# DETECTION OF FISH (sardine) DISEASES USING IMAGE PROCESSING

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## Abstract

They are Fishermen alarm for citizens that the fish of sardines It's not eggs but a parasitic disease that travels to human. In state of eating sardine infected fish .
It is caused by seawater pollution Corpses Immigration illegal Legitimacy And it must Citizens Attention , And with technology evolves was used image processing on wide Domain In the field of detection About infected diseases For human , plant and animal With the assistance of experts It was completed to provide The right treatment for those diseases. And in this system Diseases Discovery Infected with fish (sardine). The system consists of three steps: the first step is Pre-processing (gray level, threshold) Second Step Features Extraction Fish Disease Gray-level co-occurrence matrices and third step is the determination of the ratio Fish disease using percentage.

**Keywords** : pre-processing, Features Extraction using GLCM, Classification using percentage , fish diseases (sardines).

## 1. Introduction

It was used in this system image processing and to detect fish diseases (sardines). Because sardines are fatty fish. That is distinguishes its small size and many benefits health where contain a high percentage of omega-3 fatty acids fatty, which contributes to the protection of heart disease. And Sardines are a rich source of vitamin D and Calcium and phosphorus, Which counts all of them necessity Governorate on healthy structure of the bones[1]. The Sardine fish Ranging in length from 15-30 cm, Elongated shape has one tail fin and there is no side line on it and It also does not have scales on its head It lives in dense groups and feeds on plankton they migrate along the coast and lay their eggs in the spring , Then she moves her neck in a messy and random way until she's a free-swimming fish. Fish Sardine contains a high percentage of oil, And when swimming Group of sardines in the ocean Or a large tank or aquarium they appear in a harmonious and charming way. this is because the fish move simultaneously and they all appear as one piece. Sardines of fish prefers by some especially with the arrival of spring and Ready to smell the breeze for its

benefits and It causes health problems and tastes delicious, [2]But it must be taken into account that it is a type of fish that spoils quickly and should be used with caution for those with kidney disease[3],It harms the daily intake of sardines even if you only eat 150-200 grams, It is recommended not to eat more than two servings of sardines per week Because sardine fish, despite its health benefits, is rich in cholesterol too, It contains mercury, high in calories, Fish disease is very serious Because it has the ability to rapidly deploy by water , This is why it is necessary Fast and accurate diagnosis so that the disease does not spread.

## 2. LITERATURE SURVEY

In Paper [4],In this work, digital image processing was used to detect infected fish and that identifying the affected area of the fish's body In order to be treated early to prevent the spread of the disease Between fish using image processing techniques. The more illness Fish the less to produce Fish and their economic losses and Detection of fish disease manually Very difficult , and As technology evolves in this time, was used Processing images in disease detection.[5]. Using an algorithm MOBILE NET v2 Accuracy was obtained 90% And the only disadvantage.
For this algorithm It takes approximately 40 minutes [6].In this research work, image processing techniques were used, including k-mean segmentation Accuracy was obtained 89%[7]. There are many fish with disease And that's why it's necessary Diagnosis and reliance on a human expert To identify treatment that's the fish[8] . And as technology evolves, In the processing of images, neural networks and Fuzzy logic determine the rate of reduction of diseases[9].

## 3. The objective of research

The aim of the system is to distinguish between the normal area and the affected area and Determining the rate of infection Because fish disease spreads Through water so as not to cause diseases to humans and animals

## 4. Research problem

Fish disease is considered Economic losses to citizens due to illness And with the appearance of image processing Technique was used to detect the affected area of the disease In order to provide appropriate treatment.

## 5. System Architecture

### 5.1 Image Acquisition

In this research, it was used A collection of different pictures Using a digital camera with the required accuracy and . the database contains 50 images , And the following figure1 Shows a portion of the fish that has been applied in the database.

