EAI Endorsed Transactions
on Cloud Systems
Research Article EAI.EU

An Innovative Cloud Based Approach of Image Segmentation for Noisy Images using DBSCAN Scheme

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Abstract

Partitioning a picture is an imperative idea in picture preparation. Partitioned pictures are fundamental for various picture preparing techniques. In this paper, we are endeavouring to obtained the components to procure the sections of a boisterous picture with density bunching built approach. At first we input a boisterous RGB picture and perform RGB to Grayscale transformation on it. We perform median percolation on it to evacuate salt and pepper commotion. To find the spatial availability of the pixels, density built bunching is utilized which is a compelling grouping strategy utilized in information digging for finding spatial databases. Test outcomes employing projected procedure by presenting empowering execution. We estimate the values of similarity matrices for segmented images to assess the similarity between original and segmented images which is essential to sustained the loading of segmented images in cloud space.

Keywords: Segmentation, Density, Cloud, Bunching, Pixel, Matrices etc.

Handling editor: Mohammad Ayoub Khan, College of Computing and Information Technology, University of Bisha, Bisha 67714, Saudi Arabia

Received on 01 August 2020, accepted on 11 October 2020, published on 26 October 2020

doi: 10.4108/eai.26-10-2020.166768

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1. Introduction

We as a whole are very acquainted with bunching in which we may shape the gathering of information segments in an advanced way comparing to which the information parts in a similar group hold a similar arrangement of highlights. We may accept a picture as an altitudinal dataset comprise of huge information which is basic to process so as to make it commendable and appropriate to an application [2].The procedure of segregating a picture into assorted non-overlying segments so as to keeping up the significant surface and force is called as picture division. Sectioning a picture is fundamental as we need to achieve various errands on picture segments to remove new features [11]. At first we input an uproarious RGB picture and expel it's commotion utilizing middle filtration procedure with the goal that it might be liberated from undesirable pixels. Middle Filter executes pixel by pixel and replaces each uproarious pixel with its middle neighbouring pixels [3]. In a 2D-picture, all the pixels with in the range are the members to diminish the weak pixels. At that point we continue to discover the edges to get the associated parts [13]. These associated segments might be an obstruction in portioning a picture. So we need to discover the component to diminish the no. of associated segments. For this we require the gathering data [4].As a model, if the client doesn't get a lot of information about space, it will be hard for him to distinguish the database questions expressly [12]. Moreover spatial database may envelop a terrible piece of data in which, attempting to decide gatherings of data may end up being dearer. Places of gathering might

be moreover self-pushy and multifaceted [1]. Close by some prestigious grouping estimations like K-suggests, K-medoid, Progressive Clustering and Self-Organized Maps. By the by, none of these controls can manage all these three referenced concerns [23]. So as to encourage pragmatic control, acknowledgment, what's more, object-based investigation of mixed media assets, apportioning pixels in a picture into gatherings of intelligent properties is indispensable. This process is viewed as picture division [1]. Many techniques for shading picture division have been proposed in the previous years. These techniques can mostly be grouped into two classes: one is shape based and the other is area based [2]. Strategies for the principal classification use irregularity in a picture to distinguish edges or shapes in the picture, and afterward use them to parcel the picture.[19] Techniques for the subsequent class attempt to separate pixels in an picture into various gatherings comparing to sound properties, for example, shading and so on., that is, it for the most part use choice standards to section a picture into various areas as per the likeness of the pixels. Area developing and grouping are two agent strategies for area based division [1]. Downsides of the district developing strategy are that it is hard to make the developing or quit developing measures for various pictures and the technique is delicate to commotion. As of late, most of the analysts centred around rewarding the division Issue as an unaided characterization Issue or bunching Issue 13-71, In their techniques, division is gotten as the worldwide minima of measure capacities related with the fluffy possibility separation between the models and the picture pixels [7]. By parcelling pixels as indicated by their worldwide element dispersion, these strategies accomplish great worldwide parcelling results for a large portion of the pixels. In any case, in these strategies, spatial relationship of the pixels is once in a while considered [20][21]. The loss of spatial data of the pixels perhaps prompts outlandish division results for that the pixels that are comparative in low level element (shading and so on.) yet separate in spatial will be gathered into one district. Also, simultaneously, run time multifaceted nature of this worldwide segment is regularly high. By viewing the picture division as the Issue of apportioning pixels into various groups as per their shading closeness and spatial connection, we propose our shading picture division strategy. It is a district based technique. As indicated by the technique, pixels in each divided area should be connective in spatial what's more, comparable in shading. At that point, base on thickness based grouping (DBSCAN), a way to deal with coordinating the spatial network and the shading comparability at the same time in the division procedure is introduced. By this methodology, pixels in a shading picture will be gathered into various bunches, and these groups structure the last fragmented areas of the picture. Run time intricacy of the technique is low contrasted and that of the worldwide bunch strategies.

