A REVIEW ON DIGITAL IMAGE PROCESSING WITH BLUR/DE-BLUR IMAGES

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Abstract - Image processing is very important in today's digital world because of various noises and many problems faced by digital image in way of transmitting to the receiver. Blur detection is very useful techniques in real life application such as image restoration, segmentation and enhancement. De-Blurring is used to remove the blur from image blurred region which can be due to camera defocus or object in motion. Blurring is a form of bandwidth reduction in image which tends to low quality image constructions. De-blurring techniques are basically used to enhance an image using parameters &methods so that high quality image can be obtained. This paper focuses on introduction and literary review of researches done on blur and de-blurs techniques of image processing.

Keywords: Fuzzy Logic, Blur, De-Blur, Image Processing.

I. FUZZY LOGIC

Initially Fuzzy logic was introduced in 1965. Problems that are not definable by rigorous mathematical models are majorly solved by fuzzy logic. Fuzzy Logic defines problems with incomplete &imprecise data, nonlinear functions of arbitrary complexity. In addition, fuzzy logic in generally consumes less computing power &memory as compared with conventional methods, thus final system is less expensive and smaller.[1][2]

II. APPLICATIONS OF FUZZY LOGIC

Region of fuzzy logic is very vast. Few of the application of fuzzy logic are listed below:
1. Control system
   a. Consumer Electronics
   b. Robotic, automation and Tracking
2. Pattern recognition
   a. Machine Vision
   b. Image Processing

3. Information systems
   a. Data Fetching and DB Management.
4. Sensor Support

III. PROPERTIES OF FUZZY LOGIC

Following are the few state properties of fuzzy logic. [1]
1. Robust
   Inputs can be variable with noise. Output is smooth controlled with respect of noisy &wide range in inputs.
2. User Defined Rules
   Fuzzy logic can be changes to enhance or completely modified the system working. Digital Sensors can be used in the system by modify user defined rules
3. Fuzzy logic role is not limited to control outputs, feedback inputs and it is not requires to calculate rate as parameters changes.
4. Non-linear systems
   Fuzzy logic can be model nonlinear functions that will difficult to work with mathematical model.

IV. DIGITAL IMAGE PROCESSING

Digital image Processing is use computer algorithms to perform image processing on digital images. Picture and Image elements, Pixels are the elements of digital image. Each of which has its own exact position and value. To represent elements of digital images mostly used Pixel. In our senses; Vision is at top most, thus images is at topmost importance in human perception. Human eyes only work in visual band of the electromagnetic spectrum irrespective of this digital imaging works in entire EM spectrum. Image processing works on images generated by sources such as ultrasound and computer generated images. [3]

V. LEVELS IN DIGITAL IMAGE PROCESSING

1. Low-level
   a. This operates on noise reduce, contrast and image enhancement.
   b. Both inputs and output are digital images in this.
2. Mid-level
   a. This includes segmentation recognition of objects in image.
   b. Inputs in mid-level are image, and the outputs are attributes obtained by processing on images.
3. Higher-level

a. This level involves processing on recognized objects, image analysis and performing the functions associated with digital image processing.

VI. STEPS IN DIGITAL IMAGE PROCESSING [3]

1. Image acquisition
   Processing performs in very first step is to get image in digital form by scaling or any other means.
2. Image enhancement
   After getting the digital image in step one, in this image improvement is done so that required result will be more as per requirement.
3. Image restoration
   Also deals with enhancing the overall appearance of digital image. Image restoration is an objective process, as restoration techniques are majorly based on mathematical and probabilistic models.
4. Compression
   In this the physical size of the digital image is reduced so that the storage space will be less, thus it also reduces the bandwidth required in transfer process as it directly related to the size of the image.
5. Segmentation
   As the name suggest it partitions any digital media into no. of small units.
6. Representation
   Previous stage leaves the data in the form pixels that is readable by machine only. Thus converting the data from this output into human understandable form is processed under this representation stage in image processing.

VII. DIP MATHEMATICAL TOOLS

For all this process of digital image processing no of mathematical tools are required to do so. Few of them are listed as below: [3]

1. Operations
2. Arithmetic Operations, Set and Logical
3. Array, Matrix ,Linear, Nonlinear
4. Vector and Matrix Operations
5. Probabilistic Methods
6. Image Transforms

VIII. IMAGE DE-BLUR BLIND DE-CONVOLUTION

Is this both images are recognized (1. true image: actual image (De-Blur) and 2. Blurred image both are represented in Fig. 1) using all available information. Various approaches have already been proposed for the solution to problem defined. Approaches based on implementation strategy are as follow: [4] [5]

Blur Identification

It identifies the blurring kernel separately from the true image, which is to be used later with any of the classic image restoration algorithms.

Source Image Identification

Estimation of the source image is done in the second class. Methods used are based on statistical, blurring kernel and noise in the digital image.

Figure 1: Blur, De-blur Image

IX. BLUR MODELS

The blurring models are related to the following variants: [6] [7]

Space invariant

These are generally independent of image pixel location. The blurring function produces a uniform blurring effect for each pixel location.

Space variant

It creates a different blurring effect for every image pixel location. Resulting in blurring effect that is different for every pixel.

X. BLURRING TYPES

Overall three types of blurring effect exist in digital images:

Average Blur

Whenever in any image noise or specks are presents than that is known as Average Blur.

Gaussian Blur

Whenever in an image a bell shaped curved burring is present in a digit image.

Motion Blur

When in a digit image motion effect is needed than we can add motion blur in it using software's.

