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Image Clustering using K-Means on Marine Products

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Abstract: ***In this study, the researcher collected 360 marine product images consist of red snapper, prawn, silver belly, pomfret, mackerel, cuttle fish, lobster, crab and sardine to conduct try-outs at first. Secondly, images are separated from background for processing. Then from the images features are extracted via Gray Level Concurrence Matrix. Finally images are clustered according to its groupings by K-Means clustering algorithm. Since marine products are consumed by most of populaces regularly because of its health benefits, availability of nutrients and low cost. For that reason all and sundry can buying. This research helps to identify them by their physical appearances. Marine products have eye-catching altered physiognomies which are cherished to extricate and conclude a specific category. These physical appearances comprise of size, shape, texture, and color. This research succeeds 83% accuracy for bunch the images into nine clusters.***

Keywords : Image clustering, Gray Level Concurrence Matrix, K-Means

I. INTRODUCTION

In Fisheries enforcement identification is important and critical task. Today fish provides animal protein to poor people daily. In Kaniyakumari coastal are in India, most of the people consume fish as regular diet every day not only fish, other marine products also like prawn, squid and crab. So identify the marine products is most important task. Because foodstuff should be carefully added to diet.

At the outset image to be documented is cultured by using a mobile camera or a digital camera which is fed to the identification system. A complete database is assembled by packing every meticulous information of every image. Next, algorithm extracts interest point features from the images which are used for matching of the same in changed views. Identification of features consists of staged filtering methodology. The images can be categorized to their respective species based on the clustering results.

The remaining paper is assembled as follows: Section II offers the current researches conducted in this field; Section III describes the data source ; Section IV and Section V stretches the K-Means clustering for images and experimental results respectively; Section VI concludes the paper and deals the Future enhancements and Section VII gives the References.

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II. RELATED WORKS

This section analyses the existing research completed in fish image classification and clustering. Limited of them are chronicled at this juncture. Hong Yao et.al., combined K-means clustering and mathematical morphology to improve the fish image segmentation. S. Daramola et.al., [6 classified fish images hooked on dissimilar classes by features achieved from Single Value Decomposition (SVD). Training and testing of the fish classification system are done using Artificial Neural Network (ANN). In testing phase, 36 fish images were verified and 94% correct classification outcome is documented. Vaneeda Allken et.al.,[8] classified the images from the Deep Vision trawl camera using deep learning neural network and achieved classification accuracy of 94% for blue whiting, Atlantic herring, and Atlantic mackerel. Yaxin Ma et.al., [9] gained abundant accuracy as 97.19% to classify and identify the fish images by Convolutional Neural Network. Simone Marini et.al., [7] collected images more than 20,000 images at 30-min. frequency, continuously for two years, over day and night. Automated recognition and manual counts are matched extremely high. Longquing Sun et.al.,[5] proved that when working with same images execution time was 56% lesser than Kmeans ++ algorithm and 71% shorter than fuzzy clustering algorithm correspondingly. Dhruv Rathi et.al., [3] used Convolutional Neural Networks, Deep Learning and Image Processing to categorize fish species and attained 96.29% accuracy.

From the above literature survey, it is undoubtedly explaining the effectiveness of fish image clustering and classification. In the same style, real images are collected and then images are clustered. But the unique of this study is focused all marine products such as variety of fishes, crab and prawn. Data muster and the particulars of the images are expounded in next section.

III. DATA SOURCE

Totally 360 marine products images comprising of species as Red Snapper, Prawn, Silver Belly, Pomfret, Mackerel, Cuttle Fish, Lobster, Crab and Sardines are collected from Pillaithoppu which is coastal area in Kanyakumari District, Tamil Nadu, India for this research to conduct experiments. In this study to conduct the experiment dataset is created. This dataset contains 360 images of nine classes.

Table 1 affords intuitions interested in the quantity of illustrations considered for respectively distinct types sheltered. Images were taken by Samsung J7 mobile Camera. Samples of collected images are as presented in Figure 1.