This paper is alienated into numerous divisions. First division contributes the overview of filtration procedures with image subdivision. Second division contributes density built bunching practice. Third division accentuates on prevailing investigation efforts already made in this arena and collate it with projected ideas instigated in the succeeding paper. Fourth division projected a procedure for image subdivision using filtration procedure and DBSCAN methodology. Fifth division display the enactment portion of projected algorithm on raucous RGB images. Sixth division converses the outcomes attained through the execution stage and lastly seventh section summarizes the paper and concludes with the fact findings.

2. Density based Clustering

In our technique, altitudinal system of the pixels is found by thickness based bunching proposed by Ester in 1996 for finding bunches in altitudinal database SI. To endorse our strategy, we give a quickly presentation to DBSCAN here. [20] The fundamental thoughts of thickness based grouping include various new definitions. We instinctively present these definitions and afterward catch up with the prologue to the fundamental thought of the calculation. Given a spatial dataset and articles in it conveys in a two-measurement space:

- The area inside a range of guaranteed object is known as the Eps of the item.
- In the event that the Eps of an article contains in any event a least number, MinPts, of item with comparative property, at that point the item is known as a center article.
- Considering collection of objects X, an object u is unswervingly accessible to another object v, if a lies inside the Eps of b and b is the primary pixel.
- Thickness reachability is the transitive conclusion of direct thickness reachability and this relationship is hilter kilter. This topsy-turvy thickness reachability is thickness network.

DBSCAN perspectives for bunches by demonstrating the eps of each point in the dataset. If the Eps of a point u contains more than M-Pts, another gathering with u as the middle article is made [16].DBSCAN then iteratively assembles authentically thickness reachable things from these inside items, which may incorporate the merge of a couple thickness reachable gatherings [22]. The system closes when no new point can be added to any gathering. Picture can he considered as a one of a kind spatial dataset in which each pixel bas a spatial territory and a concealing regard [24]. By then, procedure used to discover packs in spatial will he convincing on discovering bundles in an image [17]. Pixels which are near in concealing and connective in spatial can be .bundled together to shape a segmented territory. [18] The differentiation between spatial gathering and pixel

batching is that image pixels scatter not simply in spatial space, yet furthermore in other part space, for instance, concealing, etc. Pixels that collected into one gathering should not only connective in spatial yet what's more be near in concealing.

3. Related Work

Many researchers have set their outlooks on image segmentation for numerous application usages. Specific of them practice diverse diagnostic procedures to corroborate the conventional segmentation of images.

Amongst these scholars [1] concerted on the dimensional connectivity of pixel and their comportment. They castoff density built methodology to mark the connotation concerning dimensional connectivity and graphical traits.[2] in his investigation concerted on the distinction between density built methodology and mean-shift scheme to segmented an image.[3] implemented the trialling to examine the efficacy of density built methodology with simulated and actual image files and discover that it performed equitably upright.[4] instigated the perception of density built bunching on biomedical metaphors and discover that the subdivisions of pigmented membrane slices can be attained as per the color sections.[5] associate six diverse percolation procedures to eradicate the noise element from an image to mark it added expedient for advanced studies.

In accumulation [6] recommended a practice using median filtration and watershed algorithm to acquire the subdivisions of an image with decent and operative eminence by eradicating the unexploited and insignificant pixels. [7] familiarized an enhanced mean shift bunching methodology using kernals.they employed the outcomes expending semi supervised methodology of bunching. The exactitude of bunches may be attained merely with scarce constrictions.[8] construed and broaden the mean shift practise with appropriate investigation .It construed it as a genre pursuing progression on shadow kernel built apparent.[9] undertakes a wave leader pyramids concerned with Graphical Evidence Conformity system for image excellence valuation which expressed upright outcomes of numerous image excellence matrices.[10] prominence on the usages of rand factor for the suitable extent of segmented slices of an image. The paper made a disparity between mechanical subdivisions and hand engendered subdivisions of an image and equate the outcomes.[11] recommended a method for untraced subdivision using Gaussian dissemination and adaptive sequence cryptogram to augment the coding stretch and entropy of a picture.[12] recognised the perceptual merits of image subdivision which is grounded on the numerous minced true standards to estimate meticulous and right level of subdivision.[13] offered the elucidation of the delinquent allied with numerous sections. The upshots are attained with two neighbours who perform suggestively for low-slung as well as high variable sections. [14] absorbed on the efficacy of image subdivision for computer revelation and estimation procedure to regulate the utility of each constituent of an image. [15] Recommended a process for subdividing grayscale pictures into disarticulate counties of articulate brilliance and texture.

