ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 4, April 2017

Automatic Contrast Enhancement Based on Retrieved Images

Fathima Farseen PK, Shelmi MS

P.G Scholar, Dept. of Computer Science and Engineering, Cochin College of Engineering, Kerala, India

Assistant Professor, Dept. of Computer Science and Engineering, Cochin College of Engineering, Kerala, India

ABSTRACT: Here implement a guided image contrast enhancement framework based on cloud images, here we combining context-sensitive and context-free contrast for solving a multi-criteria optimization problem. For determining the contrast enhancement level, the parameters in the optimization process are estimated by taking advantages of the retrieved images with similar content. For automatically avoiding the presence of low-quality retrieved images as the guidance, no-reference image quality metric is implemented to rank the retrieved images from the cloud. By uni fied contrast enhancement and guided contrast enhancement methods we efficiently create visually-pleasing enhanced images which are better than those produced by the classical techniques.

KEYWORDS: Contrast enhancement, guided image, retrieved images

I. INTRODUCTION

If an image is low contrast and dark, we wish to improve its contrast and brightness. Contrast is the visual difference that makes an object distinguishable from background and other objects. For better and easier human interpretation of images and higher perceptual quality, contrast enhancement becomes necessary and it has been active research topic since early days of computer vision and digital image processing. To human viewers, sharp contrast of edges and subtle tone of smooth surfaces in an image are often interpreted as high perceptual quality. But various condition, such as foggy weather, poor illumination, low grade imaging sensor, etc., can make an acquired image look faded and blurry. However, it is not uncommon that raw image with low perceptual contrast still contains information on the details of the captured scene. Therefore, since every early days of image processing many contrast enhancement techniques have been proposed and used.

In this paper, we attempt to address two issues in contrast enhancement:unifying context-sensitive associated with context-free methods and automatically deriving the proper enhancement level. By joining the context-free and context-sensitive methods, we propose a unified contrast enhancementframework. Proposes a multi-criteria optimization strategy, in which the input image, the enhanced image withun-sharp masking, and the sigmoid transformed image are considered. Here find the the best contrast level is inferred by taking advantages of the retrieved images that are selected with the help of a no-referencess(NR) IQA method, it gives the perceived quality of each retrieved image without referencing to its corresponding pristine quality original image. Also implement firefly optimization for more accuracy and time consumption.

II. RELATED WORK

In this section we discuss about the related work in this domain. Here mention three related work based on this research area. That are:

- **Optimalcontrast-tone mapping**:This paper proposes a novel algorithmic approach of image enhancement via optimalcontrast-tone mapping [1].In a fundamental departure from the current practice ofhistogram equalization for contrast enhancement, the proposed approach maximizes expected contrast gain subject to an upper limit on tone distortion and optionally toother constraints that suppress artifacts. The underlying contrast-tone optimizationproblem can be solved efficiently by linear programming. This new constrained

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optimization approach for image enhancement is general, and the user can add and fine tune the constraints to achieve desired visual effects.

