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Identification of Quality of Louhan using Image Processing Techniques

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Abstract: *Today's one of the most profitable and popular aquaculture is ornamental aquaculture which is breeding Lou Han. This Louhan is in many types with some standards. The standard Louhan is sales at high cost with high demand. Nowadays there is various aqua farms in different countries are involved themselves in breeding them. The main problem in behind of this breeding Louhan is selecting the quality parents for raising the juveniles. We are providing the systematic solutions for this selection of the parents. The standard or quality is identified by the shape and size of the Kok, color and pearl (strains) of the Louhan. This standard has been varied with types of Louhan. We have proposed the image processing techniques for selecting the best parents for breeding in the captivity. We can also use this method for selecting the best fishes in the competition and also use as the guide for the unfamiliar person of the Louhan field.*

Keywords: *Louhan, Kok, pearl.*

I. INTRODUCTION

Nowadays the most successful ornamental aquaculture in most of the nation is breeding the Louhan. In 1993, Malaysia was found out these fishes by breeding different types of cichlids. The combination of vibrant colour and physical structure of the cichlids produce the vibrant and different body shape juvenile. It is namely called as Louhan. Later this aquaculture is spread towards the Taiwan and Thailand. This Louhan becomes very popular by their vibrant colours and kok. They are generally divided into two types namely the type Bonohead Louhan Fish and Fish Louhan types of Waterhead. From this main two types there are many types of Louhan raised namely King Kong parrots, Zhen Zhu, Golden Monkey, Kamfa, Golden Based (Faders), King Kamfa, Kamfamalau.

All the varieties of the louhan are varied upon the size of the body, kok, colors and pearl patterns. They have the standards for each breed of Louhan. When the particular species satisfies their standard rules and size, they have accepted as the quality louhan. Each breed has their own markings, kok size, pearls and body size. All these have been measured easily by using the techniques in image processing. We are having various techniques used in the image processing to measure the size of the Kok, color intensity to find the quality of the louhan. The intensity of the color has been varied depends upon the color and pearl markings of the fish. If the color is dim and pearl marking is also less, then the values get for the fish is low which shows the particular fish is not high quality breed.

II. RELATED WORK

Louhan is not look like the normal fishes. It is quite different from the other fishes in the structure. It is the man made fishes which has some quality and standards in their look. In general, the other fish does not have some special structure which is present in the louhan. The anatomy of the fish is shown in the Figure 1: Anatomy of Louhan. The fish color, pearl and markings are the special features we can see in the louhan. The Louhans special features only make their marketing is very high and popular. The special features are to be identified and calculated to find the quality of the fish.

In image processing we have known that most of the colors are depend upon the three basic colors such as red, blue and green. The combination of these three colors produces the vibrant colors such as violet, yellow, black etc [1]. Since the louhan is colorful fish we can get various colors in the image. As we have already discussed, the quality of the louhan is described by the coloration of the fish. According to the color vibration in the image we can identify the quality of the fish. This color has been processed in many ways using

image processing techniques. There is various colors may be presented in the louhan but the markings is also considered as one of the important parameters to find the quality of the fish. So we have to find out the markings from the whole various color sets.

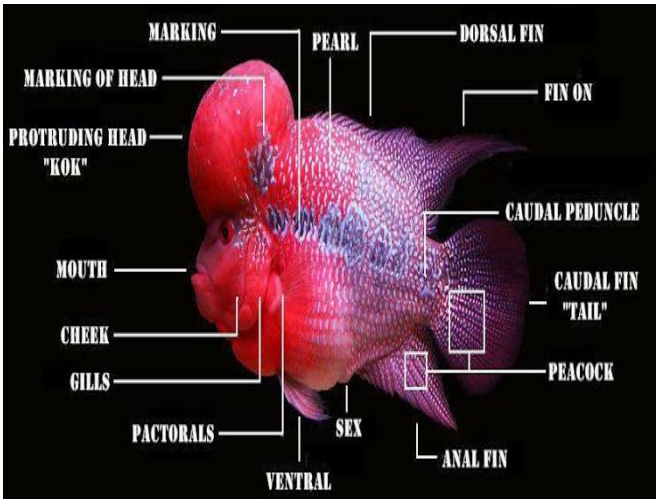

Figure 1: Anatomy of Louhan

The colors and the variations have been identified easily by the color image processing techniques. The color images must have the primary colors and the secondary colors. The primary colors of the color image are Red, Green and Blue. It consists of the secondary colors such as magenta which is produced by the combination of Red and blue, white is produced by the combination of three basic primary colors and Yellow is produced from the combination of Red and Green likewise the secondary color is produced by etc color combination. In normal, the human eyes have 6 to 7 millions of cones in it. Among them 65% cones can observed red light, 33% cones can observed green light and 2% only observed blue color light.

The cones in the eyes are used to observe the lights from the objects. By the human eyes we can observe only more red lights, then the green and blue light. Hence the human eyes cannot observe the lights correctly. The selection of the quality fishes for breeding may not correct. By the combination of the correct color parents only we can get the good quality juvenile louhan. In order to select the perfect color parents, we are in need of the system to observe correctly and qualified it. The method of selecting the best and our needed qualified color louhan is shown in the next section.