Thus afterwards considering the prevailing exploration work in this arena, we proposed a procedure which can excerpt the subdivisions of raucous pictures using DBSCAN methodology and centred on it we estimate the values of precise similarity matrices which can be rather expedient while loading the segmented image into cloud space and mark this reading dissimilar to the prevailing readings in this arena.

4. Proposed Algorithm for Image Segmentation using Cloud Based Approach with DBSCAN

Sectioning a picture is to a great extent to isolate a picture into various divisions [9].The goal of division is to simply modification the portrayal of a picture snared on rather that is further noteworthy and casual to investigate; dividing a picture is ideally used to pinpoint stuffs and fringes in images. Further explicitly, picture division is the system of passing on a marker to every pixel in a picture with the goal that pixels having the indistinguishable marker share firm features [10]. Following advances are ahead to dividing and removing the picture parts:

4.1 Initiate to input the noisy RGB image

At first we feed a loud RGB picture .The picture might be chosen cautiously as we need to manage a few multifaceted nature Issues during division. Chosen picture must be appropriately arranged according to the necessity of division and ought to contain some uproarious pixels.

4.2 RGB to Grayscale Conversion

When we input a picture, we will probably change every RGB esteem parts to their equal grayscale segments as the assignment of edge location can be dull with RGB picture segments .The edges are not plainly recognizable with RGB picture pixels. Grayscale is just lessens multifaceted nature from a 3-D pixel value(R, G, B) to a 1-D esteem. Numerous undertakings don't react better with RGB highlights.

4.3 Work on median filtration to diminish salt and pepper noise

Median Filtration is the famous permeation technique which is castoff to wipe out commotion from a picture or

sign. Such clamour decreasing is an unmistakable pre-processing stage to retouch the results of prior preparing. Middle sifting is exact by and large castoff to domain edges while dispensing with commotion. The focal impression of the middle channel is to execute over the sign thing to thing, subbing each thing with the middle of neighbouring things. Middle is expected by at first organizing altogether the pixel coefficients from the connecting region into math request and afterward subbing the pixel being estimated with the focal pixel coefficient yet in the event that the area under pondering holds an even measure of pixels, the mean of the two focal pixel coefficients is castoff.

4.4 Extracting edges through edge detection

Identifying an edge involves a variety of logical systems that object at distinguishing truth in a picture at which the picture light goes amiss unexpectedly or further appropriately has shorts. The focuses at which picture brightening variations unexpectedly are normally arranged into an assortment of twisted line parts known as limits. Spreading an edge discovering technique to an image can expressively lessen the Volume of realities to be taken care of and can so work out material that might be seen as rarer critical though rationing the indispensable operational attributes of a picture. in the event that the picture discovering task is productive, the succeeding endeavour of deriving the material in the genuine picture could be particularly abbreviated.

4.5 Smoothing edges to shrinkage the no. of associated portions

Picture smoothing is performed to decrease the no. of bordering associated parts in a picture. It is accomplished by convolving the picture with a low pass channel piece. It is helpful for expelling commotion. It really expels high recurrence content from the picture. So edges are obscured a tad in this activity. It just takes the normal of the considerable number of pixels under the portion territory and replaces the focal component. Leveling is additionally regularly focused on a solitary worth speaking to the picture, for example, the normal estimation of the picture or the center worth. It is basic for us to achieve the smoothening of a picture with the goal that the related parts might be consolidated. Smoothing gives a helpful domain to portioning a picture.

4.6 Estimating Associated Portions

Presently we count the no. of related segments to assess the degree of relationship in a picture with the goal that the picture might be set up for division and extraction. Associated parts might be marked as 4-associated or 8-associated pixels. Here we are thinking about the 8-associated pixel intectraction.it can be controlled utilizing scientific capacity bwlabel (arg1,arg2) which takes two contentions arg1 is the two dimensional nonsparse grid which hold the picture coefficients though arg2 is the degree of associated pixel.it might be 4 or 8.