- **Unsharp masking algorithm:**Enhancement of contrast and sharpness of an image is required in many applications.Unsharp masking is a classical tool for sharpness enhancement[2]. We propose a generalized unsharp masking algorithm using the exploratory data model as a unified framework. The proposed algorithm is designed to address three issues: 1) simultaneously enhancing contrast and sharpness by means of individual treatment ofthe model component and the residual, 2) reducing the halo effect by means of anedge-preserving filter, and 3) solving the out-of-range problem by means of log-ratio and tangent operations. Here also present a study of the properties of the log-ratiooperations and reveal a new connection between the Bregman divergence and thegeneralized linear systems. This connection not only provides a novel insight intothe geometrical property of such systems, but also opens a new pathway for systemdevelopment. We present a new system called the tangent system which is basedupon a specific Bregman divergence. Experimental results, which are comparable torecently published results, show that the proposed algorithm is able to significantlyimprove the contrast and sharpness of an image. In the proposed algorithm, the usercan adjust the two parameters controlling the contrast and sharpness to produce thedesired results. This makes the proposed algorithm practically useful.
- **JPEGartifacts suppression [3]:**While contrast enhancement boosts the image appearance, it can unintentionallyboost unsightly image artifacts, especially artifacts from JPEG compression. MostJPEG implementations optimize the compression in a scene-dependent manner suchthat low-contrast images exhibit few perceivable artifacts even for relatively highcompressionfactors. After contrast enhancement, however, these artifacts becomesignificantly visible. Although there are numerous approaches targeting JPEG artifactreduction, these are generic in nature and are applied either as pre- or post-processingsteps. When applied as pre-processing, existing methods tend to over smooth theimage. When applied as post-processing, these are often ineffective at removing theboosted artifacts. To resolve this problem, we propose a framework that suppressescompression artifacts as an integral part of the contrast enhancement procedure. This approach can produce compelling results superior to those obtainedby existing JPEG artifacts removal methods for several types of contrast enhancementproblem.
- **Cubic un-sharp masking:**The cubic un-sharp masking method is introduced in this paper [4]. It is demonstrated,through both a statistical study and some computer simulations, that the proposedmethod has a much reduced noise sensitivity with respect to the linear un-sharp maskingtechnique and it permits to obtain perceptually pleasant results. The proposedoperator also compares favorably with other algorithms which recently have beenstudied to improve the behavior of the un-sharp masking approach.The algorithmproposed in the present paper belongs to this class, and is based on the well-knownun-sharp masking (UM) technique.

III. PROPOSED SYSTEM

Automatically enhancing an image to the desired contrast level is much difficult. Here we make an assumption that the guidance images from cloud could have the perfect enhancement quality, as many of them may have already been manually selected and processed when they were uploaded. To realize the automatic guidance image selection, an NR-IQA method is applied to re-rank the retrieved images such that the one with best quality from the retrieved images is treated as the “guidance”. Specifically, given an input image, image retrieval system will return a batch of images with similar content. Also add an extra optimization process,That is firefly optimization. It is a good method for feature selection, fault detection and time consumption. Visualization of our system is given in Fig.1.

A. Unified contrast enhancement framework

Here we fuse context sensitive approachsuch as unsharp masking and context sensitive approachsuch as tone-curve adjustment to generate final image. Generalized figure is shown in below Fig.1. We can discuss more about this unified contrast enhancement framework.

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Context-sensitive approach:un-sharp masking is to amplify thehigh-frequency components of the image signal by applying alinear or nonlinear filter. Only image structure should be enhanced as amplification of the noise is usually undesirable. This motivated us to firstly pre-process the image to reduce noise while preserving the edge, followed by a un-sharp masking process. Generally, there are various edge-preserving filters, and each of them can generate a un-sharp masking version, as illustrated in Fig. 2. The fusion of the processed images is regarded as the context-sensitive enhanced image. When giving input image **I,** theun-sharp masking algorithm can be described below equation. Type equation here.