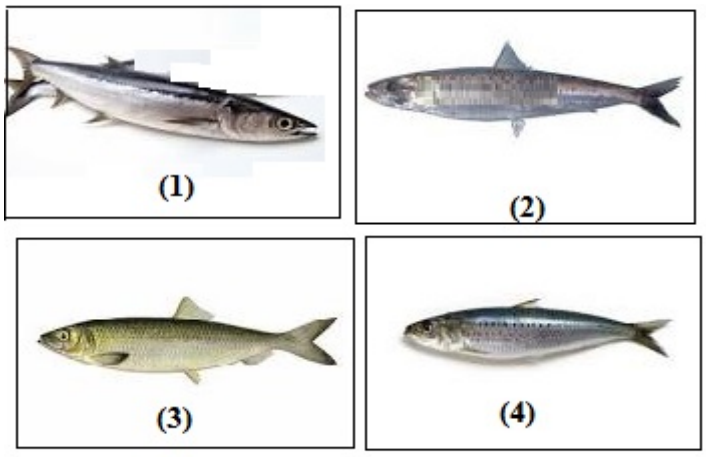


Fig 1 " FISH sardine "

## 5.2 Pre-processing

The system requires more accurate To detect sardine fish diseases overcome some major difficulties. such as Gray scale images , Threshold Filter and the following figure shows the steps pre-processing

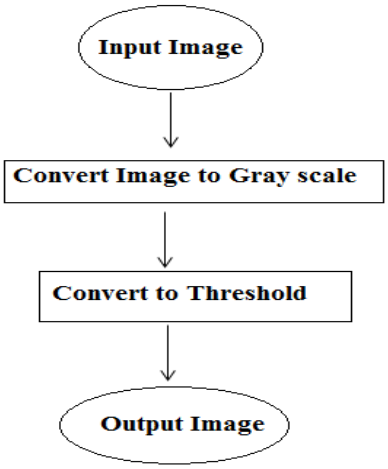


Fig 2 "step pre-processing "

### 5.2.1 Gray scale images

At this step, the coloured image of the affected skin was inserted by the scanner It will turn into a gray-level image. Each image of an infected skin will be converted into a coloured entrance Gary scale image using severity relationship as shown in eq 1.

$$I=(R+G+B) / 3 \quad (1)$$

### 5.2.2 Threshold Filter

This filter is used to convert image to black (0) and white (255).[5]

The goal is to remove unnecessary information by using specific threshold as

$$B(I,j)= \begin{cases} 255 & \text{if } I(i,j) \geq T \\ 0 & \text{if } I(i,j) < T \end{cases} \quad (2)$$

I (i, j) is the gray level of the pixel and T is a specific threshold value Obtaining T automatically

1.Select a value of Threshold

2.Segment the image using the obtained T. this will create to groups of pixels. $G_1$ with all pixels with values <= T, and $G_2$ with all pixel with values >T.

3.Compute the average U1 and U2 for the two regions $G_1$ and $G_2$

4.Compute the new threshold T= 0.5 (U1+U2)

5. repeat steps 2 to 4 until the change in T is smaller than predefined value

### 5.3 Feature extraction Using Gray-level co-occurrence Matrices Algorithm .

GLCM is a statistical method of examining texture that considers the spatial relationship of pixels is the Gray Level Co-occurrence Matrix (GLCM), also known as the gray-level spatial dependence matrix. A GLCM is a matrix where the number of rows and columns is equal to the number of gray levels, G, in the image.[8]

Horlick has extracted many properties or features from GLCM. The gray Comtrex program in visual basic.net2015 creates a gray-level co-occurrence matrix (GLCM) by calculating how often a pixel with the intensity (gray-level) value $i$ occurs in a specific spatial relationship to a pixel with the value $j$ . Grey Level Cooccurence Matrix can be defined as:

$$C_{\Delta x,\ \Delta y,}(i\ ,j) = \sum_{p\ =1}^{n}\sum_{q\ =1}^{m} \begin{matrix} 1 & if\ \ I\ (p\ ,q\ ) = i\ \ and\ \ \ I\ (p\ +\Delta\ x\ ,q\ +\Delta\ y\ ) = j \\ 0 & therwise \end{matrix}$$

Where m and n are grey levels normally m=n for symmetry GLCM. The basic GLCM algorithm is as follow:

1. Count all pairs of pixels in which the first pixel has a value i, and its matching pair displaced from the first pixel by d has a value of $j$ .

