A Review on A Novel Approach to Design a Customized Image Editor using Image processing in Matlab

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Abstract

In todays digital technologies, image processing have much border scopes due to the regular growing digital visualization for scientific area. In modern world ongoing application of image processing is medical image restoration, satellite image reconstruction etc. In this paper, a new algorithm has been presented to implement with a GUI (Graphical User Interface) consisting of various Matlab functions which is related to image processing and using of these function create an advanced image processing editor. This advanced editor having the different functions and features like separating the RGB value of any colour image, noise addition and noise filtering, colour detection in pixel by pixel, image restoration , resize , resolution adjustment, image rotation, brightness and contrast control, colour mapping etc. This editor is compact so it is easy to use and cause of GUI it's also can be easy to control all features.

Keywords: Image Processing, Image Editor, noise, image restoration

I. INTRODUCTION

In this paper, we shall be create an image editor in MATLAB, Which is very compact and number of features and functionalities of current commercial packages such as paint, Microsoft digital image suite, adobe Photoshop. Before we can get consider the detailed algorithms for any of the functions, we must be produce an image display framework in graphical user interface (GUI), which is to allow the functions to be called modify and controlled, and to show their results in GUI image display.

We have chosen to use Matlab platform as the basis for our system, because it allows the quite complicated image-processing operations to be implemented with the relatively small amounts of the code, and it has the basic functions [2] for providing a suitable and easy Graphical user interface for the user to interact with the program [12].

Design of a MATLAB based image editor deals with blending of the functions of MATLAB image processing toolbox along with some algorithms made on our own. Digital Image Processing using MATLAB [1] comes very handy on that front. Mainly users deal with three types of images RGB, Grayscale and Binary images.. Binary images consist of only zero and one, zero being black and one being white. Grayscale images consist of values ranging from 0 to 255 with 255 being the brightest pixel value. These two types are represented by a 2 dimensional matrix where the total rows correspond to the height of the image and columns correspond to the width. Color images however are represented by a 3 dimensional matrix where there is a separate matrix for red, green and blue color channel each. Inside each channel there are 2-dimensional matrices. Now any mathematical, numerical operation can be performed over a Matlab matrix or even over combined Matlab matrices. The image editor is equipped with basic image processing editing functions and some special editing operations. The user can customize the editor as per his/her requirements and can be make it more & more easy and advanced.

The advantage of the development of image processing based image editor to provide an effective, easy handling tools and understanding for users [11]. It is important to consider in this system the processing in all aspects like the speed and the quality of the image, image effects. MATLAB platform having a general numerical-analysis and visualization tool. The underlying data structure in MATLAB is the matrices, and this structure lends itself well to image processing. This processing tool needs to be revised to make them more user-friendly, focusing on issues such as layout, illustrations, message, information, and cultural appropriateness.

II. OBJECTIVE

The main objective of this paper is to design a GUI based customized system using image processing toolbox in Matlab. Which have many image editing function. This system can be help to reconstruction and restoration of any image. We can be add noise, filter, change resolution of image etc. functions can be used

III. LITERATURE REVIEW

The rapidly development of digital technology has directly impacted on the techniques in image-processing techniques and the implementation of survey image processing systems. This main development has been shifted from mainframe system to PC Desktop platform. User now can easily perform and handle all kind operations, functions and processing techniques [15] ranging from the small-scale to the large scale in statistical operations. In the research framework and the methodology complies[3] with the ADDIE model [4, 5]. The five main phase presents in this system are Design, Analysis, Development, Complete practical Implementation, and Evaluation, Which is represent a dynamic and flexible guideline for building effective training and performance support tools in the system.

Our aim is to use the MATLAB programming platform [6] as a tool for modification and developing of Color Image Processing software package [5] [6]. Such techniques are image enhancement, noise filtering, image segmentation and morphological dilation operation in Image Processing will be included in the Image Processing based compact editor software package. This editor should capable of using GUI unit to display input image, output image and various click button for various image processing techniques as well as a description of the techniques so the user will earn effectively the application on how image is analyzed instead of learning the mathematical algorithm for such techniques. The number of image editing function packages for the image processing and editing have increased over the few years.

