IN-DEPTH INVESTIGATION OF DIFFERENT SEGMENTATION TECHNIQUES ON LOCAL FISH IMAGES

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Computer Science and Engineering.

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APPROVAL

This Thesis titled **"In-Depth Investigation Of Different Segmentation Techniques On Local Fish Images"**, submitted by Md. Abdul Aziz, ID No: 163-15-8396 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 7th December 2019.

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DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Md. Tarek Habib, Assistant Professor, Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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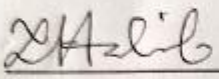

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ABSTRACT

Over the year's pictures are one of the major information sharing outlets. Nowadays Image segmentation is used to identifying the objects as well as boundaries in the images. Due to the advancement of computer vision technology I try to investigate different image segmentation techniques on local fish images. There are several algorithms proposed for segmenting an image. In this paper five segmentation techniques for local fishes are discussed, they are Otsu Method for Thresholding Algorithm, Histogram based Algorithm, K-means Segmentation Algorithm, Edge Detection Algorithm, Region Growing Algorithm. The results revealed that the Otsu Method for Thresholding Algorithm has achieved a very good result comparing with other techniques. A fish dataset consisting of real-world images was tested. More than 90% accuracy has been achieved, which appears to be good and promising by comparing the performances obtained with the relevant works recently reported.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

TABLES **PAGE**

CHAPTER 1
INTRODUCTION

1.1 Introduction

The value of computer vision object segmentation is rising day by day. Object segmentation is one of the most important and difficult problems in image analysis. Digital image process plays an excellent trip in day by day life application like natural pictures, medical pictures, satellite pictures and then forth. Image segmentation could be a vintage subject within the field of image process an is also a hotspot and hub of image process techniques. Segmentation of images is an important part of the processing of images. Segmentation of the fluctuated segments among the particles is to an excellent degree crucial to restorative decision. The method of partitioning an image into relevant regions or artifacts in computer vision is image segmentation. Segmentation has a range of strategies like: Edge detection — This technique distinguishes the edges and identifies the boundaries in an object. It is a special approach used for segmenting the edges. That attempts to capture artifacts' significant properties in the picture, Region Growing — Building pixels into larger regions based on predefined seed pixels, growing parameters and stopping conditions, Otsu Thresholding — Which iterating through all possible threshold values and measuring the pixel level spread measure Segmentation is used in many fields in many applications; it can be used to classify and detect persons, artifacts or animals. Watershed — Due to' flooding' due to its local minima, a digital image forms a watershed and builds the' dams' as the waterfront collects together. Once the image is completely flooded, the watershed is formed collectively by all the dams. This channel covering the edges is used for image segmentation. Using the algorithm, the waterlines are traced in an image to distinguish the different regions. In my case, the recognizable proof is still a challenging assignment due to assortments of shape, skin color in fishes, changeability of deformity sorts and nearness of stem and so on.

1.2 Motivation

Fish have a major role to play in Bangladesh's livelihood and culture. In Bangladesh, around 76 fish species are often included as both freshwater and marine. The change in habitat in Bangladesh means local fish will be extinguished by the change in flows of the river. Fish is Bengali's everyday food. We can never think, but we don't know the exact name of the fish. The name of these fish is not known to our youth society. Because our local fish are extinguished day by day. In our country, around 54 fish species are extinct. In our country, there is no work on this. I will do this research to introduce the local fish to young people on the path to the extinction of local fish in Bangladesh.

Local fish in Bangladesh will be eradicated due to habitat changes as the river flow changes. Fish is Bengali's regular supper. We couldn't think about the exact name of the fish without fish, but we didn't know.

The name of the fish is unknown to our young society. Because our local fish are extinguished every day. In our country, approximately 54 fish species are extinct. In our country, there is no research on this. We will do this work to bring young people into local fish on the path to the disappearance of local fish in Bangladesh.

I tend to select ten local natural fishes used for my review to examine this subject quickly and extra remedy. These local fishes are-

- Batasio,
- Bronze
- Featherback,
- Elongate Glassy
- Perchlet,
- Gangetic Leaffish,
- Gourami,
- Guntea Loach,
- Olive Barb,
- Pale Carpet,
- Tank Goby,

- Tire Spiny Eel

Many images are gathered for the system to train the system in MATLAB using K-means, Otsu method for thresholding, Edge Detection, Region growing techniques.

1.3 Objectives

The aims of this research are to find out and analyze a technique that can help separate local fish from farms or markets and thus make an appropriate profit. The proposed system is user-friendly, easy to execute and can be easily implemented in any process.

- To show to our country man the local fishes
- To make the people of our country conscious of endangered fish
- To contribute to our country's research field
- To go back to the extinction of fish
- To use techniques for segmenting images.

1.4 Expected Outcome

Bangladeshi fish are the people's favorite food. Yet fish are extinguished like local fish like rui, katla, chital etc. And we're not familiar with these issues in today's youth culture.

But we thought to know about the fish. And we've done this work in this project. We thought of a method that will be open to the youth society by taking photos to identify the local fish. For this problem we need a Classifier system. In Classifier system we need to do image preprocessing like segmentation. My proposed system I will try to investigate different segmentation techniques for find the better results.

- I will get a research-based project (There is no work on local fish segmentation system in our country until now. I believe that lot of information will come out in our research)
- Can know about local fish (This system not only segment fish, but also will be provides information about fish)
- Know about endangered and extinct fish
- Show the local fish to future generations and country

1.5 Report Layout

Chapter 1: Introduction

We addressed the introduction, work motivation, priorities, expected results of the research work and the document format in this section.

Chapter 2: Background

In this chapter, we discussed the background of our work. We also provide literature review, research summary, problem scope, and system challenges.

Chapter 3: Research Methodology

This section contains the methods and steps proposed by the system, classification, process of data collection, algorithms and statistical analysis.

Chapter 4: Experimental results and discussion

The chapter describes all the experimental outcome obtained by the proposed system along with the performance analysis and provides a description of the result.

Chapter 5: Conclusions

This chapter contains the part of the conclusion and the ideas of the further analysis on this subject.

CHAPTER 2

BACKGROUND STUDY

2.1 Introduction

In this section, several studies carried out by researchers in the field of image segmentation, fish segmentation, image categorization, fish recognition, classification is addressed. Specific research work that is actually done in this field.

Image segmentation has been an active field of research over the past two decades, resulting in several image segmentation techniques being identified in the image processing research literature. This rapid increase is partly due to various problem domains and applications requiring domain-specific processing and analysis of image data.