2. This count is entered in the its row and column of the matrix Pd[i,j] .

3. Note that Pd[i,j] is not symmetric, since the number of pairs of pixels having gray levels[i,j]does not necessarily equal the number of pixel pairs having gray levels [j,i].

4. The elements of Pd[i, j] can be normalized by dividing each entry by the total number of pixel pairs.

5. Normalized GLCM N[i, j], defined by:

$$N\ \ [I\ \ ,J\ ] = \frac{P\ [I\ \ ,J\ ]}{\sum_{I}\sum_{J} P\ [I\ \ ,J\ ]}$$

The Following GLCM features are extracted in this research work:

- Contrast
- Correlation
- Homogeneity
- Energy

**i) Contrast**

Contrast is defined as the separation between the darkest and brightest area. It is the difference between the highest and the lowest values of a contiguous set of pixels.

$$\text{Contrast} = \sum_{i,j=0}^{n-1} p_{i,j}(i-j)^2$$

**ii) Correlation**

Correlation is a measure of gray tone linear-dependencies in the image; in particular, the direction under investigation is the same as vector displacement.

$$\text{Correlation} = \sum_{i,j=0}^{n-1} p_{i,j}\frac{(i-u)(j-u)}{\sigma^2}$$

**iii) Homogeneity**

Homogeneity gives information about how little change there is in an image. Homogeneity is defined as the quality or state of being homogeneous.

$$\text{Homogeneity} = \sum_{i,j=0}^{n-1} \frac{p_{i,j}}{1+(i-j)^2}$$

**iv) Energy**

Energy parameter is also called as Uniformity**.** Energy is a feature that measures the smoothness of the image.

$$\text{Energy} = \sum_{i,j=0}^{N-1} (P_{i,j})^2$$

**Algorithm:** For calculating GLCM measures for each pixel:

1. Read the input image.

2. Convert the data type to double and Zero pad the image

3. Extract a 3×3 window image from the input image

and compute the co-occurrence texture measure

4. Estimate the texture parameters for the obtained texture image

5. Repeat the step3 and step4 by moving the window till the end of the image

6. Display various texture parameters by normalizing them

### 5.4 Classification stage using the percentage

The After the feature extraction Stat comes the classification Stat using percentage , The area affected by the disease is collected divided by the total of a percentage to determine the percentage.

The flow chart of the system classification is shown in Figure 2.

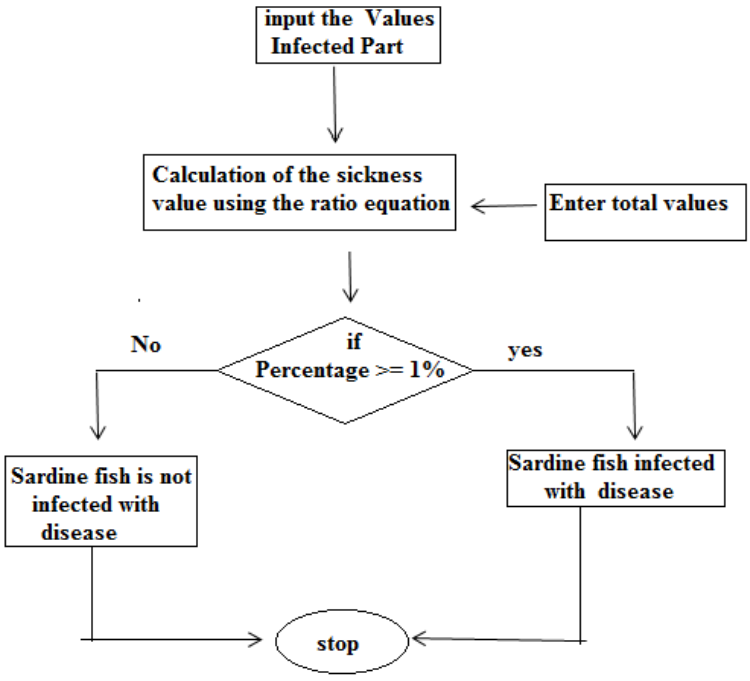


Fig 3 "flowchart of the Extract the proportion of disease infected in the fish (sardine)"

### 6.Result sickness'

The following figure shows the general interface for detecting sardine fish diseases

## Conclusion

The proposed algorithm produces good results and if the ratio is more than 1% or more, fish eating (sardine) will be dangerous for humans. And therefore algorithm is successful method for identification Percentage disease fish (sardine).

