ISSN: 0067-2904

Classification of Iraqi Anber Rice by Using Image Processing and KNN Algorithm

Azhar S. Hassoon*, Luma F. Jalil
Department of Computer Science, Technology University, Baghdad, Iraq.

Abstract

Image classification takes a large area in computer vision in term of quality or type or data sharing and so on Iraqi Anber Rice in they need this kind of work, where few in the field of computer science that deal with the types of Iraqi Anber rice, and because of the Anber Rice are grown and produced in Iraq only, and because of the importance of rice around the world and especially in Iraq. In this paper a proposed system distinguishes between the classes of Iraqi Anber Rice that Grown in different parts of Iraq, and have their own specifications for each class by using moment invariant and KNN algorithm. Iraqi Anber Rice that is more than Fiftieth class Cultivated and irrigated in different parts of Iraq, and because of the different methods of agriculture and irrigation, they differ in their characteristics and qualities and taste, and the image shape of grains differs from one class to another one. All grain enters the image processing stage to prepare the image to the next stage. A feature extraction stage to extract seven moments for each grain and then began the classification process using an algorithm 1-nearest neighbor (KNN) and it calculates the Euclidean distance between test image and training images. After the implementation of the proposed system the result was good, where its compared test image (one image) with the training image(100 image). The success rate of the classification(83%) and after applying the confusion matrix to calculate the recall and precision. The value f recall is (84.0585) and the value of precision is (82.6358), these results for the use of nine classes of Iraqi Anber Rice.

Keywords: K-Nearest Neighbor (KNN), Euclidean distance, moment invariant, image processing.

تصنيف الرز العنبر العراقي بأستخدام المعالجة الصورية و خوارزمية أيجاد اقرب جار

أزهار سعد حسون*، لمى فائق جليل
قسم علوم الحاسوب ، الجامعة التكنلوجية ، بغداد ، العراق.

الخلاصة

ان تصنيف الصور يأخذ مساحة كبيرة في الرؤية الحاسوبية من حيث الجودة و نوع و مشاركة البيانات ، وكذلك الرز العنبرالعراقي بحاجة الى هذا النوع من التصنيف، حيث قلة في مجال الحاسوب التي تتعامل مع أنواع من الأرز العنبر العراقي، وبسبب ان الرز العنبر يزرع وينتج في العراق فقط، وبسبب أهمية الأرز في جميع أنحاء العالم، وخاصة في العراق لزم علينا تطوير هكذا اعمال خاصة ببلدنا العراق. في هذه العمل يميز النظام المقترح بين فئات الرزالعنبر العراقي التي تزرع في مناطق مختلفة من العراق، ولها مواصفاتها الخاصة لكل فئة باستخدام moment invariant و خوارزميةKNN. للرز العنبرالعراقي أكثر من خمسون صنف تزرع وتروى في مناطق مختلفة من العراق، وبسبب اختلاف أساليب الزراعة والري، فإنها تختلف في خصائصها

*Email: azharsaad90@gmail.com

صفاتها وطعمها، وشكل الحبوب يختلف من صنف الى أخر. جميع الحبوب يدخل مرحلة معالجة الصور لإعداد الصورة إلى المرحلة التالية. مرحلة استخراج الخصائص لاستخراج seven moment لكل حبة ثم تبدأعملية التصنيف باستخدام خوارزمية (KNN) وحساب المسافة الإقليدية بين صورة الاختبار والتدريب بعد تنفيذ النظام المقترح النتيجة كانت جيدة، حيث تمت مقارنة صورة اختبار (صورة واحدة) للصنف الاساسي للرز العنبر العراقي مع صورة للتدريب (100 صورة) لتسع اصناف مهجنة ومحسنة من الرز الاصلي. نسبة النجاح للتصنيف (83٪)، وبعد تطبيق confusion matrix لحساب الاسترجاع والدقة. كانت قيمة الاسترجاع هي (84،0585) وقيمة الدقة هي (82.6358)، وإن هذه النتائج طبقت على تسع فئات من الرز العنبر العراقي.