Image processing is the most important weapon for analysis in various sectors in agriculture sciences. Image processing now has excellent performance for a few days to find more accurate results in modern fields of work. Nevertheless, most of our farmers are not aware of modern technology. In order to produce more harvest in a better way, they must acquire the expertise. And here the processing of images is a very useful process. Image processing is not only used for segmentation of fish images, but also for segmentation, detection, classification, texture, color, etc. of fish or vegetable diseases. The proposed system is capable of studying various segmentations on images of local fish. Many researchers are already discussing various segmentation algorithms using several techniques.

MATLAB is mainly used in our work for implementation. MATLAB is a program in which image processing algorithms can be easily implemented. It includes the Live Editor in an executable notebook to create scripts that combine code, output, and formatted text.

2.2 Literature Review

In this section, we're going to introduce brief studies on our work. After examining a number of terms paper, we found crucial information to raise our expand thought. Here is the review of those paper -

Nobuyuki Otsu et al. [1], proposed in the above provides additional means of evaluating other important aspects than the selection of optimal thresholds. The class probabilities (2) and (3), respectively, for the chosen threshold k*, represent the portions of the areas occupied by the classes in the picture as the threshold. The class means (4) and (5) are used to estimate the mean class levels in the original gray-level picture.

Chuang et al. [2], suggested an automated fish segmentation algorithm sampled by an underwater camera system based on trawl. In the successful segmentation of fish, they obtained a 78 percent recall against the ground truth, under very low contrast underwater images.

Hong Yao et al. [3], said the split images obtained a large area of under-segmentation using the Otsu algorithm. Segmentation of the level set and segmentation of the EM cluster of fish is not complete. The target image is more complete using the improved K-means clustering algorithm.

Sun Xueyan et al. [4], using the Gaussian Laplace filtering edge detection method, which can easily detect false edges and is sensitive to noise.

Tan Zhicun et al. [5], an improved K-means genetic clustering algorithm for the image segmentation process has been suggested.

Cor J. Veenman et al. [6], thought object segmentation could be achieved step by step across multiple cluster scales.

Ng, H.P. et al. [7], proposed a combination of K-means and an advanced watershed segmentation algorithm for the segmentation of medical images.

W. X. Kang et al. [8], the main image segmentation algorithm has been tested and offers some important image segmentation algorithm characteristics. Otsu algorithm has been listed by the researchers as a region-based segmentation algorithm threshold. The Otsu thresholding algorithm's complexity rate is also very high and the processing speed is very slow. Otsu segmentation algorithm's result in segmentation is stable or better. By concluding here, combine it with another algorithm to enhance the performance of the Otsu algorithm.

Tara Saikumar et al. [9], the proposed watershed algorithm is that an overlay image of the ridge lines and the original binary image should be noted. The FCM algorithm has got the approximate outline of white matter. As a result of excess segmentation, snooping of other regions appears.

Stan Sclaroff et al. [10], proposed show based locale gathering with deformable shape detection. They utilized region-merging calculations, standard picture handling calculations, most noteworthy certainty to begin with (HCF) algorithm, parametric shape models, MATLAB, Downhill-simplex strategy. Where, HCF calculation could be a most favored strategy which gives nearly accuracy.

2.3 Research Summary

In this research, we've collected a lot of local fish from various locations. The local fish are then captured and the pictures captured are ready for pre-processing. The frames were processed during pre-processing. Additionally, the method of noise reduction is used here.

After completing the pre-processing stage, we used various segmentation forms such as K – means clustering, Otsu system, histogram and thresholding. For each segmentation performed in the MATLAB system together with a particular tag, the data set is ready and finished.

And using those segmentations, our ultimate goal is to identify the shape of local fish so that those fishes can be easily recognized.

2.4 Scope of the Problem

The proposed system allows local fish to be marked by individuals. The entire process of capturing images is applied, although the image is introduced as input and a non-professional user who has no experience of this type of system can be true to implementing the feature. But it is a proposed framework whose main purpose includes the main idea of how to process data properly and the right steps about how algorithms should be applied.

Secondly, I have faced difficulty to find out the matrix calculations of our images. It was more challenging. Find out region is also very difficult for us. In k – means clustering, we cannot display all the images in the same page. It was another challenging task.

2.5 Challenges

We have faced different types of challenges in our research on image processing. First of all, finding rare local fruits that are not available in markets is very difficult for us. Collecting good quality images is very difficult for us. And the calculation of the pixels is not a simple task.

Furthermore, we encountered difficulties in carrying out our photos ‘ matrix calculations. It was more complicated. It is also very difficult for us to find out the area. We can’t display all the objects on the same page in K-means clustering. It was another difficult task.

CHAPTER 3
RESEARCH METHODOLOGY

3.1 Introduction

To investigate different types of segmentation techniques I use four segmentation algorithms in my project. Before segmentation first I remove the image noise and after than filter the stored image. After pre-processing I segmented the captured fish images. Fig: 3.1 shows the overall process of my entire project shows it sequentially. I don't use here any classifier I use k – means clustering to find the region of interest of different types of fishes.

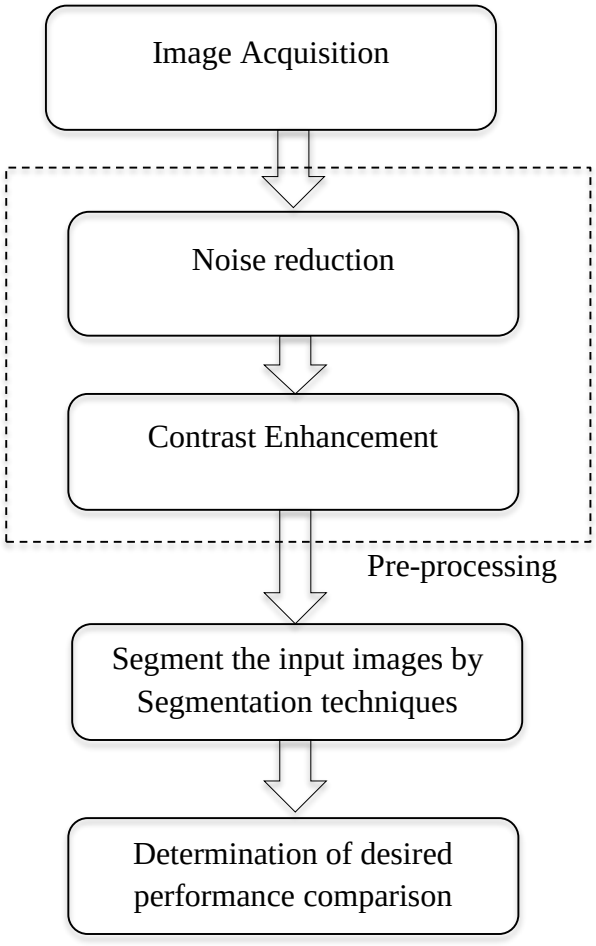


Figure 3.1: Block diagram for segmentation of local fish images.