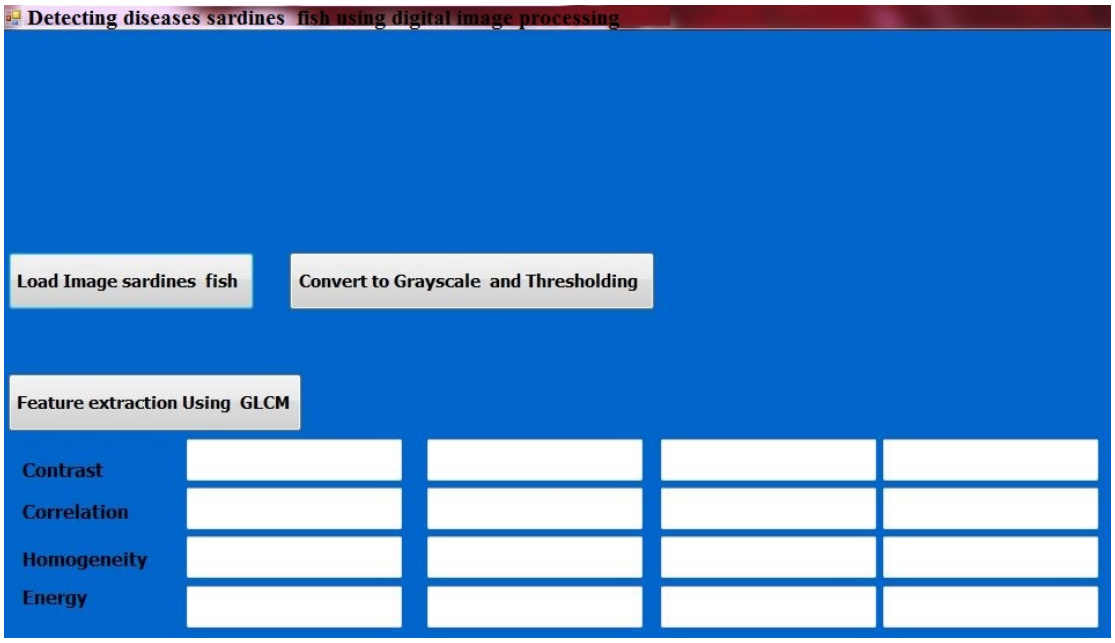


Fig 4 the general of the system

The next section Showing Image Entry

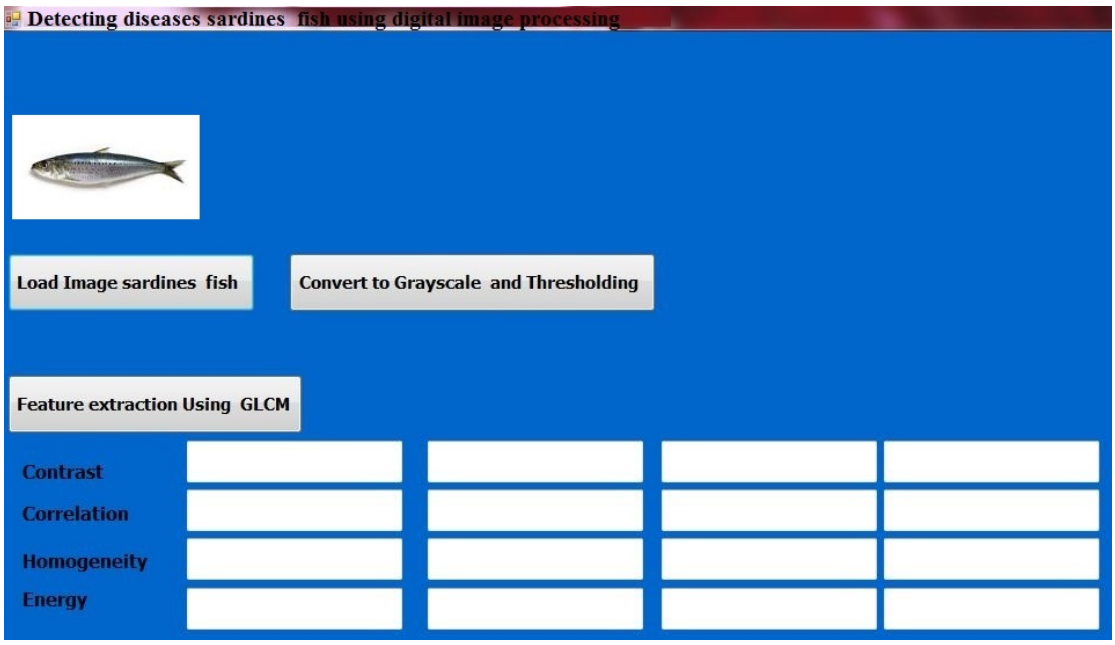


Fig 5 " Enter the fish image"