Introduction

For the headway Previously, PC technologies, advanced image transforming provisions need is progressively utilized for dissection for caliber about the nourishment material. Robotized machine based review utilizing programming framework may be more speedy, accurate, convenient, safe Furthermore non-destructive in the examination for customary techniques we camwood formed once more system on arrange those iraqe anber rice Furthermore this strategy could serve Similarly as An skeleton on create a programming framework. [1]. Rice (Oryza sativa L.) it is the The majority essential agricola grain products clinched alongside creating nations. More than 900 million people around the world's depend on rice as producers or consumers [2]. There are various methods available for classification of iraqe anber rice. This work proposed a new principal component analysis based approach for the classification of different shapes of iraqe anber rice. The experimental result shows the effectiveness of the proposed methodology for various samples of different shapes of iraqe anber rice.In this work we use k-means grouping to classification, k-means grouping is An parceling based grouping strategy for classifying/grouping things under k groups,The grouping is carried by minimizing those entirety of cash about squared distances (Euclidean distances) between things and the relating centroid. Acentroid (also known as mean vector) is "the focal point of mass of a geometric item for uniform density"[3].

K-nearest neighbor Algorithm

The nearest neighbor classification is easy and simple but is apowerful method of classification. The main idea of classification KNN is that similar things belong to similar layers.the fragile 1-NN classification rule to select agrain. such as the introduction of x-pattern to a class of nearest neighbors, this idea can be expanded(1 to k) to become KNN entry form with x being assigned to the class,which represents a majority of the KNN (Kim &Han 1995).This algorithm randomly selects a K number of objects, each of which initially represents a cluster mean or center. For every of the remaining objects, an object is assigned to the cluster to which it is most similar, depend on the distance between the object and group mean. Then it computes new mean for each group. This process iterates until those paradigm capacity converges [4, 5]. One of the key drawbacks of the KNN classification is needed for the whole available data, and this leads to high cost whether the data set large training.When using more than one neighbor for the classification of each neighbor giving the same to contribute to decsition-making consequently can be correlated between the classes with the largest possible number of neighbor in the KNN group."distance" detween two objects is taken as euclidean distance between them. To calculate this distance, every object must be represented by an apposition vector in multidimensional characteristic space [5]. The distance between two points in the plane with coordinates (x, y) and (a, b) is given by equation (1):

$$\text{dist}((x,y)(a,b)=\sqrt{(x-a)^2+(y-b)^2} \quad (1)$$

- An object is the neighbour of the another object if the distance between them below a predefined threshould .
- The nearest neighbour of an object x is the sample object whose distance to x is lowest among all input samples.
- The 2^{nd} nearest neighbour of an object x is the sample object whose distance to x is the 2^{nd} lowest among all input samples. the north nearest neighbor is defined analogously [6].

K nearest neighbors of an object are the collection of sample objects *xi* where i=(1,2,…….k) and *xi* is the nearest neighbour of x [4].

Image processing method

Image processing that used to improve and prepare the image for being understood and analyzed by the next stage of the system. Image processing includes the set of processes which serialy are (grayscale process ,image enhancement , binarization process and edge detection) [7].

Related works

1. **In 2008 , Bhavesh B. Prajapati , Sachin Patel,** Propose algorithm for quality analysis of Indian Basmati Rice using image processing techniques. With the help of this algorithm, they discuss the different parameters used for analysis of rice grains and how algorithm can be used to measure and compare them with accepted standards. The algorithm takes an image as input with proper size and resolution, calculate parameters like length, width, and chalkiness. Based on these parameters it measure length to width ratio, percentage chalky rice grains, percentage damaged/discoloured rice grains and percentage broken/fragmented rice grains. At last it compares the quality for standard, checks if the caliber is satisfactory or not Also generates nitty gritty report card [1].
2. **In 2014 Veena.H and Latharani T.R** displays a programmed assessment strategy to determination about caliber from claiming processed rice . Around the milled rice samples the quality of broken rice kernels are determined with the help of shape descriptors and geometric features. Grains need aid said on a chance to be broken kernels whose lengths would 75% of the grain size. This method gives good results in evaluation of rice quality. proposed system contain image of mixed rice samples as input and Morphological image broken rice image as output and then Extract morphological features by image processing and Calculation of pre-processing data of known samples, data of test samples.If the length of the rice kernel is less than 75% then it is treated as broken rice [6].
3. **In 2015, W. Tahir, N. Hussin, Z. Htike and W. Y. Naing** ,preposed a system for grading Malaysia's type of rice using image processing method based on several features which is length, colour and shape. There are several method used in this project, First classification used naïve baize to classify the class of the rice based on the parameter. The Naïve baize method is used to classify the length, color and shape. The program is the supervised learning based where we need to train the system to identify the image. 60 image of rice from each class are used to train the image so that the system can recognize every pattern of each class based on the previous features [7].