Figure 3.1 Illustrates the working of the proposed system. A machine learning framework is required to implement such a machine vision application as defined in this inquiry.

The statistical closeness of our work includes most natural products from the neighborhood that are collected from various sources using drastic gadgets such as camera or mobile phone. We have two different ways of discovering their shape after receiving these anticipated pictures. Pre-processing and separation are the two specific ways. We shift the pictures in pre-processing organize and make it clamor free when we get various pictures. We use various kinds of segmentations to discover their shape after completing pre-processing. Here we use the Histogram, Otsu thresholding, K–means clustering, Regio Growing. In a piece chart, we organize all of the division procedures. The piece chart is given below:

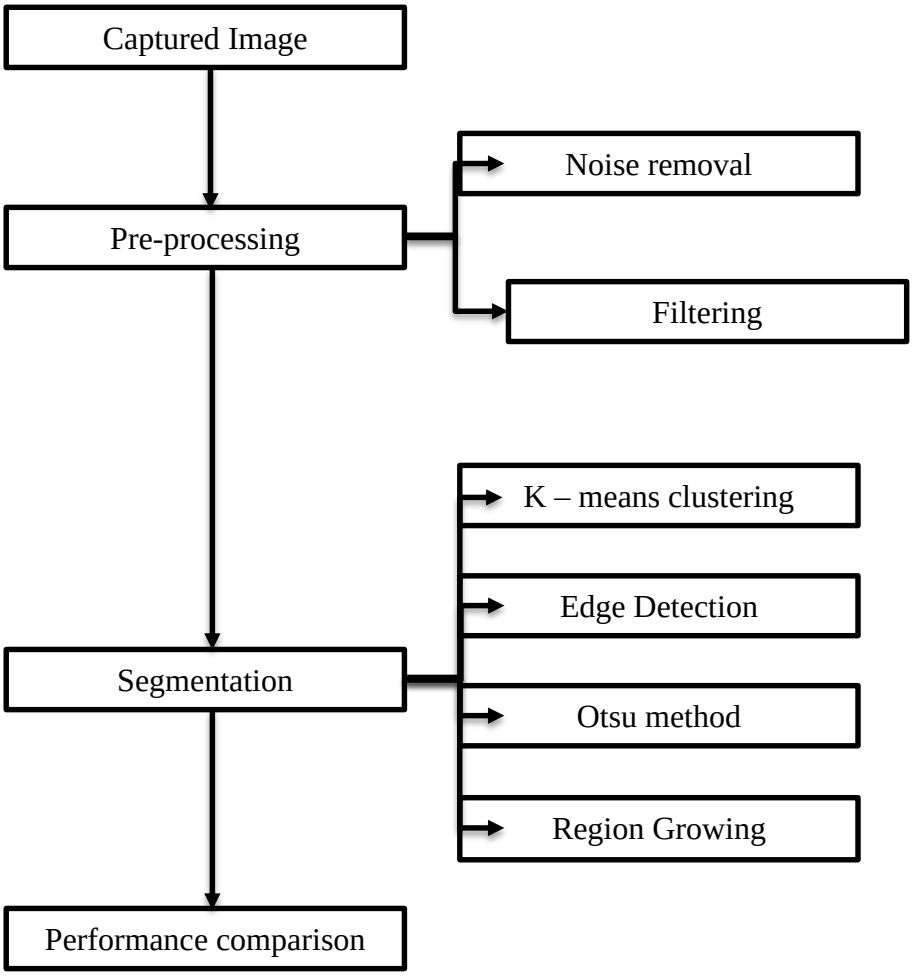


Figure 3.2: Proposed fish segmentation system

3.2 Research Subject and Instrumentation

3.2.1 Image Acquisition

In fish handling the processing of fish means shipping a fish from a few suppliers – more often than not an origin for handling dependent on hardware. It is an important step in managing advanced photo. The rough picture is obtained and another is prepared to urge the desired information.

Different fish that are collected and captured from different places are used in this research work. Essentially, for my term paper, I use 10 different local fish. For my research, I used Batasio, Bronze Featherback, Elongate Glassy Perchlet, Gangetic Leaffish, Gourami, Guntea Loach, Olive Barb, Pale Carpet, Tank Goby, Tire Spiny Eel. RGB (Red, Green, Blue) color show is used to shape the fishes. RGB is a color model commonly used to depict fish within the pixel with their color values consisting of different RGB values. In value and arrangement, the pictures have contrasts that should be treated in a specific form in order to prepare the dataset.

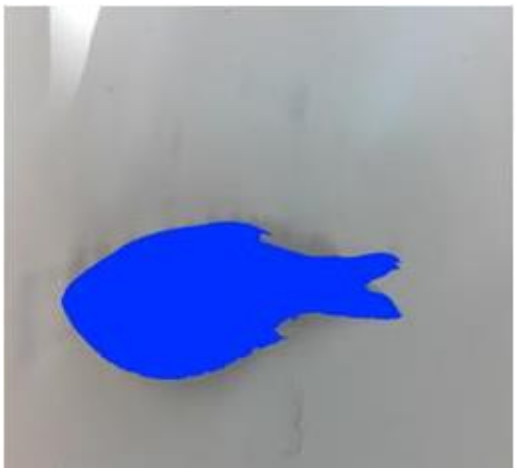
(a)

(b)

(c)

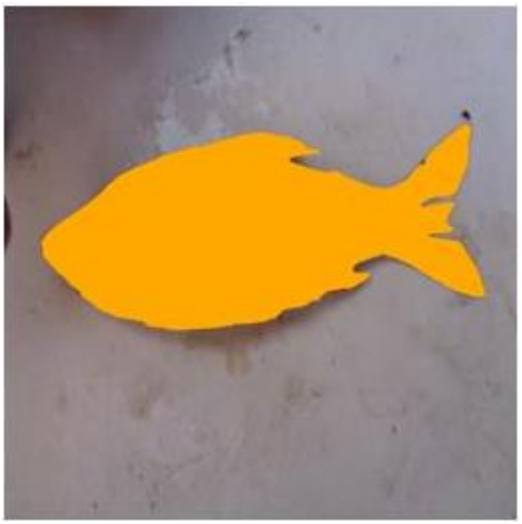
(d)