The next section Showing step pre-processing

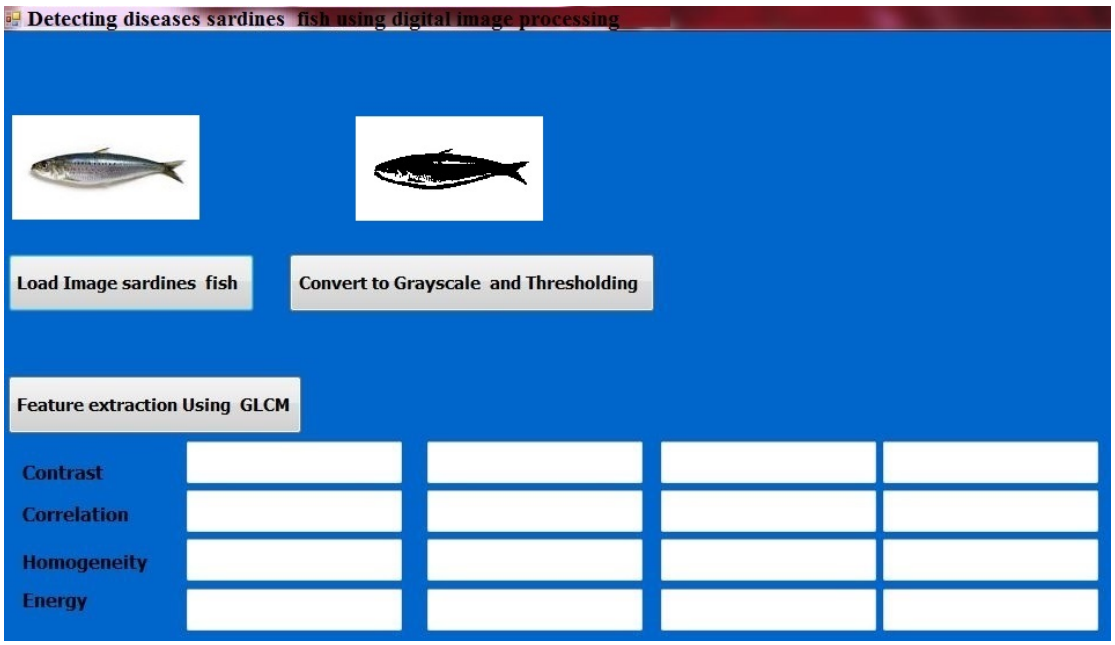


Fig 6 " convert input fish (sardine) to pre-processing"

The next section Showing step feature extraction using GLCM after pre-processing.