IV. IMAGE RESTORATION AND CUSTOMIZATION TECHNIQUES AND APPROACHES

The proposed system contains various function which is described below:

A. Noise Interface with Modified Image

We define noise is a type of an unwanted component of the image which is degrade the image and create a complexity to understand [18]. The randomly noise interface in images for many of reasons. Noise can be generally be grouped into two classes [4] such as independent noise and the noise which is dependent on the image input data. Generally the additive noise is randomly distributed over the frequency domain (i.e. white noise), where as an image contains with mostly low frequency information. Hence, the noise is dominant for the high frequencies and its effects will be reduced using some kind of the low-pass filter. This can be done either with a spatial filter or with a frequency filter.

1) Gaussian Noise

Gaussian noise is basically adding to each image pixel a value from a zero-mean with Gaussian distribution. The zero-mean property of the Gaussian distribution allows to such of noise to be removed by locally averaging image pixel values [11]. Noise is interface such as additive white-Gaussian noise. Where all the noisy image pixels deviated from the original values of image following to the Gaussian curve. We have a spatial filter which can be reduced the Gaussian noise. It is noticed that when time of smoothing a noisy image, we reduce not only the image noise, but also the find the fine-scaled image details because they also be correspond to the blocked high frequencies in image.

2) Salt-and-pepper Noise

Another common form of noise is data dropout noise (commonly referred to as intensity spikes, speckle or salt and pepper noise). Here, the noise is caused by errors in the data transmission. The corrupted pixels are either set to the maximum value (which looks like snow in the image) or have single bits flipped over. In some cases, single pixels are set alternatively to zero or to the maximum value, giving the image a `salt and pepper' like appearance. Unaffected pixels always remain unchanged. The noise is usually quantified by the percentage of pixels which are corrupted [11].

3) Speckle Noise

Increase in power of image signal and the noise introduced in the image is of same amount that is why speckle noise is termed as multiplicative-noise [12]. It known as signal dependent, non-Gaussian and the spatially dependent. Due to the microscopic variations in the image surface, roughness within the one pixel, the received image is subjected to the random variations in the phase and amplitude of the image. The variations in phase, which are interface constructively results in a strong intensities while the other which are interface destructively results in low intensities. This type of noise variation is called as Speckle noise [12].

B. Noise Spatial Filtering of Modified Image

4) Gaussian Filter

The concept of Gaussian smoothing is to use for 2-D distribution as the `point-spread' function, which is achieved by the convolution techniques. Since the image is stored as a collection of discrete image pixels. We need to produce a discrete approximation for the Gaussian function before we can be perform the convolution techniques. In this paper, the Gaussian distribution is be non-zero everywhere, which would be require an infinitely large convolution kernel, but in the practice it has effectively zero more than about three standard deviations [7] from the mean value of image pixels, and so we can be truncate in the kernel at this point.

5) Average Filter

Average filter is known as windowed filter of linear class, that smoothest image. The filter works with low-pass one. The basic idea behind this filter is for any element of the image take an average across its neighborhood pixels.

6) Median Filter

The median filter is a type of the non-linear digital filter [14], which is used to remove noise from images. The principal of the median filter is to the replace the value of every image pixel in an image by the median of the gray levels in the neighborhood defined by the filter mask. Median filtering try to reduce the blurring of edges in image. It is very effective works in the presence of the impulse noise.

C. *Histogram based Contrast control*

Histogram of an image, which is represents the occurrence or frequency of a particular in gray level of image. It is a graph, which is depicting gray level intensities on the x-axis and the frequency of these intensities on the y-axis. It controls the contrast in an image. It helps to categorize the images in many different areas. It provides the image statistics for many various techniques like intensity slicing, threshold and segmentation.