(e)



(f)

(g)



(h)

(i)

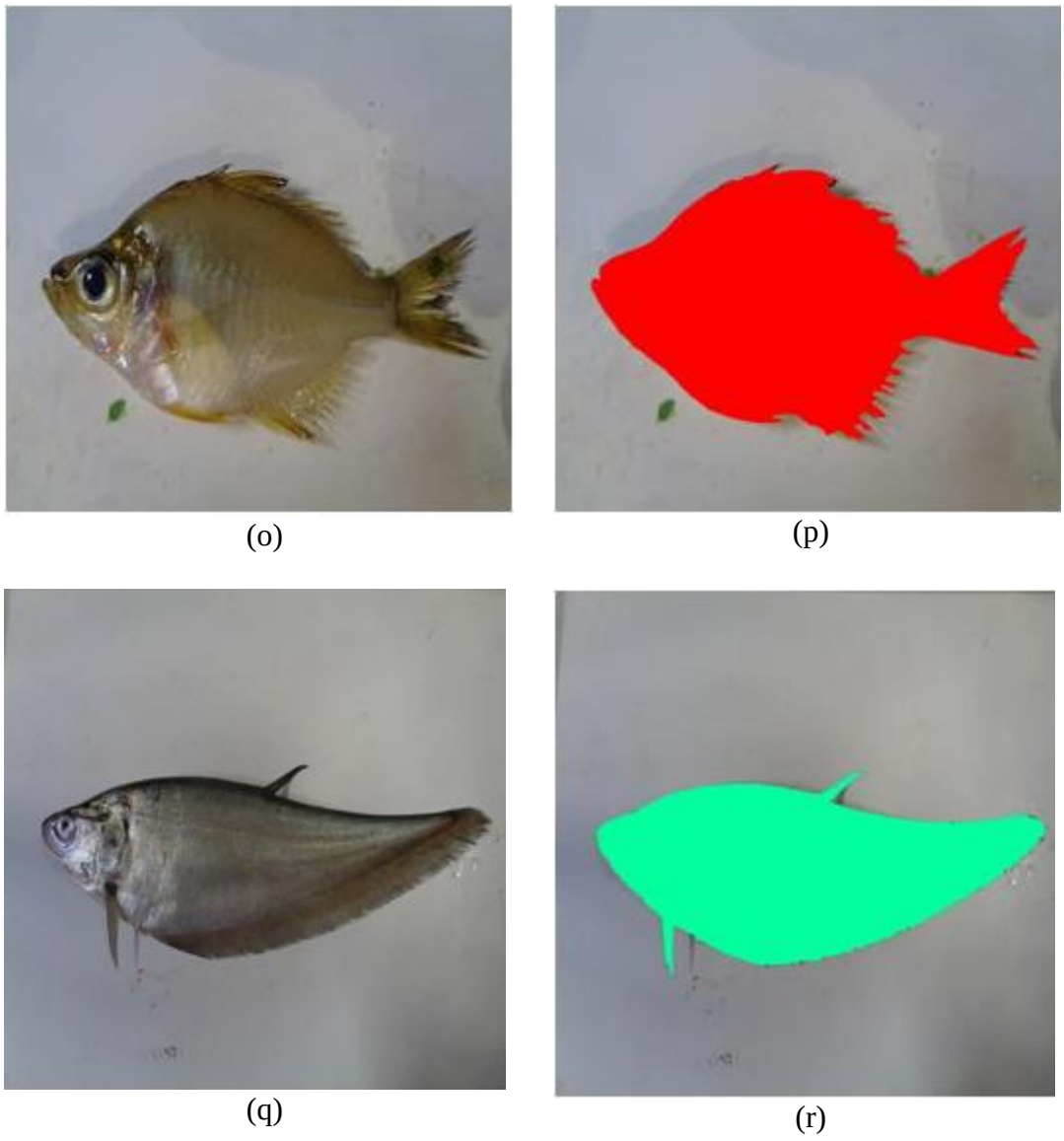
(j)

(k)

(l)

(m)

(n)



(o) (p)

(q) (r)

Figure 3.3: Different types of local fishes along with ground truth (Batasio, Bronze Featherback, Elongate Glassy Perchlet, Gangetic Leaffish, Gourami, Guntea Loach, Olive Barb, Pale Carpet, Tank Goby, Tire Spiny Eel)

3.2.2 Image Pre-processing

Pre-processing is a common name for lowest abstraction level image operations, both input and output are frequency images. Pre-processing is aimed at improving image data which suppresses undesirable defects or improves certain essential image features for further processing. Some pre-processing of the images was performed including noise reduction and filtering before using the fishes for segmentation. Computerized fish are prone to commotion of various kinds. Clamor is the result of errors in fish procurement that prepare the result in pixel values that do not reflect the real power of the real scene.

Mohammad Naved Qureshi et al. [11] the grayscale image suggested to their channel is a simple type of image containing one domain, and each pixel in the image can be represented by an integer [0,255] i.e. it only carries knowledge about frequency. We used the built-in method of MATLAB to determine each pixel's intensity value.

3.2.3 Filtering

All images include frequencies of space. In space, the gray level in the image varies, i.e. it rises and falls. Filtering is a simple method of image processing. We know that high frequencies are passed by a median filter and low frequencies stop. Similarly, in an image, we can filter spatial frequencies. The Median Filter is a non-linear digital filtering technique, often used to eliminate noise from an image or signal. These noise reductions are a normal pre-processing step in order to improve the performance of later processing.

The median filter is a common way to remove "salt-and-pepper" noise from an image while retaining edges and maintaining useful information at the same time. The median filter is used in this paper to preprocess and smooth the images of the source. The formula used is the following:

$$F'(x_0, y_0) = \left[\underset{(x,y)\in S}{sort} F'(x,y) \right]_{(N+1)/2}, \qquad \mathrm{N} \geq 0 \qquad (1)$$

(a) Original image | (b) Before apply filtering | (c) After apply filtering

Figure 3.4: Noise removal and filtering part. From left to right (a) Original image (b) Before apply filtering (c) After apply filtering.