III. PROPOSED SYSTEM

In the analysis of quality of louhan we have to select the markings available in the body, colors of the fish and the pearls available in the body. The markings are considered as one of the best quality of the louhan. The marking is the dark bluish green patch in the body of the fish. Each marking has their own desired pattern. The pattern has to be taken in to account to find the quality of the fish. In the next, we have to find the colors and pearls of the fish. This has been easily determined the preprocessing of the image and their relative histograms produce the results for selecting the high quality louhan.

In the color image processing the pixel values are depends upon the color of the pixel. The color pixel value is represented as the vector. The pixel value is represented as f(x,y). The color pixel value is represented in equation (1). The color image processing is classified into full color and pseudo color image processing. In our system we use full color image processing to accept all the various colors present in the louhan images. Each pixel is represented by the triplet of 8 bits which gives the depth value of 24 bits. The basic color pixels value has consists of Red, Green and Blue.

$$c = \begin{bmatrix} C_R \\ C_G \\ C_B \end{bmatrix} = \begin{bmatrix} R \\ G \\ B \end{bmatrix} \quad (1)$$

3.1 Marking

We have designed our architecture with two phases for finding the best markings available in the body. The phases namely are Recognition Phase and Analysis Phase shown in Figure 2. In the recognition phase the image acquisition is done from the camera. The preprocessing of the image is taken and the required feature is extracted from the whole fish and compared with the available stored patterns to find the nearby marking [3]. Then the feature is classified by using the learning process. If the classified marking is different from the previous sample patterns then the marking is added as the samples for further learning process. We can use color slicing method to extract the object from the surroundings. By this we can extract our markings separately from the other parts of the body.

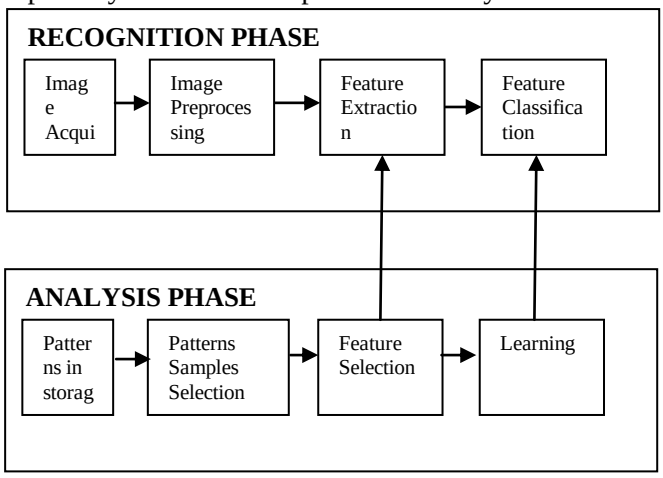

Figure 2: Phases for pattern Recognition

3.2 HSI

In our work, we are not only dealing with the primary colors but also with the secondary colors which is not clearly visible to the human eye perception. Hence we cannot continue our work simply with RGB model. So we continue our work with the HSI model to get the high resolution quality [5]. Hue, Saturation and Intensity has to be calculated to find the right values of the color of the louhan The RGB colors has to converted into HSI model with the normalized range of [0.1]. H is calculated in the equation (2) and θ is calculated which divides the primary and secondary colors using the angle in (3)[6]. The saturation and Intensity is shown in the equation (4) and (5)

$$H = \begin{cases} \theta & \text{if } B \le G \\ 360 - \theta & \text{if } B > G \end{cases} \quad (2)$$

(2)

$$= \cos^{-1}\left\{\frac{\frac{1}{2}[(R-G)+(R-B)]}{\sqrt{[(R-G)^2+(R-B)(G-B)]}}\right\} \quad (3)$$

Where,

(3)

$$S = 1 - \frac{3}{(R+G+B)}[\min(R,G,B)] \quad (4)$$

$$I = \frac{1}{3}(R+G+B) \quad (5)$$

section/sub-section) should have the first line indented about 3.6 mm (0.14").

IV. OUTPUT AND RESULT

We have considered the three fishes images as samples namely Yellow Faded, Red Texas and one poor quality louhan. The process images are shown in the Figure 2. We have converted the color images into the grayscale value and the corresponding fish images taken to do the preprocessing and taken the fish image from the surrounding[2].

Figure 3a: Gray scale converted sample1

Figure 3b: Edge Detection of sample1

In Figure3a the color image is converted into black and white in which we can easily find out the eyes of the louhan and the intensity of the color is determined. In Figure 3b the specified object is well defined by using the edge detection system. In Figure 4a the Red Texas image is converted into grayscale image. In Figure 4b the Edge detection of the image is shown to well defined the louhan image.

Figure 4a: Gray Scale converted image

In our system we have determined the HSI values of the sample 1 and sample 2 to find out the range of colors which is available in the sample1 and 2 is shown in the Table1 and Table 2. The Hue angle is varied upon the colors available in the body of the louhan. The saturation percentage is also varied as per the values of the color pixels present in the sample1 and sample2.

