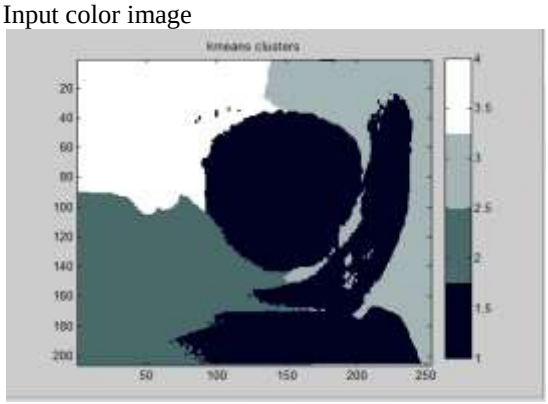
IV PROPOSED SOFTWARE DESIGN

The system software is made using MATLAB 10 .We are implementing hill climbing technique and k Means clustering first on the plane color image, and then applying consistency test using SPRT. Dynamic region merging algorithm and nearest neighbor graph on color image. This operation is totally software part. In the used DRM algorithm, five parameters that control the consistency condition are considered. While implementing the system there are four fix parameters, they are α, β, λ1, λ2.Here (α, β) represent the probability of accepting an "inconsistent" model as "consistent" and rejecting a "consistent" model as "inconsistent" .m is used to decide the amount of data selected for the random test. If we set λ2=1, then only λ1 is the user input which can be vary.

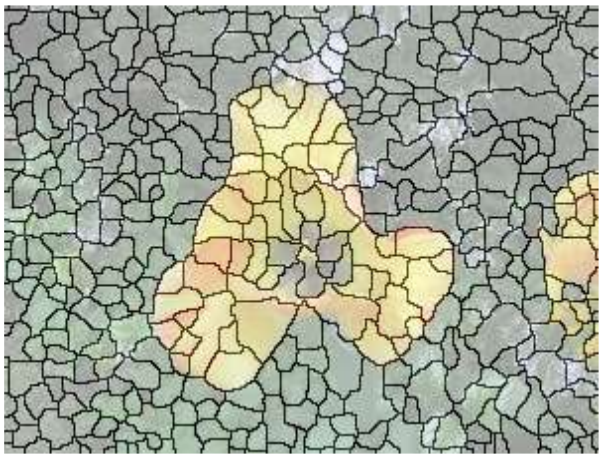
V RESULT

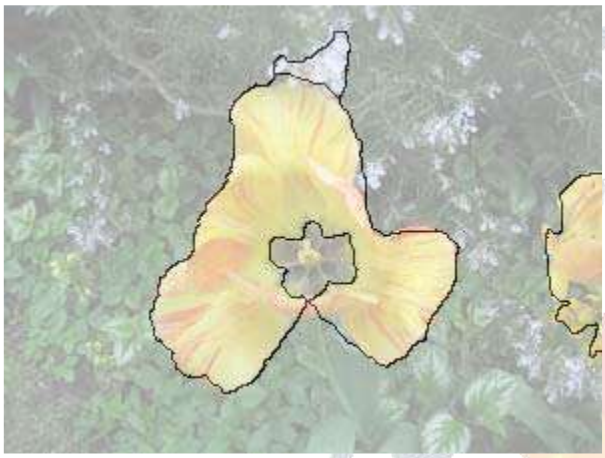
Following images are used to represent results.

Input color image



Region based segmentation





3) Output segmented image

VI CONCLUSION

In this paper we discuss various image improvement techniques with the use of different type of algorithm like dynamic region merging, nearest neighbor graph, clustering. These image improvement techniques are very useful in the modern electronics world. The extension to above mention paper is to increase the efficiency and also increase in tolerance.

VII ACKNOWLEGEMENT

It gives me immense pleasure to express my sincere thanks and gratitude to my co author Prof. Pallavi Mathur for her valuable inputs provided at each and every stage of every work. Her help from the point of conceptualization of the paper to the point of conclusion was appreciable.

I am also thankful to Prof. Mangesh Manke, Head of Department of Electronics & Telecommunication Engineering for his valuable suggestion during review stage of the paper.

I would like to thank Prof. L.V.Kamble, Principal, D.Y.Patil Institute of Engineering and Technology for his support and motivation during the paper.

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