3.2.4 Image Segmentation

(a) K-Means Clustering

Image segmentation is the division of the object into different groups. In the field of object segmentation, a lot of research has been done using clustering. There are various methods and one of the most popular methods is the k-means clustering algorithm. This algorithm is an iterative clustering algorithm which aims in each iteration to find local maxima. For the large number of clusters, the K-means clustering algorithm can create many empty clusters. When no points are assigned to a cluster during the assignment phase, this could lead to a loud image. So we need a criterion to remove the problem of empty cluster generation. Consider each pixel to delete the empty clusters and then apply the clustering algorithm for producing a wide range of clusters. Eventually merge the related clusters and delete the empty clusters. The technique is to separate image from the background by calculating pixel intensity values. Algorithm based on color-based segmentation using K-means clustering is given below [12]:

1. Read input RGB image.
2. Convert RGB color space into L*a*b color space.
3. To separate groups of objects, classify colors using K-means clustering in 'a*, b*' space.

4. Each pixel in the image is marked with K-means results, which return the index for a cluster.
5. Build images that separate the marked image by color from step 4.
6. Choose the appropriate segment of the fish.

(b) Otsu method for Thresholding

Thresholding is an extremely simple method of segmentation. A threshold is set and then compared with each pixel in an image. If the pixel exceeds the threshold, it is marked as a foreground and as a background when it exceeds the threshold. The threshold is usually a color or luminosity value. There are various thresholds that may vary from one object to the other, but thresholds are a simple technique and only function for very simple segmentation tasks. Using a thresholding method, a gray image is converted into a binary image, assuming that the image contains two pixels classes (first pixel and background pixels). The ideal value for a bi-modal histogram separating the first and last image from the background. Originally, we looked at RGB fish from our collected fish and converted them into gray pictures of the natural products. Then we use Otsu's technique to locate his parallel images. In this session in order to gain the number of two parallel images, we presented the histogram of the parallel images. It can cause the degree of the double image to be identified. Thus, the whole detection processing using Otsu method is mentioned below:

1. Read input RGB image.
2. Convert RGB image to corresponding gray image.
3. Apply Otsu method to cluster the gray image into three clusters.
4. We fill up all the pixels with white color, except the infected areas, for the benefit of only black regions from the output of the gray image after the application of Otsu. Now we just have a gray picture with an infected area.
5. As the image of our input is RGB, you want it to be RGB, too. Furthermore, to find the color values of pixels in infected areas, we compare the input image and the gray image output. The end result picture only includes contaminated regions that may be used to recognize and classify more diseases.

(c) Edge Detection Segmentation

This technique identifies the edges of an object and the boundaries. It is a special approach that is used to segment the edges. Identifying the edges of the original image is the three important steps involved. The next step is to process the edges with the boundaries of the object being closed. Then, by filling the object boundaries, transform the output into a segmented image. The methods used to implement the edges concept are listed below:

Thanks to ' flooding ' thanks to its regional minima, a digital image creates a river and constructs the ' dams ' as the coastline gathers together. Once the object is completely flooded, the channel is formed collectively by all the dams. The watershed covering the edges is used for image segmentation. To separate the different regions, the algorithm is used to trace the waterlines in an image.

(d) Region Growing Segmentation

This chapter used the Area Rising method. Regional methods are normally equal to their neighbors by one pixel. The pixel can be set as one or more of its neighbors belonging to the cluster when a criterion for similarity is met. The user entered the coordinates of the fish center manually in order to achieve high efficiency and returned the divided fish body to the algorithm of the area.

- The region segmented may be smaller or larger than the current region.
- Image over or under-segmentation (the appearance of pseudo objects or missing objects)
- Fragmentation.

3.3 Data collection procedure

The process of gathering information involves collecting and evaluating interested variable data in an organized, efficient way that enables one to respond to expressed questions, test hypotheses and analyze results.

I note that there are different types of local fish in many local markets. I used to go to some local markets and ask the vegetable vendor to take pictures of various local fish, and I said I was dealing with extinct local fish. With distinct variations of color and textures, the row images vary in length, form and class. Therefore, I only pick a single picture of each fish for segmentation from every picture. From time to time, I bought fish from the market and took pictures of fish. In order to obtain all of them in a suitable type of information, all pictures are prepossessed.

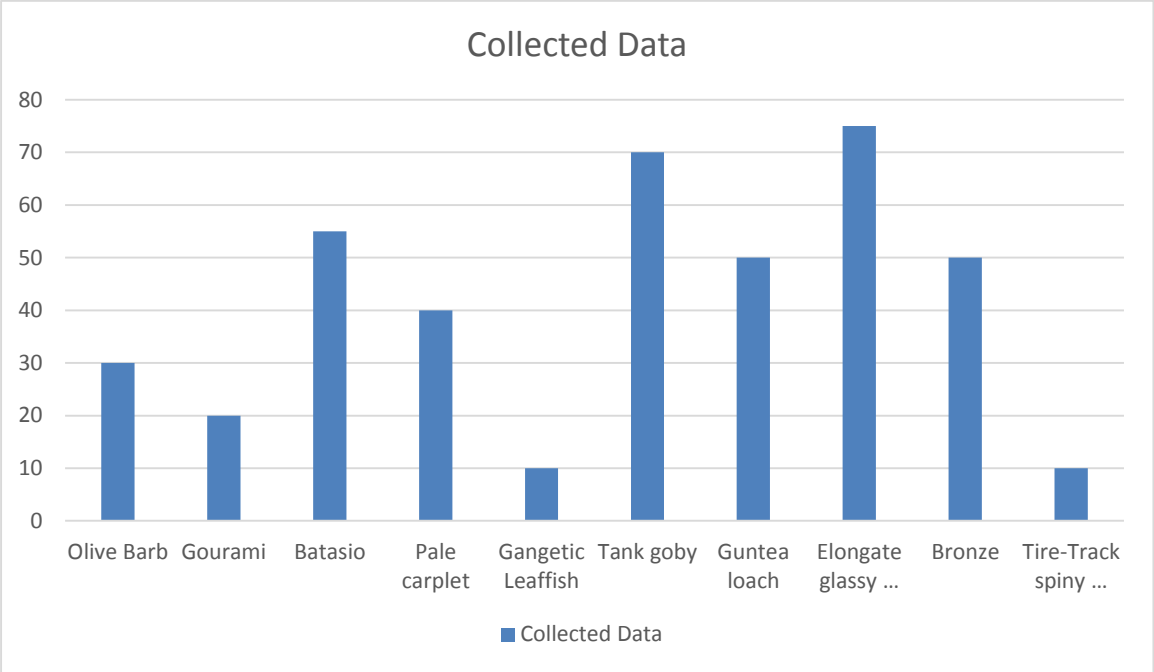


Figure 3.5: Collect data procedure

3.4 Statistical Analysis

Compared to an accepted reference standard, segmentation algorithms are typically evaluated. The cost of producing accurate reference standards for segmentation of the fish image can be significant. Because the test expenses and the likelihood of statistically significant differences in accuracy are dependent on the size and reliability of the analysis reference standard, balancing these trade-offs encourages successful exploitation of research resources.