Feature Extraction

Done distinguishment for Questions What's more characters, in any case of their position, measure What's more introduction Similarly as illustrated the ticket from claiming utilizing minutes to shape distinguishment picked up an unmistakable quality The point when Hu (1962), inferred An set for invariants utilizing mathematical invariants. Two-dimensional minutes of a digitally sampled M ×M picture that need gray capacity [8]. *f (x, y), (x, y* = 0, . . . *M* –1*)* is given as:-

$$m_{pq} = \sum_{x=0}^{x=M-1} \sum_{y=0}^{y=M-1} (x)^p \cdot (y)^q f(x, y) \quad p, q = 0, 1, 2, 3 \cdots . \tag{2}$$

The moments *f (x, y)* translated Eventually Tom's perusing a add up (a, b), need aid characterized as:-.

$$\mu_{pq} = \sum_{x} \sum_{y} (x + a)^p \cdot (y + b)^q f(x, y). \tag{3}$$

Along these lines those national moments m_{pq} alternately μ_{pq} might make registered from (2) once substituting $a = -x$ and $b = -\bar{y}$ as:-

$$\bar{x} = \frac{m_{10}}{m_{00}} \quad \text{and} \quad \bar{y} = \frac{m_{01}}{m_{00}} \tag{4}$$

$$\mu_{pq} = \sum_{x} \sum_{y} (x - \bar{x})^p \cdot (y - \bar{y})^q f(x, y).$$

At a scaling normalization may be connected those central moments transform as:-.

$$\eta_{pq} = \mu_{pq}/\mu_{00}^{\gamma}, \quad \gamma = [(p+q)/2] + 1 \tag{5}$$

Done particular, Hu (1962), characterizes seven values, registered by normalizing national moment through request three, that need aid invariant will article scale, position, and orientation. As far as the central moments [8], the seven moments need aid provided for as:-.

$$\begin{aligned}
M_1 &= (\eta_{20} + \eta_{02}),\\
M_2 &= (\eta_{20} - \eta_{02})^2 + 4\eta_{11}^2,\\
M_3 &= (\eta_{30} - 3\eta_{12})^2 + (3\eta_{21} - \eta_{03})^2,\\
M_4 &= (\eta_{30} + \eta_{12})^2 + (\eta_{21} + \eta_{03})^2,\\
M_5 &= (\eta_{30} - 3\eta_{12})(\eta_{30} + \eta_{12})[(\eta_{30} + \eta_{12})^2 - 3(\eta_{21} + \eta_{03})^2]\\
&\quad + (3\eta_{21} - \eta_{03})(\eta_{21} + \eta_{03})[3(\eta_{30} + \eta_{12})^2 - (\eta_{21} + \eta_{03})^2],\\
M_6 &= (\eta_{20} - \eta_{02})[(\eta_{30} + \eta_{12})^2 - (\eta_{21} + \eta_{03})^2]\\
&\quad + 4\eta_{11}(\eta_{30} + \eta_{12})(\eta_{21} + \eta_{03}),\\
M_7 &= (3\eta_{21} - \eta_{03})(\eta_{30} + \eta_{12})[(\eta_{30} + \eta_{12})^2 - 3(\eta_{21} + \eta_{03})^2]\\
&\quad - (\eta_{30} + 3\eta_{12})(\eta_{21} + \eta_{03})[3(\eta_{30} + \eta_{12})^2 - (\eta_{21} + \eta_{03})^2].
\end{aligned}$$

Data set

The data set is used in this paper are 100 images of rice grains from 10 types of iraqe anber rice. there are various types of iraqe anber rice more than 50 class, some of them are shown in Table-1 [2]

Table 1- Some varieties of improved rice in Iraq

class	The rate of plant height /cm	existence of vessels in the grain	Grains colors After crunches	Grains colors After Rigorism	Plant age of Agriculture until the maturity of the grain completely
Anbar33	Tall 150-100	Not found	White yellowish	White	140-130 days Grown in June
IR22	Short 85	Not found	White yellowish with little transpareny	White more transparency	130 days Grown from 1-10 June
IR8	Short 65	There short& clear vessels in grain	Yellow light	White	135-130 day Grown from 1-10 march
IR26	Short 72	Not found	White transparent	White more transpareny	130-120 days
Noama45	Tall	Not found	White nailed	Yellow light tend to white	130-120 days
Basmate	Long usuall y	There is a clear	Transparent white	White Bright	Late planting and producing with Anber
Hoazawe	Tall	Tall and clear	Red or Brunette	White Brunette	Early implants produced by Anbar period approximate month
Graba	Tall	Not found	Yellow Nailed	White Brunette	Early planting in March and matures before Anber