XI. LITERATURE REVIEW

In1991 S. J. Ko and Y. H. Lee. Approaches Center Weighted Median Filters and Their Applications to Image Enhancement. [8]

In 2005 Bezdek, J. C. et al. focus on Fuzzy Models and Algorithms for Pattern Recognition and Image Processing, [9]

In 2010, Aborisade, D.O [11] develops a new algorithm for fuzzy based edge detection algorithm. [1]

In 2012, Amrita Sarkar, G.Sahoo and U.C.Sahoo, presents the analysis of results achieved using fuzzy logic for representing complex and movement process. [2]

In 2013, Juliano da Silva Ignacio, Sidnei Jose Buso, Waldemar Alfreda Monteiro   highlights the processing of digital image in previous research articles by researchers with initial zero knowledge of matter. [10]

In 2013, Meenakshi Yadav, Mr. Omprakash, "A Comparative Study for Deblurred Motion Blurred Images " define the study of PSNR values calculated for the restored images [5]

In 2014, Sonu Jain, Akhilesh Dubey, Diljeet Singh Chundawat, Prabhat Kumar Singh, represents new idea to long – terms difficulties in digital photography: Noise Removal. [11]

In 2014,Mahmud S, Mohammed J, Hasan Muaidi, Shihadeh Alqrainy, Muath alzghool, "A Survey of Digital Image Processing Techniques in Character Recognition" explains the brief overview over the digital image processing techniques. [12]

In 2015, Ajay Kumar Boyat1 and Brijendra Kumar Joshi, explained the brief overview over various noise models available in digital image. [13]

In 2017, Anwesa Roy, Pooja Aher, Krushna Kalaskar, Priya Agarwal, Prof. Shital S. Bhandare, "Blur Classification and Deblurring of Images" aims at getting parameters, deblurring and blur classification in three stage frameworks. [14]

In 2017, Preeti, Sachin Suryan, focus on extracting Deblur images using fuzzy logic. [6]

In 2017, Renuka Yadav, Munesh Yadav, "Extracting Deblur Image Using Fuzzy Logic Approach from Impulse Noise in Dip",focus on Gaussian blur suppression from images. [7]

XII. SUMMARY & CONCLUSION

This paper conducted a brief review about the existing process of digital image processing with image blur and de-blur process. Details about the history of digital image processing and its application are reviewed in this paper. For this digital image processing study of fuzzy logic is must as fuzzy logic provides solution to complex mathematic functionally that is needed in image processing along with digital image processing mathematic tools. By further proceeding with this work, major focus will be on defining and implementing a de-blur techniques in digital image processing.

REFERENCES

[1] Aborisade, D.O performed a work, "Fuzzy Logic Based Digital Image Edge Detection" Global Journal of computer science and technology, Vol. 10 Issue 14 (Ver. 1.0) November 2010

[2] Amrita Sarkar, G.Sahoo and U.C.Sahoo, "Application Of Fuzzy Logic In Transport Planning",International Journal on Soft Computing (IJSC) Vol.3, No.2, May 2012

[3] Gonzalez, R. C.,Woods, R. E., and Eddins, S. L. [2004]. Digital Image Processing UsingMATLAB, Prentice Hall, Upper Saddle River, NJ.

[4] Yuji Oyamada and Hideo Saito. Blind deconvolution based projector defocus removing with uncalibrated projector-camera pair. In IEEE International Workshop on Projector-Camera Systems (PROCAMS), 2009.

[5] Meenakshi Yadav, Mr. Omprakash, "A Comparative Study for Deblurred Motion Blurred Images "International Journal of Emerging Research in Management &Technology ISSN: 2278-9359 (Volume-2, Issue-10) 2013

[6] Preeti, Sachin Suryan, " A Review on Extracting DEBLUR Image Using Fuzzy Logic Approach from Impulse Noise" International Journal of Advance Research , Ideas and Innovations in Technology. ISSN: 2454-132X 2017

[7] Renuka Yadav, Munesh Yadav, "Extracting Deblur Image Using Fuzzy Logic Approach from Impulse Noise in Dip", International Journal of Advance Research , Ideas and Innovations in Technology ISSN: 2454-132X, 2017

[8] S. J. Ko and Y. H. Lee. Center Weighted Median Filters and Their Applications to Image Enhancement. IEEE Transactions on Circuits and Systems, 38(9):984 – 993, September 1991.

[9] Bezdek, J. C. et al. [2005]. Fuzzy Models and Algorithms for Pattern Recognition andImage Processing, Springer, New York.

[10]Juliano da Silva Ignacio, Sidnei Jose Buso, Waldemar Alfreda Monteiro, "Processing and analysis of digital images: How to ensure quality of data captured?" International Journal of Recent advances in Mechanical Engineering (IJMECH) Vol.2, No.2, May 2013

[11]Sonu Jain, Akhilesh Dubey, Diljeet Singh Chundawat, Prabhat Kumar Singh," Image Deblurring From Blurred Images, International Journal of Advanced Research in Computer Science & Technology Vol. 2, Issue 3 (July - Sept. 2014)

[12]Mahmud S, Mohammed J, Hasan Muaidi, Shihadeh Alqrainy, Muath alzghool, "A Survey of Digital Image Processing Techniques in Character Recognition", IJCSNS International Journal of Computer Science and Network Security, VOL.14 No.3, March 2014

[13]Ajay Kumar Boyat1 and Brijendra Kumar Joshi, "A Review Paper: Noise Models in Digital Image Processing, Signal & Image Processing : An International Journal (SIPIJ) Vol.6, No.2, April 2015

[14]Anwesa Roy, Pooja Aher, Krushna Kalaskar, Priya Agarwal, Prof. Shital S. Bhandare, " Blur Classification and Deblurring of Images", International Research Journal of Engineering and Technology, Volume: 04 Issue: 04 | Apr -2017