D. *Morphological Operators*

Morphology in the relation to image processing is a tool to extract the image components [1]. That methods are useful in the description and representation of region shape in image. The morphological operations tries to simplify images, preserves and quantify the main shape characteristics of image objects. In morphological operations we use a structuring element, which is applied to an input image and the output image of same size is which is obtained. The value of the each image pixel in the output image. Which is calculated by comparing of the corresponding image pixel in an input image with its neighbors pixel. The most of basic morphological operations are be dilation and erosion. Morphological operations are used in image pre-processing to enhancing the object structure and the segmentation of objects from the background.

E. *Dilation*

Dilation is the process in which an image is expanded from it's an original shape. The way in which the image is expanded is to determine by the structuring element. The dilation process is same as the convolution process, that is, the structuring element is the reflected and shifted from left-to-right and the from top-to-bottom, at the each shift, the process will be image look for any overlapping similar image pixels between the structuring element and that of the image. One of the simplest applications is for bridging the gaps.

F. *Erosion*

In this paper Erosion combines two sets using of the vector subtraction of set elements .Erosion is the new counter process of dilation system .It will shrinks the image quality. The way in which the image is shrunken is determined by using the structuring element. It is a type of thinning operator. Here the application of erosion is to use for eliminate the image narrow regions and the thin out the wider region.

G. *Image Restoration*

1) Image size and resolution

An Image shrinking In many applications we want to change the aspect-ratio of an modified image or resize. It to fit in a smaller display. This can be accomplished by finding the optimal seams in horizontal and vertical directions and removing them from the image. One way is to first remove all the horizontal optimal noise and then remove all the vertical ones in image. But a more efficient and fastest way is to remove the noise in an optimal order from the image, where we can be compare the cost of energy of the horizontal optimal noise to the vertical optimal noise and first remove the one with the minimum of cost energy. By repeating of this process and recalculating the new energy map in each iteration, the image can be resize and can be converted to the desired size and resolution in image.

2) Image Enhancement

Enhancing is a process, which is a particular image is mainly done by adjusting the contrast and brightness levels of image [16][17]. This is achieved by the obtaining the image histogram, which is known as pixel frequency distribution and then spreading out of this distribution over the entire range of 0 to 255. A local adaptive histogram equalization techniques [4] is used which works for grayscale images. In this paper we presents a way to expand this technique to color images [10]. The input color image is in RGB format which is be converted to the HSV format. Now instead of this red, green and blue the three color channels are be hue, saturation and value. Individual histogram equalization is apply on the image.

V. LIMITATIONS OF THIS SYSTEM

We have some of the limitations in this system. The system input image can work with color images. We cannot add noise with accurate reading of noise data. We can interface noise with a constant value in every time.

VI. DISCUSSIONS

In this paper, we try to design an image editor with five core capabilities: image utilities, image filtering and transformation, image compression, image analysis and programming; and data analysis environment. The user can be easily used and modify any image with the graphical user interface of this system, which design by the help of Matlab functions. It is very important for any of software package during in step of designing. This image editor having the four essential qualities: reliability, impact, practicality and validity. Validity is the normally taken to the extent, which a processing can be shown, which is to produce scores and that are an accurate modification of the image taken.

VII. EXPECTED OUTCOMES

We will try our level best to develop the compact and advanced image editor as user-friendly as possible. The purpose of this image editor is to bring the various image editing facilities and functions, which is available in MATLAB image processing tool box under one of common platform and try to make it easier for the user to understand it. Our future work can be aimed for this editor is to expand the set of new and important applications than what has been used in this paper.

VIII. CONCLUSION

Basic important concepts of our image editor which is based on image processing are briefly presented in this paper. In this system the GUI developed performs the important operations on the color images. It helps to give the user a better view of each operation at the click of the simple button. This GUI can be used for any general colour image .The same GUI can be used for other operations by altering the callbacks. Most of the functions presented in this paper can be further investigated and their performance can be improved. Future work aims at expanding the set of applications, calculating the statistical improvement after the application of the image processing techniques.

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