Meshkab	Short 80	Scar Peripherals	White	White	Early planting in the first half of March and matures before the anber in the 2nd and 3rd weeks of October
Hajeen	Middle 110	Not found	White	White	Early planting in the first half of March 100-120days
Furat1 Sensetral33	Short 85	Not found	White Nailed	White transparency	135 days from1-10 June
Yasameen	90 cm	Not found	White	white	130 days 15-20 June
Anbar baghdad	134	Archaeologil	Tinted White	White	120 days
Anbar manathra	128	Archaeologil	Tinted White	White	120 days
Anbar furat	124	Archaeologil	Tinted White	white	120 days
alabasea	109	Not found	white	White opalescent	130 days

The proposed system

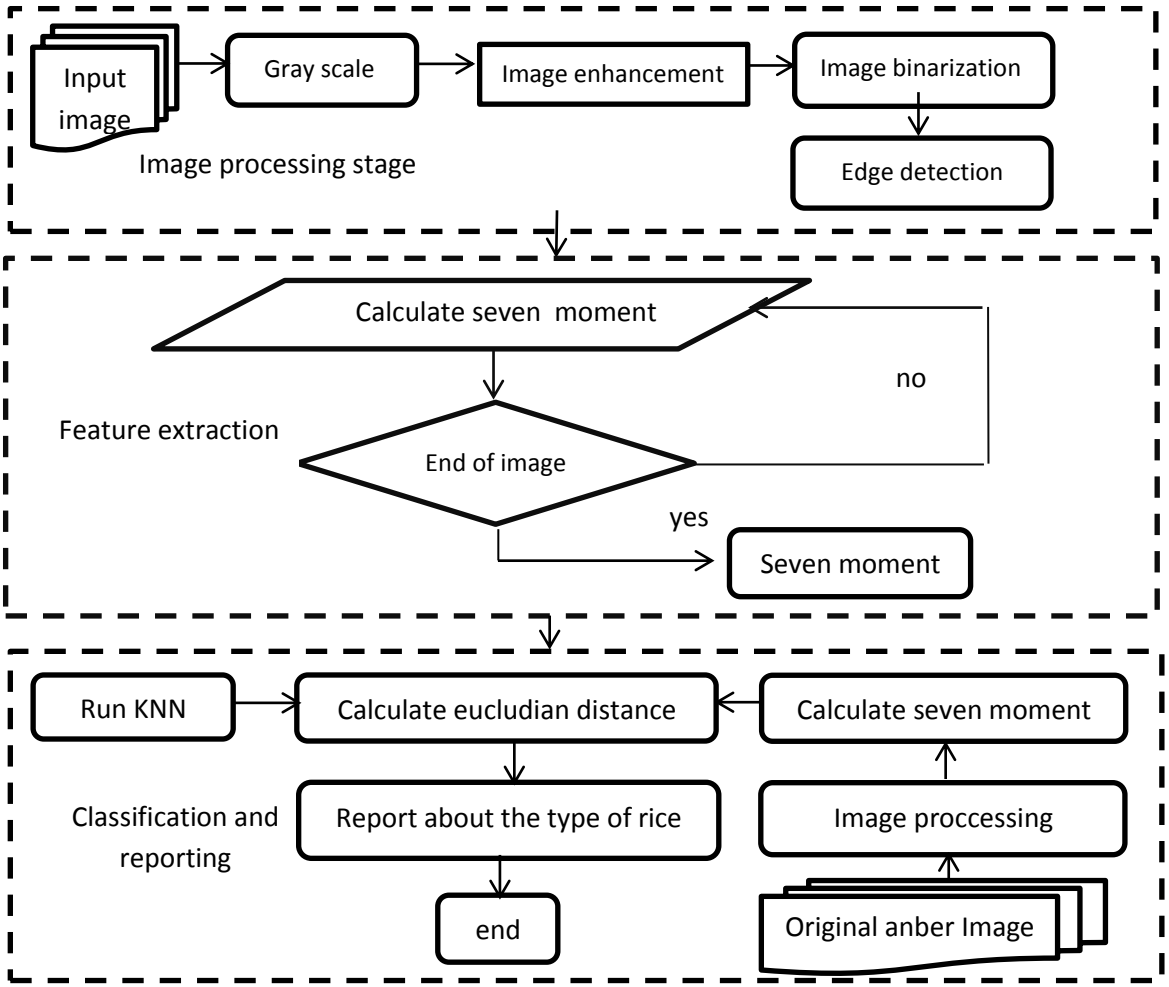

Figure 1- the proposed system work flow

Stage1: Image Processing

The first stage in proposed system is image processing that used to improve and prepare the image for being understood and analyzed by the next stage of the system. In the first we take the image for Iraqi Anbar rice and input it to image processing algorithms. Image processing algorithms involved grayscale process, image enhancement, image binarization, and edge detection [9].

a. **Gray scale process:**A grayscale image is a digital copy in which each pixel has the proportional value of the primary color values. The primary color are red, green, and blue. This type of image is the result of measuring the intensity of light at each pixel. We implement the gray scale process for input image to reduce the data that captured in image, where we convert the RGB image to gray scale image for simple the treatment with image. average equation(6), lightness equation(7),and equation(8) which are used to reduce the three dimensional color intensities of each pixel into signal dimensions gray scale shade [10,11].

$$Pix(i,j)_{gray} = (Pix(i,j)_{red} + Pix(i,j)_{green} + Pix(i,j)_{blue}) /3 \quad (6)$$

$$Pix(i,j)_{gray} = (\max (Pix(i,j)_{red,green,blue}) + \min (Pix(i,j)_{red,green,blue}) /2 \quad (7)$$

$$Pix(i,j)_{gray} = (0.59* Pix(i,j)_{red} + 0.3* Pix(i,j)_{green} + 0.11* Pix(i,j)_{blue}) \quad (8)$$

b. **image enhancement filters** that involve the **median filters** and **mean filter.**Those median filter is A nonlinear advanced sifting technique, regularly utilized with uproot noise, median filters uproot the salt Also paper clamor. Those mean filter will be A straightforward sliding-window spatial channel that replaces the focal point quality in the window for those Normal (mean) for every last one of pixel qualities in the window,mean filter smoothing the picture [12, 13] see Algorithm1 and Algorithm2

