# Prawns Identification Based on Edge detection and Feature Vectors

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***Abstract:*** **Prawns identification is one of major task in Indian fisheries. In this paper we developed algorithm for prawns identification based on edge detection and feature vectors. By edge detection method and boundary connection we extracted prawn object form background. After extraction of object form background object and divided into eight different regions where the majority of information is available for identification of prawn. For eight areas we applied discrete wavelet transform and extracted feature by considering high-high Sub bands where the edge feature exists. All eight features are combined and formed as feature vector. Finally minimum distance is calculated between for obtained feature vector and database feature vectors. Minimum distance is considered as identified prawn. We conducted experiment of thousand prawns and got 80% accuracy.**

***Keywords—Image segmentation, Edge detection, Canny, Image strengthen, Noise removal, Image gradient, neural networks, fuzzy logic, Membership values.***

## I. INTRODUCTION

Prawns are generally found in this marine. Typically these people live up to degree associated with 50 yards and also usually found in rugged substrate, as well as within the dirt as well as stone crevices. Prawns are generally found in all international locations and also nearly all this cuisines on the planet lots of prawn's dishes. There are a couple form of prawns. Small types and also bigger types that happen to be known as wagering action Prawns. Prawns are not just quite scrumptious to eat however have become nutritious to eat also. These are containing more quite containing more healthy proteins nevertheless minimal about extra fat and also energy. The idea can make all of them ideal foods for many who desire to slim down. Even though Prawns are elevated in Cholesterol but they are elevated in good cholesterol and reduce the bad cholesterol. A normal size prawn contains about 2 grams associated with Fat, 30 grams associated with proteins and about 125 mg associated with minerals. This ideal mixture of fats and proteins help it become very beneficial for this human health. Prawns are also very easy to cook plus they don't take much fat or spices to make meals them.

Prawns identification is one of the major tasks for food making persons. For this purpose prawns identification is complex task in computer vision. For identification and recognition image segmentation is first step. For prawns segmentation we used edge detection and boundary extraction. Since major features of prawn is at edges only. Many edge detection method are already in use [1][2][3][4][5][6] particularly in this method initially for prawn object extraction from foreground we adapted edge detection ,edge linking and object extraction. Many methods are implemented for object feature estimation [7][8] and forming feature vector like statistical features, histogram, color, texture. In this paper we used Discrete Wavelet Transform (DWT) based feature extraction for identification.

## II. PRAWN IDENTIFICATION PROCESS

Prawn identification method is shown in figure.1. Initially prawn image is taken form camera and then captured image converted gray scale. By edge detection, linking and boundary extraction object is extracted from fore ground of converted gray scale image. Then the extracted object is divided into eight reasonable regions of equal size blocks and DWT is applied. For all the regions HH sub bands are considered as feature vectors and form as single vector. Similarly feature vectors are calculated for all different types of prawns in data base and saved as dataset. For present prawn and saved prawns feature vectors minimum distance is calculated. Minimum distance image is identified image. Developed algorithm is shown in below figure.2

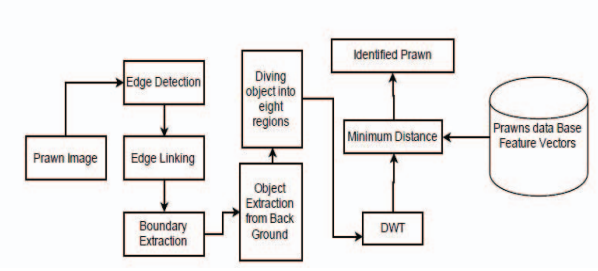


Fig. 1. Developed prawn identification system

*A. Prawn Image:*

It is the first block of prawn identification system. By taking prawn image as an input, the complete identification process was initiated.

*B. Edge Detection:*

Edges of input prawn was identified by Edge Detection methods. There are many edge detection methods are available; by making comparative study of edge detection methods the suitable edge detection method was chosen, with these identified edges only it is possible to frame structures of the prawn.

*C. Edge Linking:*

If Edges are extracted by using edge detection methods than some edges may be very thin than by using edge linking process we increase the intensities of the edges.

*D. Boundary extraction:*

For a given input prawn there will be number of edges found either internal or external parts of an image, we need to extract only the boundary of an image.

*E. Object extraction:*

Foreground or back ground of an image but not the parts of prawn body, than we are extracting only foreground image

*F. Object division:*

Extracted image than divided into eight equal blocks by using block divisions based on the rows and columns coordinates. These blocks are used for comparison purpose.

## III. IMPLEMENTATION PROCESS

The below algorithm describes the process of identification and extractions of a given prawn.