4.7 Apply density based clustering to obtained the segmented components

The altitudinal territory of a given pixel is known as the altitudinal Eps of the pixel. We name it altitudinal eps. The size of altitudinal eps. is the amount of all pixels in the circle. Obscure endeavours in the hover address pixels which are protecting equivalent with a pixel p. The region in concealing space of ensured pixel is called concealing Eps of the pixel. We name it C-Eps. C-Eps is used to condemn if pixels are relative in concealing with p or not. Pixels inside the ellipsoid are concealing similar with p and pixels outside are concealing different with p. In case the SpatialEps of a pixel contains in any occasion a least number, M-pts, of pixels similar in concealing, by then the pixel is known as an inside pixel. Its SpatialEps structures an inside region. Right when we are using thickness based bundling to find packs in an image, we need to know there what number of pixels that are concealing tantamount with p in its S-Eps. By then we envision .all the pixels in p's S-Eps to its C-Eps, if the amount of pixels inside the ColorEps is greater than M-pts, p is known as a middle pixel and its S-Eps structures an inside region. Thickness receptiveness to guidance and thickness arrange for pixels have vague definitions. The concealing similarity between concealing pixels is transitive as thickness receptiveness to guidance is transitive. Contagiousness of concealing resemblance makes it possible that pixels that are by step changing in concealing and related in spatial will be packed into a comparable region. This is solid with human perception. Considering the above definitions and conclusions, we support our division procedure as follows:

- Pursuit the pixels without label in a picture which are in appeal for recent center pixel and recent center district. The appeal is from the upper left comer to the base down corner of the picture.
- In the event that a center pixel p is discovered, another bunch is made. At that point, we iteratively gather unlabelled pixels that are thickness associated with pixel p and Label these pixels with same group mark.
- On the off chance that there are despite everything existing center pixels in the picture then repeat the procedure.
- Containing the picture elements that are omitted from any clusters, cartel them with the horde that

is connecting them and has the most eminent nearness in normal shading esteem with them.
- Style each team we find in the picture as a split locality.

After the above division process, pixels are placed into different packs and structure various segmented regions of an image. The going with zone will acquaint a system with choosing the limits of S-Eps and C-Eps for an image.

4.8 Evaluation of Similarity between Original and Segmented Images

Afterwards attaining the sectional components of a picture, we estimate the values of similarity matrices Jaccard Index Score, Dice Index Score and BoundaryF1 Index Score using the usual procedure exploiting the bases of original and sectional pictures compatible on MATLAB software R2020b.

4.9 Cloud Storage of Image Segments for Cloud Applications

As soon as Image segments of various noisy images are obtained, we choose a cloud space in which we may store the image segments conveniently so that a cloud application may use these segmented images as per the user requirement. Cloud space preserves the segmented images in their pure form without any distortion. An application developer may directly use these segmented images according to the interest and nature of task. These image segments can also be utilized by researchers and innovators for further investigation.

To end with, the result of portioning a picture could be procured as an assortment of outlines covering the entire picture. Each and every pixel in a segment is indistinguishable concerning certain highlights. The ensuing depictions can be steady to contraption three dimensional renovated pictures. We can sum up every one of these means in an auxiliary structure utilizing a stream outline which speak to the progression of execution to assess the presentation of proposed approach of portioning a picture which can represent the flow of proposed algorithm in a significant manner to obtain the segments of an image and further analyse the performance of the image fractions in terms of their usability in an application and obtaining the desired outcomes which meets the basic requirements of a user. The flow chart of proposed algorithm can be represented as follows:

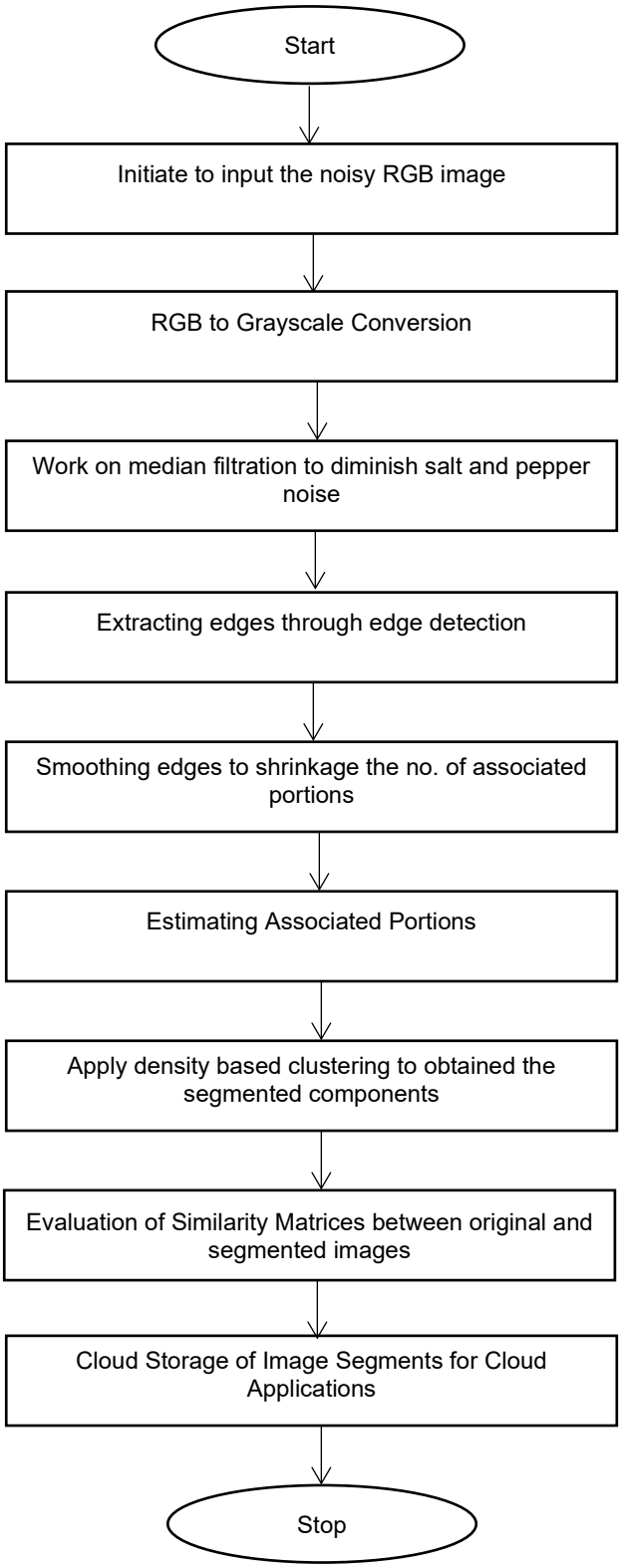

Figure 1. Flow Chart of Proposed Algorithm

5. Implementation

The predicted approach of fragmenting a picture is tested on certain boisterous RGB pictures to separate their sectional divisions and to identify their edges which brought about the type of portioned picture parts. So are moving through experimental research. For this, we have taken the image dataset of various noisy RGB images having a certain proportion of indistinct pixels as input to implement the projected algorithm using MATLAB software R2020b. Instigated outcomes can be signified in the form of attained segmented images which are as follows:

Figure 2.1 Plant Image

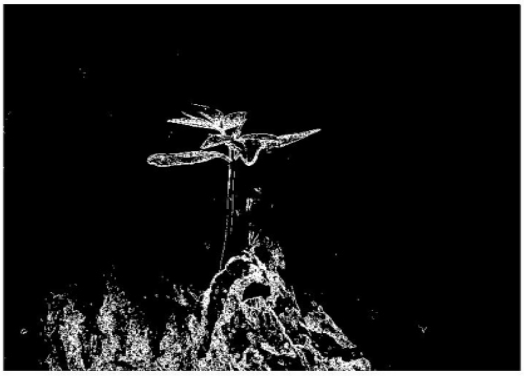

Figure 2.2 Segmented Plant Image

Figure 3.1 Fog Image

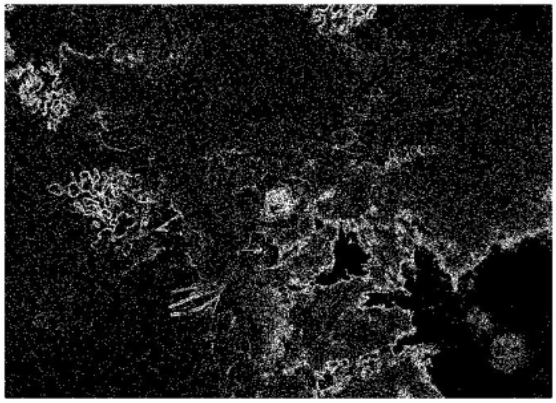

Figure 3.2 Segmented Fog Image

Figure 4.1 Duck Image

Figure 4.2 Segmented Duck Image

Figure 5.2 Segmented Monument Image

Figure 5.1 Monument Image

Figure 6.1 Bird Image

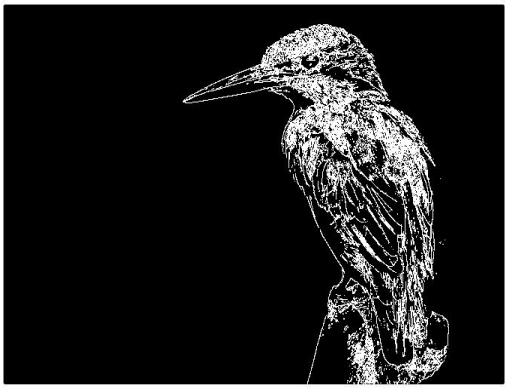

Figure 6.2 Segmented Bird Image

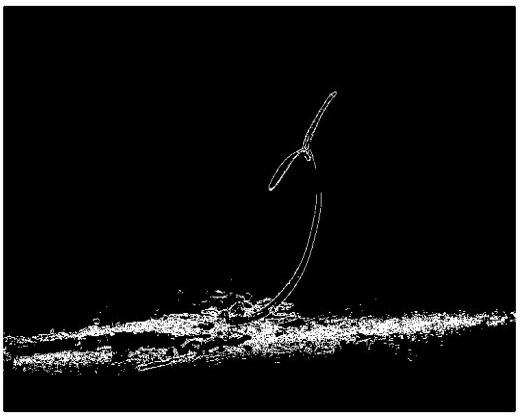

Figure 7.2 Segmented Plant Image

Figure 7.1 Plant Image

6. Results and Discussion

The procured results mean the divided fragments of an image wherein we can perceive the edges to discuss the coefficients of a noisy picture without a remarkable stretch. These outcomes showed the multifaceted nature among extraordinary and separated picture. These divided parts can again supportive to redo three dimensional pictures. We have obtained the values of similarity matrices for segmented images to validate their exactness and aptness for cloud storage. These matrices encompass of jaccard index score, dice index score and Boundary F1 index scores. These resemblance matrices are attained using original and segmented images on MATLAB software. The obtained results can be represented as follows in a tabular form:

Table 1. Evaluation of Similarity Matrices between original and Segmented Image

S.No.	Original Image	Segmented Image	Jaccard Index Score	Dice Index Score	BoundaryF1 Index Score
1	Figure 2.1	Figure 2.2	0.34889	0.55532	1
2	Figure 3.1	Figure 3.2	0.63555	0.77717	1
3	Figure 4.1	Figure 4.2	0.43998	0.61109	1
4	Figure 5.1	Figure 5.2	0.60329	0.75257	1
5	Figure 6.1	Figure 6.2	0.38037	0.61040	1

6	Figure 7.1	Figure 7.2	0.38037	0.55111	1

The values of similarity matrices clearly indicate the identity between original and segmented images. Particularly the value of BoundaryF1 index score is 1 for all pair of images which clearly suggested the contour matching in original and segmented image which is quite essential while storing the segmented images into cloud storage as it enable the image to be stored in the clod space any mismatching or ambiguity.

7. Conclusion

The acquired outcomes imply the divided segments of a picture wherein we can without much of a stretch discriminate the edges to give an idea about the conduct of a boisterous picture which can be conveniently stored in cloud space. These results demonstrated the complexity among exclusive and alienated picture. These fragmented segments can again helpful to recreate three dimensional pictures. The utilization of median percolation scheme and density built bunching methodology has come about in empowering division outcomes. Future examination will think about the accompanying Issues. To begin with, increasingly powerful boundaries decided technique for SpatialEps and ColorEps ought to be thought of. Second, surface descriptors ought to be coordinated into division procedure to improve the presentation. In this paper we have tested only boisterous images to attained the similarity matrices of a segmented image which can be cast-off for the loading of that image in the cloud space to mark it expedient for future applications. As we have examined the projected procedure only on distorted or low resolution boisterous images, it still remains to test the same procedure on high definition (HD) images which may be tested and implemented in certain diverse mode as future research.

Acknowledgement

I am extremely obliged to my seniors and family members for their unceasing motivation to undertake this research work.

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