Table- I: The Classes of images used in the Dataset

Species No.	Name of the species	No. of images
1.	Red snapper	40
2.	Prawn	40
3.	Silver belly	40
4.	Pomfret	40
5.	Mackerel	40
6.	Cuttle fish	40
7.	Lobster	40
8.	Crab	40
9.	Sardines	40
Total		**360**

Fig. 1: Sample dataset

IV. IMAGE CLUSTERING VIA K-MEANS

The humble procedure for Marine products image clustering principally involves of four steps such as Image gathering, Image processing, Feature extraction and Clustering. Initially the images are collected and a database is generated. Gray Level Concurrence Matrix features are mined. Lastly a K-means is used to get clusters. To begin with image processing, visually scrutinized the images are used in this experiment and classified them according to their features. The marine products were patented as of the finest class. The block diagram of this research methodology is illustrated as follows in Figure 2.

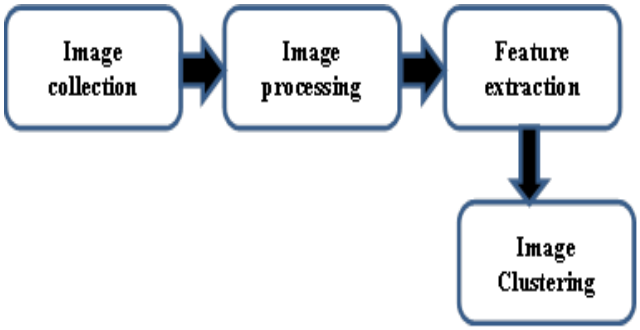

Fig. 2: Research Methodology

Images in database are resized and convert both images into Grayscale. Then the Converted Grayscale images are transformed to binary image. In binary image, count the number of pixels concealed by the images by using GLCM feature. Next, Calculate the GLCM feature of both images and find the difference in area and apply the Canny edge detection method on grayscale images. Afterward Extract the hue, saturation and intensity a from the uncropped test image. Now average of difference in GLCM feature, edge and color histogram is obtained. The above methods are repeated for all the images in the database. As a final point, K-means clustering is applied on images [1]. The steps of K-Means algorithm works is as follows:

1. Specify number of clusters K.
2. Initialize centroids by first shuffling the dataset and then randomly selecting K data points for the centroids without replacement.
3. Keep iterating until there is no change to the centroids.
4.

The above steps of K-means are executed in MATLAB and clusters are multiplied as enlightened in next section.

V. EXPERIMENTAL RESULT

In this section, results are deliberated about investigates. The database contains 360 real images. GLCM and K-means have been executed in MATLAB for real marine products images. Features such as color, shape, size and texture are extracted by GLCM and clusters of images are achieved by K-Means correspondingly. The image processing steps with an image is exposed in Figure 3, Figure 4, Figure 5 and Figure 6. The number of images are grouped by K-Means according to its clusters flawlessly is tabularized in Table 2. This method categorizes images into nine clusters in an efficient way and 83% of accuracy is reached as shown in Table 2.

Fig. 3: Original image

Fig. 4: After background removed

Fig. 4: Gray scale image

Fig. 4: Saturated image

Table- II: Experiment analysis of K-means on images

Name of the species	No. of images in Cluster	Accuracy (%)
Red snapper	37	92.5
Prawn	39	97.5
Silver belly	28	70.0
Pomfret	25	62.5
Mackerel	27	67.5
Cuttle fish	40	100
Lobster	40	100
Crab	40	100
Sardines	23	57.5
Overall Accuracy		**83%**

From the above table, to redrafting in a peapod, K-Means yields enhanced accuracy to cluster the marine products. This research conquers over its aim up to now. In next section conclusion of the research furthermore hopeful tracks for future augmentations are also pinched at the end of this article.

VI. CONCLUSION

Marine products are the embodiment food for all age group people because of its high nutritional value. It is available in all markets worldwide. Also each marine product has peculiar taste. But the selection of marine products is done very cautiously by its categories. This research pays attention on grouping them to distinguish easily. Now the times for concluding this article, in succinct, real images are collected and employed with the prominent clustering algorithm, K-means by GLCM features and executed in MATLAB and recorded the results. This research is capable of recognize the marine products and obtained 83% of accuracy. This method could not reach 100% accuracy as a number of images could not be clustered precisely because of different backgrounds. We plan to extemporize this method added by more species and more images.

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