This is done in many ways, such as: equations for regression, methods, calculations of r-squared, and study of ratios. Such approaches are intended to take statistical or numerical data in order to evaluate the association between one or more factors or to forecast the possibility of a future event occurring in similar situations again.

- **Measurable programming**
- **Econometrics**
- **Operation investigates**
- **Lattice programming**
- **Statistical visualization**
- **Statistical quality change**

Proof that the segmentation algorithm has improved precision usually involves comparisons with an accepted reference standard, such as manual segmentation experts or other imagery methods. The extraction of the function in many fish segmentation issues is a challenge. Such segmentation is difficult. The resulting mistake in comparison standards leads to mistakes on performance measures used to compare segmentation algorithms and can affect the likelihood of detecting a major algorithmic difference.

In my proposed paper I use different kinds of segmentation and I found the most accuracy of that. I found the 98% accuracy in our project. I also found some error in my project what I discussed it before.

3.5 Implementation Requirements

To carry out my plan, I had to give MATLAB assistance. MATLAB is an incredibly important requirement for upgrading my entire undertaking. MATLAB makes my job easy to do. It's the most precondition for me to do my business, making my work simpler and welcoming my client to everyone. I'm using the MATLAB 2018 adaptation here. Because it has all the overhauled offices to do the job and I used this application exceptionally well.

CHAPTER 4
EXPERIMENTAL RESULT AND DISCUSSION

4.1 Introduction

The raw picture was first gathered and captured to get the final result from different fisheries, fish markets and some mega shops. To induce the ultimate result, it was collected and captured from various ranches and shops to begin with the crude pictures. The most prepared dataset was arranged after the information was pre-processed. The ultimate results appeared as the recognized lesson at long the test image is compared to the dataset using multi-class vector machine. I use MATLAB to set up and find the results of my experiments. Because using MATLAB, getting all the result is very easy. MATLAB facilitates accurate results.

4.2 Experimental results

We can see that segmented area detection based on clustering of k-means, Otsu method, Edge Based, and Region Growing, according to visual inspection. Growing in the region yields better results than other approaches. However, the Otsu method is better than the k-means cluster, since it is used to separate the image background. We have manually extracted the ground reality using Adobe Photoshop, a tool for the image processing.

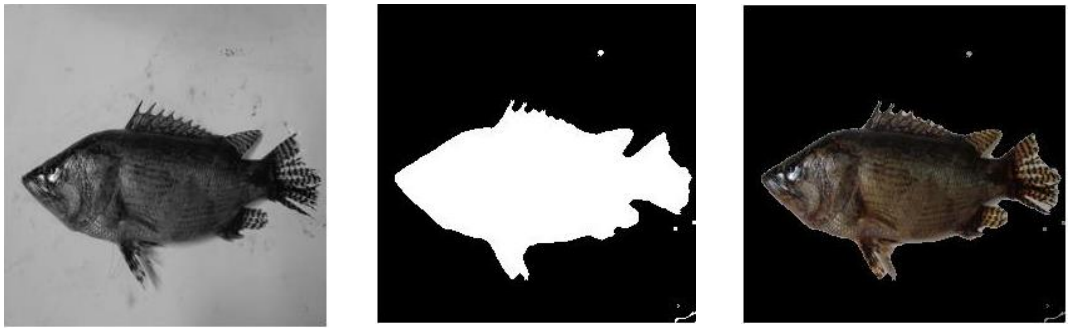
Number of pixels					
	Ground Truth	K–means clustering	Edge Detection	Otsu method	Region Growing
Figure 3.3 (o & p)	20,488	20,261	21,142	19,986	20,828
Figure 3.3 (b & c)	8,581	10,073	9,414	8,296	9,300
Figure 3.3 (m & n)	18,019	16,842	17,901	18,127	17,341

Table 4.1: Number of pixels.

Figure 4.1 to 4.4 show the process of segmentation techniques.

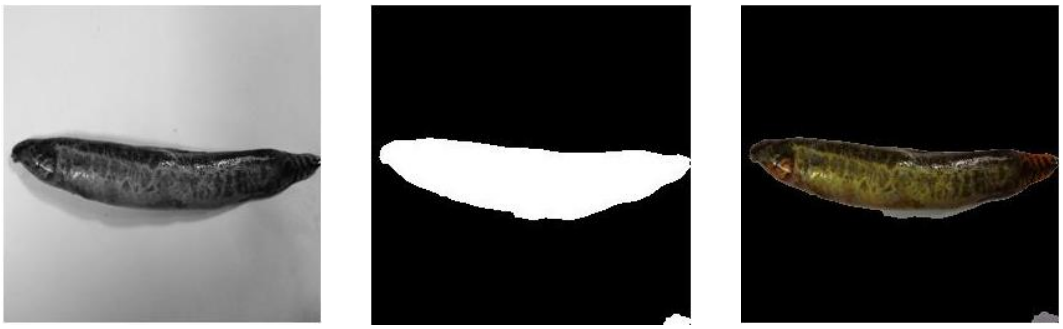
(a) (b) (c)

Figure 4.1: Experimental result based on segmentation using K-means clustering; (a) Converted gray input image; (b) Image after transforming L*a*b color space; (c) Output image with segmentation regions.



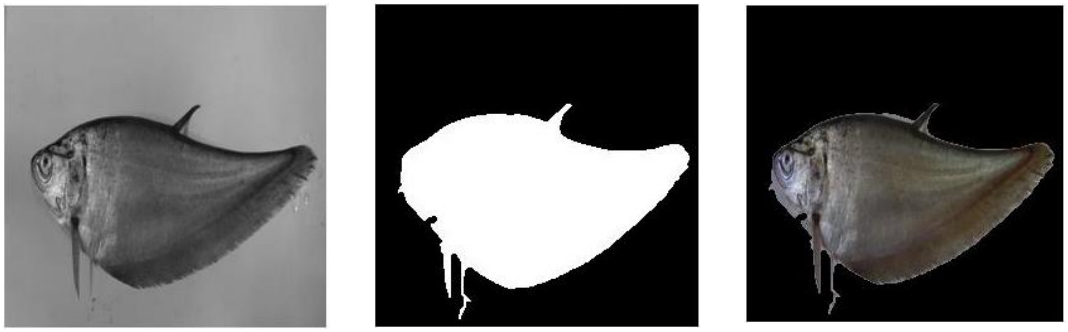
(a) (b) (c)

Figure 4.2: Experimental result based on segmentation using Edge Detection method; (a) Converted gray input image; (b) Image after using Edge Detection method; (c) Output image with segmentation regions.