Algorithm1: median filter algorithm
Input: image
Output: filtered image

Begin
Step1:read input image
Step2:for every pixel in image Do
Sort value in the mask
Pick the middle one in sorted list
Replace the pixel value with the middle one
End do
End

Algorithm2: mean filter algorithm
Input: image1, n, m
Output:image2

Begin
For each pixel $_{x,y}$ in document image1
sum=0
for i=(x-((n-1)/2))to(x+((n-1)/2))
for j=(y-((m-1)/2))to(y+((m-1)/2))
sum=sum + pixel $_{I,j}$
end for
end for
image2.pixel $_{x,y}$=sum/(n*m)
end for
end

c. **Binarization process:** Is the operation of splitting an input image into two sets of black and white component. The binarization steps convert a grayscale image (up to 256gray scale shades) to a binary image (black and white).binarization using threshold value. Equation (9) shows the simplification of the binarization process:[14]

$$Pix(I,j) = \begin{cases} 0 : pix(I,j) < \text{threshould value} \\ 1 : pix(I,j) \geq \text{threshold value} \end{cases} \quad (9)$$

d. **Edge detection:** This step is done by using soble filter by convolution technique**,**The output of This step is a zero-one image called binary image that contains the main edge of the rice only [15] see Algorithm 3

Algorithm 3: sobel filter algorithm
Input:m*n image I,gradient threshould t
Output: binary edge image j

(initial output image to zero)
For (r=0….m-1)
For (c=0…..n-1)
J[r][c]=0
End
End
(calculate gradient pixel, and then threshould)
For(r=1…..m-2)
For(c=1…..n-2)
P00=I [r-1][c-1]; P01=I [r-1][c]; P02=I [r-1][c+1];
P10=I [r][c-1]; P12=I [r][c+1];
P20=I [r+1][c-1]; P21=I [r+1][c]; P22=I [r+1][c+1];
G_x=p00-p2+2p10-2p12+p20-p22(horizontal gradiance)
G_y=p00+2p01+p02-p20-2p21-p22(vertical gradiance)
If ($\|G_x\|+\| G_y \| > t$ (then this pixel is a edge)
J[r][c]=I
End
End(for each col.)
End (for each row)

Stage 2 : Feature Extraction

This stage shows details calculate seven moment process for the processed image that produced from the stage one. Feature extraction method used to reduce the data and convert it into vector,this vector be placed in classification technique to discrimination, from the methods used to extract feature (moment invariant) [16].