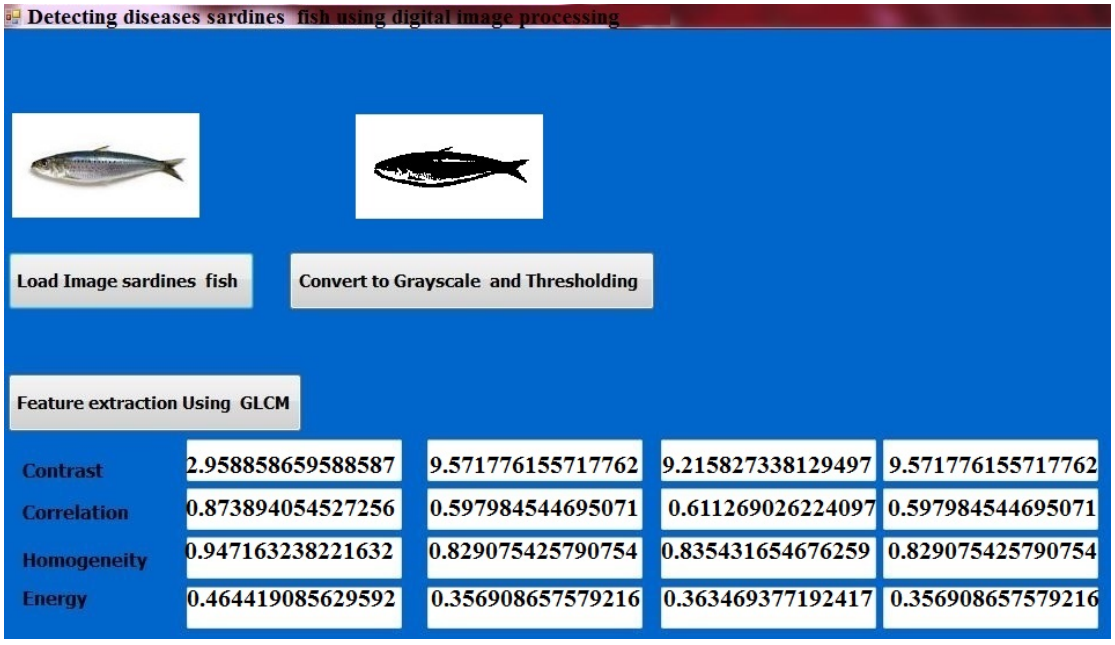

Fig 7 "convert image to feature extraction "

The next section Showing percentage disease

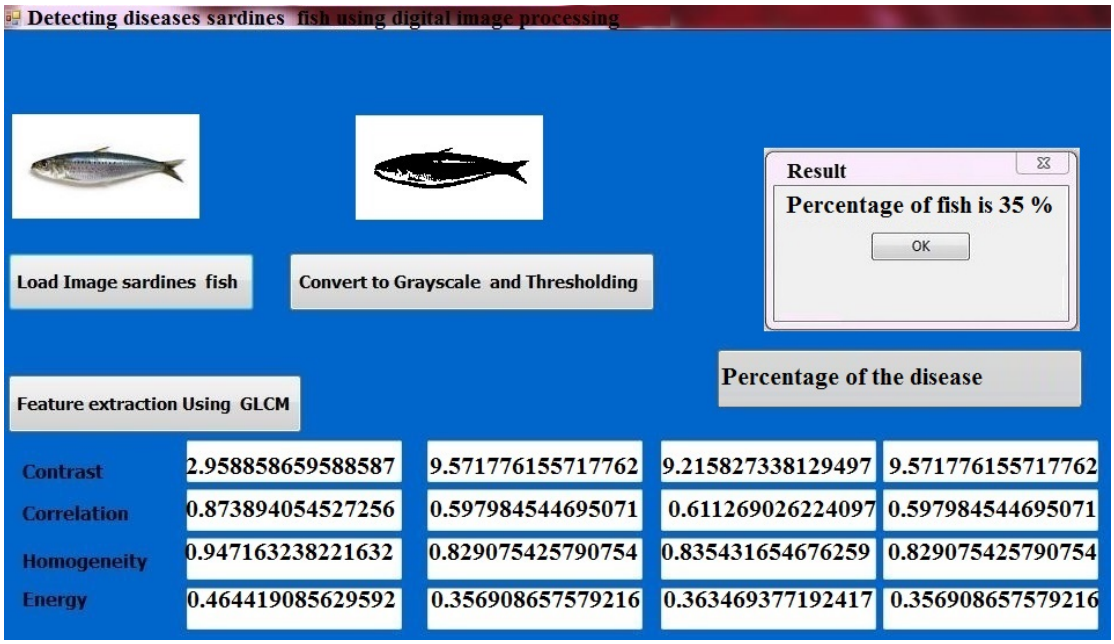


Fig 8 " Percentage disease "

**Note** : Through Percentage note that fish Not fit for lunch.

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