(a) (b) (c)

Figure 4.3: Experimental result based on segmentation using Otsu method for thresholding; (a) Converted gray input image; (b) Image after using Otsu thresholding method; (c) Output image with segmentation regions.



(a) (b) (c)

Figure 4.4: Experimental result based on segmentation using Region Growing method; (a) Converted gray input image; (b) Image after using Region Growing method; (c) Output image with segmentation regions.

Some image where applies all segmentation techniques. There is a sample input image and all segmented regions left to right. Figure 3.5 shows the expected output below:

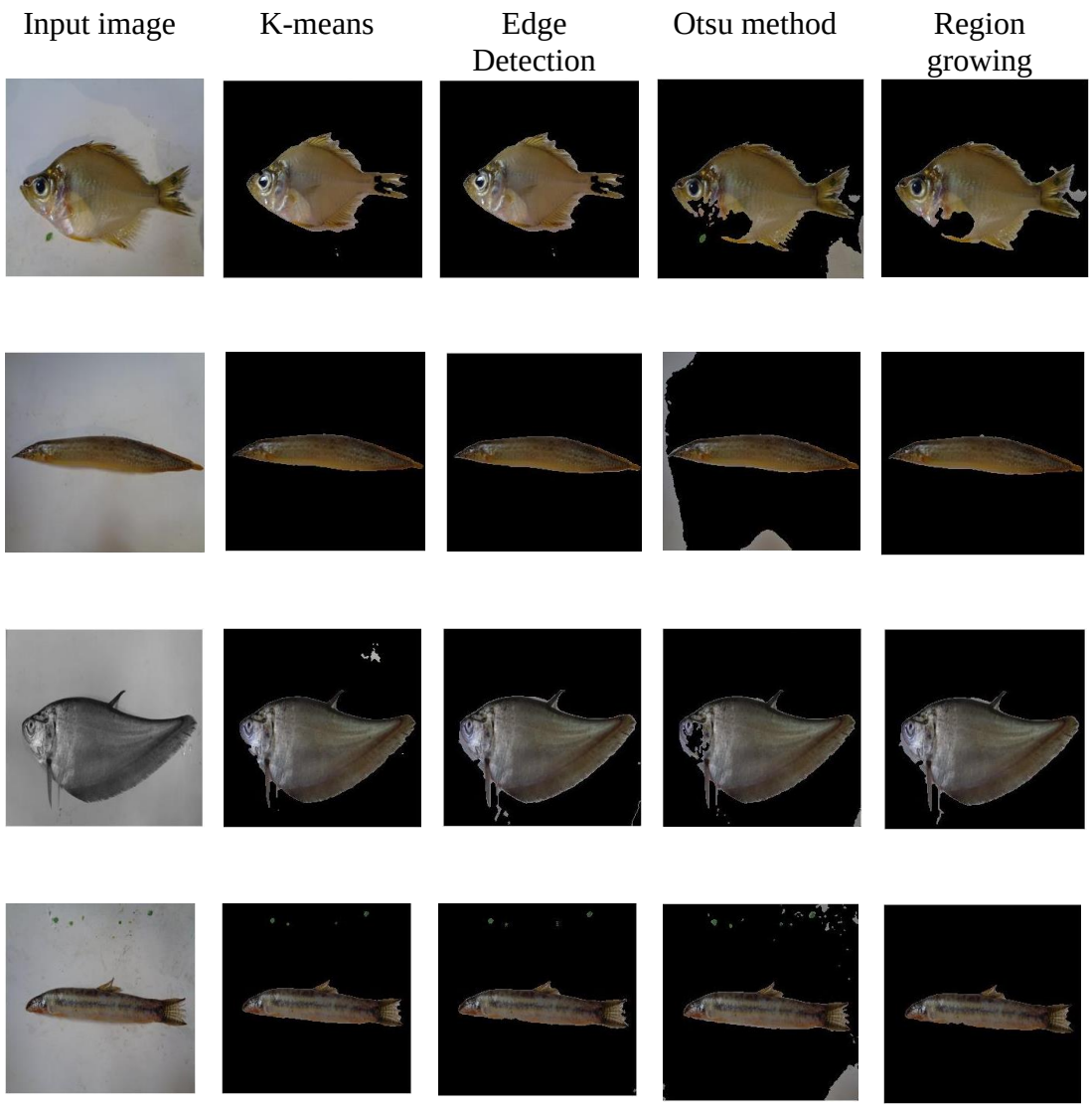


Figure 4.5: Experimental result based on segmentation using K-means clustering, Edge Detection, Otsu method for thresholding, Region Growing method.

4.3 Descriptive Analysis

To encourage the correct execution of my entire exploration requirements, I thought to start with planning the shape details of distinctive nearby natural products. Since my goal is to identify the shape to distinguish shape of various kinds of natural products. I orchestrated 10 local fishes in the neighborhood). I captured parts of pictures for my test (about 50 pictures per fish), but I used 10 pictures for the comfort of my test. I sectioned those pictures at that point using distinctive segmentation kinds.

Here I use four different segmentation techniques to segment the local fishes. I also use methods of noise remove, filtering, boundary closed to extract dataset characteristics.

Finally, the segment of local fish anticipated will be printed on the screen. After that the final segment image appeared.

4.3 Summary

Fisheries plays a major role in earning water, health, employment and exports from Bangladesh. Approximately 5 percent of the country's total manufacturing obtained from this industry and around 14 million people are constantly engaged in fishing. When our fisherman goes fishing often, it's a matter of sorrow that most fishermen don't know the name of their local fish. We don't know the fish's real name.

I will inform the actual name of different types of fish in my project segmentation. By applying this proposed method, different fish identification is well recognized and can also be implemented to define other types of fish that will surely bring a tremendous change to our agricultural sector.