Moment invariant

There are several way for feature extraction. In this thesis, method (moment invariant) was used to extract the features of the processed image, where being processed image then extracted seven moment for each image document. The advantage of this method as way in a number of application to achive aconstant features of the two dimentional image.each image is applied to the way (seven moment)and its extracted seven mathematical values of its constant factors for any image that dose not change which is not effected when the rotation and change the size and position [17], example show in Table-2:

Table 2-seven moment of ox image(different rotation)

OX Image	M1	M2	M3	M4	M5	M6	M7
	-1.6174	-7.2445	-14.6526	-12.6797	-26.0641	-16.6615	-25.5888
Rotation 90°	-1.6140	-7.2823	-13.1806	-13.4785	-27.8927	-17.6421	-28.7391
Rotation 180°	-1.6174	-7.2445	-14.6526	-12.6797	-26.0641	-16.6615	-25.5886
Rotation 270°	-1.6140	-7.2823	-13.1806	-13.4785	-27.8927	-17.6421	-28.7335

The number of image uses in this thesis are 100 image. After reading the image and processing, feture extraction stage using moment invariant and extracting seven moment, the values of moment are shows in Table-3 for ten image.

Table 3-The result of moments value for ten images

images	M1	M2	M3	M4	M5	M6	M7
1	0	0	678934.15689	678934.15689	460951589.2	0	0
2	0	0	633.27095716	633.27095716	439928.3626	0	0
3	0	0	678934.15689	678934.15689	460951589.2	0	0
4	0	0	33.659464179	33.659464179	1132.959528	0	0
5	0	0	3.8146972656	3.8146972656	14.55191522	0	0
6	0	0	18841832.908	18841832.908	35.50146673	0	0
7	0	0	1543301.5256	1543301.5256	238177902.6	0	0
8	0	0	1.5704159607	1.5704159607	2.466206289	0	0
9	0	0	931.32257461	931.32257461	867361.7379	0	0
10	0	0	3147.1443437	3147.1443437	9904517.520	0	0

Stage3: Classification and Produced Report

Classification process is the final stage in the design of proposed system which used (KNN) algorithm that calculate the Euclidean distance between moment values of an input image and the stored value of image for original Iraq anber rice, that we compare between the original class of rice and crossbred class of it. We take the image of original anber rice as testing image, and process it by two step that are image proccessing and feature exctraction once,by this we extract the moments value that are stored in program and retrivel this value when implementing the program. In this thesis KNN algorithm is used with k equal to 1, then set the class of nearest neighbors to object.these special cases(k=1) is called the nearest neighbor algorithm [18].

Overall the training phase of testing image is implemented one time,after which classification phase can be implemented a number of times. Euclidian distance technique is used to calculate the Euclidian distance of two images of rice grain by finding the square root of the sum of diffrernce square between the rice grain by equation(1) and through the application of (visual basic 6.0) program we extracted seven moments for each image where they were taking these values to calculate the Euclidian distance.

the proposal system implementation

After a document is captured using scanner or by loading image from the computer,the generated image should be input the proposal system , after that the image input into series of stage(image processing that include the gray scale, median filter, mean filter,binarization) then edge detection by sobel filter, after that the Sobel image inter the next stage of proposal system that is a feature extraction to extract the value of seven moment of image, after that the seven moment enter the last stage of proposal system that are classification and produce report by (KNN) algorithm to calculate eucludian distance respectively.

Example1-The image of (anber al-baraka)

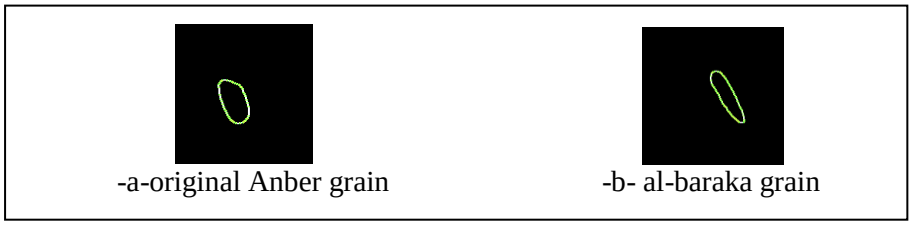

Figure 2- (a) test image. (b) detected image.(anber al-baraka)

Figure-2 (a) shows the test image, while Figure-2 (b) show the detected image. Table-4 show the seven moment of the test image and detected image.