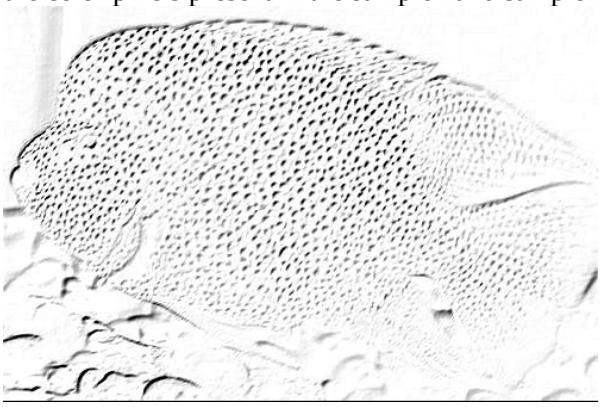

Figure 4b: Edge Detection of Sample 2

Table 1: HSI values for Sample1

RGB	Hue	Saturation	Value
020403	150	50	1.6
DA1112	360	92.2	85.5
438A35	110	61.6	54.1
939180	54	12.9	57.6
033E3C	178	95.2	24.3

Table 2: HSI values for Sample2

RGB	Hue	Saturation	Value
E71B30	354	88.3	90.6
78181A	359	80.0	47.1
A18C96	331	13.0	63.1
E35770	349	61.7	89.0
0A0A0C	240	16.7	4.7

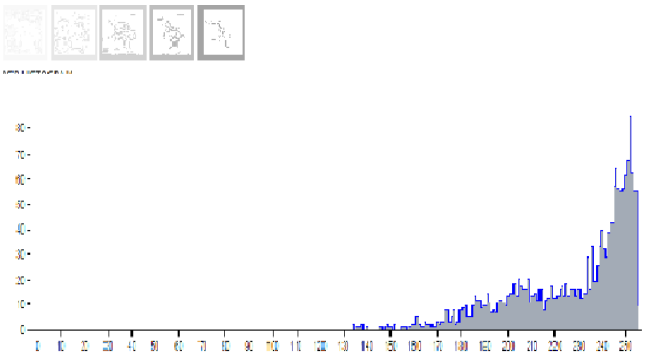

Figure 5: Results of Sample1

The results of the sample 1 are shown in the Figure 5 which shows us the variation of the colors available in the body of the louhan. We can find the various different colors in the above figure. The sample1 is one of the quality louhan which has various colors and pearls in the body which has been shown clearly in the above graph.

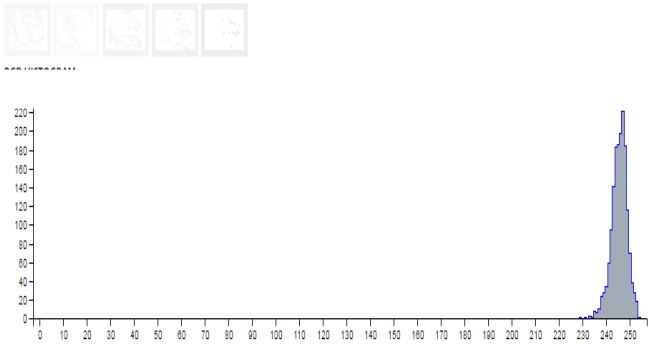

Figure 6: Results of Sample3

In the above figure we can see the difference of one of the low quality louhan and their color variation. It shows that the low color and pearls in the body of the poor quality louhan.

V. CONCLUSION AND FUTURE ENHANCEMENT

The quality of the louhan is easily determined very accurately and clearly which is having various vibrant color formations in the body and more shiny pearl markings in their body which shows their exoticness to us. In our work we have shown only finding the quality of the louhan. Likewise we can identify the types of louhans which we have told in the Section I. Along with the image processing techniques, we can add some mathematical formulas to find the types by calculating the shape and size of the kok. We can easily determine the quality of the louhans which is not visible to the naked eyes of the human beings. In this systematic approach we can easily find and get the various vibrant color juveniles by selecting the quality colorful parents. By this way our approaches and engineering gives the great development in the louhan aquaculture.

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Author's Biography

Thangamani completed her B.E., from Government College of Technology, Coimbatore, India. She completed her M.E in Computer Science and Engineering from Anna University and PhD in Information and Communication Engineering from the renowned Anna University, Chennai, India.

Dr. M. Thangamani possesses nearly 23 years of experience in research, teaching, consulting and practical application development to solve real-world business problems using analytics. Her research expertise covers Medical data mining, machine learning, cloud computing,

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Mr. K. Vinoth Raja received his M.E degree from the Anna University Chennai in 2006. He is currently working in St. Mother Theresa Engineering College, Thoothukudi, and Tamil Nadu. He is working for his Ph.D degree at Anna University, Chennai. His research interests in Bioinformatics with Big Data Mining and analysis. He is also the member of ISTE and CSI chapters of India.