CHAPTER 5
SUMMARY, CONCLUSION, RECOMMENDATION AND IMPLICATION FOR FUTURE RESEARCH

5.1 Summary of the Study

I have collected numerous nearby natural products from various locations in this inquiry. The natural products of the neighborhood are captured at that point and the pictures captured prepared for preprocessing. The images are shifted in pre-processing. In addition, the strategy of expulsion from clamor is connected here. I used distinctive sorts of division such as k-means clustering, Otsu thresholding, Histogram based, and Region growing after wrapping up pre-processing arrangement. I've done all the MATLAB division. And using those divisions our last aim is to classify the form of nearby natural products so that those species can be easily recognized. Everyone can easily detect and recognize the different types of fish using my project by first detecting their shape.

5.2 Conclusions

In this paper, I present a methodology based on a combination of K-means clustering, Otsu thresholding, Histogram based, Region growing. Of experimental purposes, 500 hundred fish pictures families were regraded, from which only 10 fish pictures are picked. I concentrate my work on segmenting and defining virtual image-based intensity pixels of local fish. In this research, local fish are segmented by image processing methods that can be used to segment any fish that can open a door to support fishermen, people and children throughout different applications. Although there were some obstacles when working, the background color and poor quality of the image that distract the application in order to produce more results.

The whole process is conducted with 98 percent accuracy using pictures taken from different angles of fish.

5.3 Recommendation

A few natural product identification techniques were created based on the properties of color and shape. Nevertheless, distinguishing natural product images may have equivalent or identical values of color and shape. Subsequently, using color highlights and shape highlights analysis strategies are not yet robust and effective enough to identify and recognize natural product pictures, an unused natural product recognition system has been suggested, incorporating three highlights examination strategies: color dependent, grayscale, size based in order to extend acknowledgment precision. By using the closest neighbor classification, the proposed strategy classifies and recognizes natural product images based on obtained highlight values. Our system then appears to the consumer as the natural product name and a brief description. The proposed model inquiry for the classification of natural product classifies and efficiently identifies up to 90 percent of the accuracy of natural products. In a variety of areas such as teaching, picture recovery and manor science, this system often acts as a valuable tool.

5.5 Implication for Further Study

To make our life less challenging, we are constantly becoming exceptionally subordinate to the advances of the present day, where in our country, the division of horticulture is far from using these advances, which can be a matter of flourishing at a significant rate. The suggested model tends to be a better approach to the machine learning technique that can classify and recognize the distinctive forms of natural products. To efficiently hit the root level ranchers, this method can be adapted into any form of portable software or web-based application. Ranchers directly send the captured picture from the arrival and get the yield on their hand in a moment when the title of their natural products appears so that they can choose at the moment what the genuine title of that particular natural product is. They were in need of a framework like this from the exceptionally early period of time to anticipate colossal misfortune of their benefit. In this investigation, we made a reasonable accomplishment from our thinking and exertion that can be linked to our agrarian innovations in order to urge an extraordinary execution of the generation framework and thus create a large sum of profit.

REFERENCES

1. Nobuyuki Otsu, "A Threshold Selection Method from Gray-Level Histograms,".
2. Chuang, M.-C., Hwang, J.-N., Williams, K., Towler, R, "Automatic fish segmentation via double local thresholding for trawl-based underwater camera systems," 2011 18th IEEE International Conference on Image Processing (ICIP), pp. 3145–3148. IEEE (2011).
3. Hong Yao, Qingling Duan, Daoliang Li, Jianping Wang, "An improved K-means clustering algorithm for fish image segmentation," Mathematical and Computer Modelling (2013).
4. Xueyan Sun, "Study of content-based image retrieval algorithm," Beijing, China Agriculture University, 2005.
5. Zhicun Tan, Ruihua Lu, "Application of improved genetic K-means clustering algorithm in image segmentation," Proceedings of the 1st International Workshop on Education Technology and Computer Science, ETCS 2009.
6. Cor J. Veenman, Marcel J.T. Reinders, Eric Backer, "A cellular coevolutionary algorithm for image segmentation," IEEE Transactions on Image Processing 12 (3) (2003) 304–316.
7. H.P. Ng, "Medical image segmentation using K-means clustering and improved watershed algorithm," Proceedings of the IEEE Southwest Symposium on Image Analysis and Interpretation, 2006.
8. W. X. Kang, Q. Q. Yang, R. R. Liang, "The Comparative Research on Image Segmentation Algorithms," IEEE Conference on ETCS, pp. 703-707, 2009.
9. Tara Saikumar, P. Yugander, P. S. Murthy, and B. Smitha, Member, IACSIT, "Image Segmentation Algorithm Using Watershed Transform and Fuzzy C-Means Clustering on Level Set Method," International Journal of Computer Theory and Engineering, Vol. 5, No. 2, April 2013.
10. Stan Sclaroff, Member, IEEE, and Lifeng Liu, "Deformable Shape Dtection and Description via Model – Based Region Grouping," IEEE TRANSECTION ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE, VOL. 23, NO. 5, MAY 2001 475.

11. Mohammad Naved Qureshi, Mohd Vasim Ahamad, “An Improved Method for Image Segmentation Using K-Means Clustering with Neutrosophic Logic,” International Conference on Computational Intelligence and Data Science (ICCIDS 2018).
12. Shiv Ram Dubey and Anand Singh Jalal, “Adapted Approach for Fruit Disease Identification using Images,” International Journal of Computer Vision and Image Processing, vol. 5, 2012.
13. Image segmentation, available in <<https://en.wikipedia.org/wiki/Image_segmentation>>, I last accessed in 04-11-2019, 05:16pm.

Appendices

Appendix A: Research Reflection

The aim of this appendix is to provide an introduction to Research Refection. The group's study project was a demanding and fun experience representative of the entire course. At university, we had little exposer to group work. As a result, being part of an efficient and vibrant team was a good change the experience taught us that planning and developing team reactions takes longer. We were instructed by the encounter that arranging and reacting in groups takes longer than your claim. Eventually, the great effort was needed. We also build and refine each other's thoughts in our meeting. We had to go to the villages and ranches to take photos that were exceptionally difficult for us.

Appendix B: Related Issues

Pictures from this kind of city area like Dhaka have been very difficult to collect. To capture the pictures of local fish, we had to go to villages and markets. For a while, we had to speak to the fishermen to let them know the study's issue and purpose. They were very willing to support us. We had to study a lot of new techniques, features and algorithms to carry out our ideas and research work. It was difficult to change the background of the image and the quality of the image and the result changes were reduced. In order to update our thoughts and inquire about work, we had to memorize many modern calculations and procedures. Various foundations of the pictures and the quality of the images have been difficult to adapt and reduce changes hereby.

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