Table 4- seven moment of the test image and detected image(anber al-baraka)

Moment	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**
Test image	0	0	9.9775	9.9775	9.9551	0	0
Detected image	0	0	2.1925	2.1925	4.8073	0	0
Euclidean distance	1.1009						
Image name	Anber al-baraka						

As show from Table -4 the Euclidian distance is (1.1009) and the image name are Anber al-baraka, in this class all the values of Euclidean distance come in this range.

Evaluation of the KNN classification

One method to evaluate classification is the confusion matrix contains information about actual and predicted classification done by the preposed classification system.

-**Recall measure** It is calculated by using the following equation:

$$R = TP / (TP + FN) \quad (10)$$

-**Precision measure** It is calculated by using the following equation:

$$P = TP / (TP + FP) \quad (11)$$

Where **TP** is the value of correct classification in the symmetric class (row),**FN** is the sum of the value of the symmetric class (row)except **TP**,and **FP** is the sum of values in the symmetric class(coloumn)except **TP**

-**TN** is the number of **correct** predictions that an instance is **negative**.

-**FN** is the number of **incorrect** predictions that an instance is **positive**.

-**FP** is the number of **incorrect** predictions that an instance is **negative**.

-**TP** is the number of **correct** predictions that an instance is **positive** [19, 20].

The proposed system took100 examples, the success rate of the classification are (83%).the recall and precision are commonly used to perform evaluation of the KNN algorithm for classification which carried out by equation (10)and by equation (11), and respectively through using information of confusion matrix . Table -5 shows confusion matrix iraqe anber rice classification result, Table-6 shows performance evaluation for each rice class. The proposed is achiving an average classification rate of (84.0585) in recall and (82.6358) in precision methods for nine classes of iraqe anber rice.

Table 5 - the confusion matrix of iraqe anber rice and classification results.

		p r e d i c T e d									total
		Baraka	Yassameen	Anber33	Brnameg4	Bohoth1	Furat1	Djlaa	gdeer	Etree64	
A C T U A L	Baraka	11	0	0	0	0	0	0	0	0	11
	Yassameen	2	11	0	0	0	0	0	1	0	14
	Anber33	0	1	7	0	1	1	0	0	0	10
	Brnameg4	0	0	1	9	1	0	0	0	0	11
	Bohoth1	0	0	1	0	8	1	0	0	0	10
	Furat1	0	0	0	0	0	12	0	0	0	12
	djlaa	1	0	0	0	0	0	10	0	1	12
	gdeer	0	1	0	0	0	0	0	9	0	10
	Etree64	2	1	0	1	0	0	0	0	6	10
total		16	14	9	10	10	14	10	10	7	100

Table 6-evaluation of classification iraqi anber rice by recall and precision

Class	Recall	Precision
Baraka	68.750	100.000
Yassameen	78.571	78.571
Anber33	77.778	70.000
Brnameg4	90.000	81.818
Bohoth1	80.000	80.000
Furat1	85.714	100.000
djlaa	100.000	83.333
gdeer	90.000	90.000
Etree64	85.714	60.000
Overall accuracy	84.0585	82.6358

Conclusions

In this paper a proposed system for classification of iraqi anbar rice using seven moment and K-NN algorithm and following point are concluded:

1. The median and mean filter may remove some of grain outlines because they detect it as a noise.
2. The image processing stage removes protrusions of the some classes of rice, which may causes wrong classification.
3. The binarization step of the proposed system used as additional process, for minimizing the noise of processed image.
4. The edge detection step of the proposed system may detect a noise as edge. This leads to unacceptable feature extraction results.
5. As a shape descriptor technique, the proof to date may be that moment invariant is very good features to use when dealing with particular types of shapes such as animals and symbols. There is a good distinction between grain through overlap occurs both within classes the discrimination is not good.
6. this indicates the moment invariants alone and this inadequate.
7. K-NN shows the maximum accuracy as compared between test image and training image. The KNN give better accuracy.
8. Likewise ,it might have been watched that KNN might have been more great On classifying pixels that veer off altogether from the comparing preparing picture.
9. As aresult, the best flavor of KNN can be achived by taking Euclidian distance, in this thesis uses value (k=1) because the wanted to find correspond one class of rice,while if the value of the k more from one this dose not achieve the required.