**Algorithm**

1) I=Input Image
2) I=f(x,y)
3) I=RGB2Gray(I)
4) I=Edgedetection(I)
5) I=Edgelinking(I)
6) I=Boundary Extraction(I)
7) I=object identification=[$I_1$,$I_2$]
8) Divide the image into eight regions IA1=[$I_{11}$, $I_{12}$, $I_{13}$, $I_{14}$,--$I_{18}$]
9) Apply DWT to all ROIs
10) F=[f1,f2,f3,f4,f5,f6,f7,f8]

Fig. 2. Algorithm for Prawns identification.

Step1: Taking an input image as prawn which is a captured image, and assign it to I for next process.

Step2: The size of input image is calculated in terms of rows and columns as x coordinate and y coordinate.

Step3: Let convert the given image into grayscale image by using the RGB2Gray method and store the resultant gray scale image into I.

Step4: For the converted grayscale image find the edges of the prawn by using any edge detection method; in this paper we are using canny edge detection method.

Step5: Fill the gaps in between the edges for extracting the foreground image by using edge linking method.

Step6: For the given image only prawn can be extracted by using boundary extractions.

Step7: Object can be extracted based on the boundary extraction and compared it with original image.

Step8: Than that extracted object can be divided into eight regions by specifying the x and y coordinators and naming as I1,I2,……..I8.

Step9: By applying Discrete Wavelet Transformation, finding the region of interest for each regions of the extracted object.

Step10: Finally all individual regions are extracted and compared with the given input Prawn.

Specified features are stored in the database for training sets. By using neuro-fuzzy system the given input prawn image was trained with the features available in the database. Based on the training and comparisons of features we can specify the category of the prawns.

## IV. SIMULATION RESULTS

For experimental verification we used 1000 images of different categories Penaeus indicus (Indian Prawn), Penaeus mergniensis (banana prawn), Penaeus monodon (the giant tiger prawn), Metapenaeus dobsoni (Yellow prawn) Penaeus semisulcatus (green tiger prawn).

The below figure shows input prawn image which can used for object extraction. It can done by finding the image size using x and y coordinators with the help of rectangular box. The object in the image is identified by indicating rectangular box. This identified object is extracted and shown in below figure 4.

Fig: 3. Input Prawn Image

Fig 4: Object (Prawn) extracted from Image

For each category image we tested with database and got accuracy results as shown in figure.5 below.

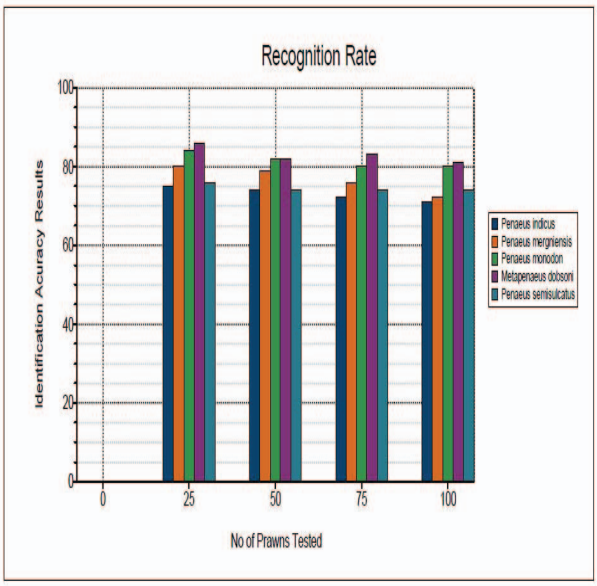


Fig. 5. Prawns identification rate of different categories

On average by this method we got accuracy around 85%. Mismatching rate is 15% for machine learning application 98% required. By this algorithm with the improvement of feature extraction is possible to attain the (8% accuracy).

Table1 gives the differentiation between different category prawns with accurate results. For testing we used five different category of prawns those are Penaeus indicus, Penaeus mergniensis, Penaeus monodon, Metapenae usdobsoni, Peanaeus semisulcatus.

TABLE.1 ACCURACY RESULTS

| No of Prawns tested | Different Prawns (Identification Accuracy results %) | | | | |
|---|---|---|---|---|---|
| | Penaeus indicus | Penaeus mergniensis | Penaeus monodon | Metapenae us dobsoni | Penaeus semisulcatus |
| 25 | 79 | 80 | 83 | 89 | 76 |
| 50 | 75 | 76 | 80 | 83 | 74 |
| 75 | 74 | 74 | 76 | 82 | 72 |
| 100 | 73 | 72 | 74 | 81 | 71 |

## V. CONCLUSION AND FUTURE WORK

In this paper a novel algorithm for identification of different category of images is designed. By this method we got average accuracy is 85% with 1000 prawns test results. This method is purely based feature vectors only with the use of DWT sub bands. By better feature extraction we can improve the accuracy rate. Algorithm implemented can be extended for more categories also.


## ACKNOWLEDGMENT

Authors would like to thank DBT, New Delhi for sanctioning the Project. Currently this work is carried out under DBT Project.


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