References

1. Prajapati, B., Patel, S. **2013**. Algorithmic Approach to Quality Analysis of Indian Basmati Rice Using Digital Image Processing. *International Journal of Emerging Technology and Advanced Engineering*, **1**(3): 503-504.
2. Hassan, S. F. **2011.** Rice, grown and produced in Iraq. *Head of the Iraqi community Iraq State Agricultural Research*, **11**(5) pp: 4-6.
3. Kambo, R., Yerpude, A. **2014.** Classification of Basmati Rice Grain Variety using Image Processing and Principal Component Analysi. *International Journal of Computer Trends and Technologys*, **11**(2): 80-85.
4. ÖZSAKABAŞI, F. **2008.** Classification of forest areas by k nearest neighbor method. PhD. Thesis submitted to the Graduate School of Natural and Applied Sciences of Middle East Technical University,**12**(6), pp: 34-37.
5. Sharma, R., Alam, M. A. and Rani. A. **2012**. K-Means Clustering in Spatial Data Mining using Weka Interface. International Conference on Advances in Communication and Computing Technologies (ICACACT), **13**(9), pp: 211-213.
6. Veena, H. and Latharani, T. **2014.** An efficient method for classification of rice grains using Morphological process. *International Journal of Innovative Research in Advanced Engineering* (*IJIRAE*), **1**(1): 218-221.
7. Putri, W. N, Tahir, W. M, Hussin, N, Htike, Z. and Naing W. Y. N. **2015.** Rice Grading Using Image Processing. *ARPN Journal of Engineering and Applied Sciences*, **10**(12): 83-85.
8. Keyes, L., Winstanley, A. **2000.** Using Moment Invariants For Classifying Shapes On Large_Scale Maps. Computers, Environment and Urban Systems, **25(**1): 119-130.
9. Guzman, J. D., and Peralta, E. K. **2008.** Classification of Philippine Rice Grains Using Machine Vision and Artificial Neural Networks. In Iaald Afita WCCA,World Conference on Agricultural Information and IT, **12**(22), pp: 24-27.
10. Chan, R. H., WaHo, C., and Nikolova, M. **2005.** Salt-and-Pepper Noise Removal by Median-TypeNoise Detectors and Detail-Preserving Regularization. *IEEE Transactions On Image Processing*, **14**(10): 77-79.
11. Ghandeharian, B., Yazdi H. S. and Homayouni, F. **2009.** Modified Adaptive Center Eighted Median Filter For Uppressingimpulsive Noise In Images. *International Journal of Research and Reviews in Applied Sciences*, **1**(3): 56-59.

12. Chan, R.H., WaHo, C., and Nikolova, M. **2005.** Salt-and-Pepper Noise Removal by Median-Type Noise Detectors and Detail-Preserving. Regularization, *IEEE Transactions on Image Processing*, **14**(10): 1-13.
13. Rakshit, S., Ghosh A. and Uma, S.B. **2007.** Fast mean filtering technique (FMFT*). Pattern Recognition* ,**40:** 890–897.
14. Rani, N. S. **2014.** A Quad Tree Based Binarization Approach to Improve the quality of Degraded Document Images. *International Journal of Computer Science Engineering (IJCSE)*, **3**(1): 70-73.
15. Vincent, O. R. and Folorunso, O. **2009.** A Descriptive Algorithm for Sobel Image Edge Detection. *Proceedings of Informing Science & IT Education Conference (InSITE)*, **10**(5): 1-6.
16. Otiniano, K. C., Chavez, G. C. and Menotti, D. **2012.** Hu and Zernike Moments for Sign Language Recognition, *IPCV'12.* The International Conference on Image Processing, Computer Vision, and Pattern Recognition. **12**(6): 354-385.
17. Wee, C.Y. and Takeda F. **2007.** Fast Computation of Zernike Moments For Rice Sorting System. *ICIP*, **9**(9): 9-18.
18. Pham, D.T., Dimov, S. S. and Nguyen, C. D. **2004.** *Selection of K in K-means clustering.* Manufacturing Engineering Centre, Cardiff University, Cardiff, UK, **27**(6): 221-288.
19. KunadhaRaju, H. **2014**. Environmental Dataset Classification Using K-Nn Classification Method. *Global Journal of Advanced Engineering Technologies*, **3**(3): 218-230.
20. Santra, A. K., Christy, J. C**. 2012.** Genetic Algorithm and Confusion Matrix for Document Clustering. *IJCSI, International Journal of Computer Science,***1**(2): 243-239.