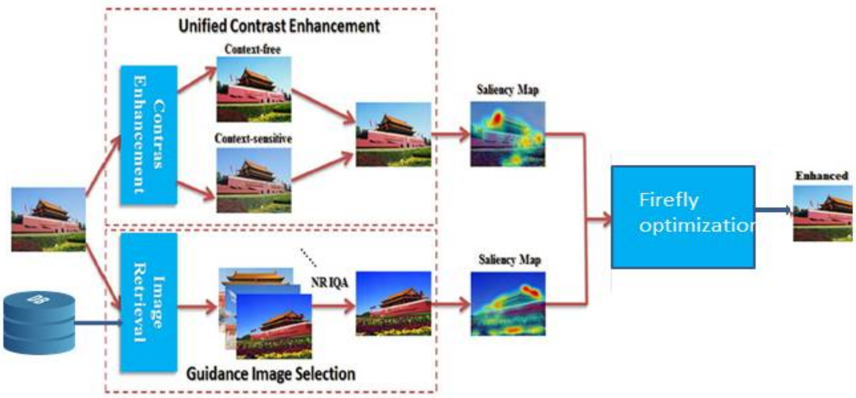

Fig.2:Flowchart of automatic contrast enhancement scheme

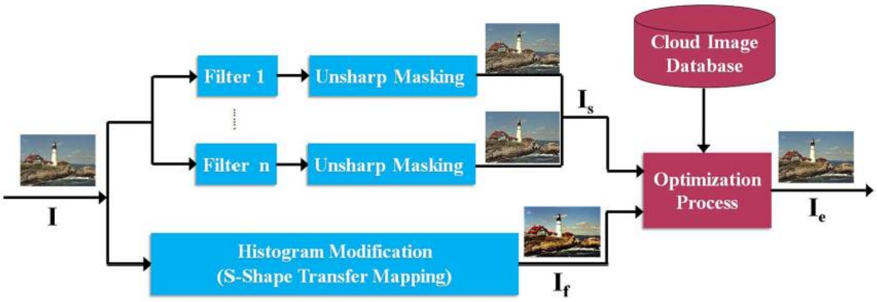

Fig.2:Contrast Enhancement Framework

$$I_s = I + \omega_1 \cdot I_{d1} + \omega_2 \cdot I_{d2} \quad (1)$$

Here I_{d1} and I_{d2}represent the high frequency signal generated following the image pre-processing with impulse functionand bilateral filter, respectively.

Context-free approach: The context-free enhancement can be achieved by the sigmoid transfer mapping. Quality of the enhanced image better matches the preference of the human visual system. The context-free enhanced image$I_s$is given below.

$$I_f = f_{clip}(M_s(I,\emptyset)) = f_{clip}\left(\frac{\emptyset 1 - \emptyset 2}{1 + exp\left(-\frac{(1-\emptyset 3)}{\emptyset 4}\right)} + \emptyset 2\right) \quad (2)$$

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Unified contrast enhancement framework: Both context-sensitive and context-free approach have their on advantages. Here we combine advantage of both approaches. goal is to find an image that is close to the enhanced images as desired, but also preserve the structure from the input image **I**. Below equation give the final enhanced image.

$$\mathbf{I_e} = \frac{\mathbf{I} + \alpha \,.\, I_f + \beta \,.\, I_s}{1 + \alpha + \beta} \qquad (3)$$

Here $\mathbf{I_e}$represent final enhanced image and $\mathbf{I_f}$ and $\mathbf{I_s}$ represent context-free and context-sensitive enhanced images.

B.Guided contrast enhancement scheme

Automatic enhancement of image to a desired contrast level is difficult task. Here we make an assumption that the guidance images from cloud could have the good enhancement quality, as many of them may have already been manually selected and processed when they were uploaded. For the automatic guidance image selection, NR-IQA method is applied to rank the retrieved images. From that image with best quality from the retrieved images is treated as the "guidance". Here,when we giving an input image image retrieval system will return a number of images with similar content. For Obtaining the content-similar images we apply the content based image retrieval(CBIR) method.
Guidance image selection with NR-IQA: The input image is used to retrieve highly correlated images from cloud or corresponding dataset. Since images in the cloud can be either good quality or corrupted by various types of distortions, it is desirable to apply an NR-IQA algorithm to re-rank these images and select the best one.

C. Contrast level derivation from guidance

Flowchart of contrast enhancement scheme is given in Fig.2. When giving an input image, firstly apply context-free and context-sensitive methods to fuse enhanced versions. A saliency region detection algorithm is performed on both the guidance and the fused images.

1. Visual saliency detection: The saliency map is obtained by smoothing the squared reconstructed image.

   $$\text{SaliencyMap} = g * (\bar{I} \circ \bar{I}) \qquad (4)$$

   Here 'g' is a Gaussian kernel and '*' and 'o ' are the entry-wise and convolution product operator.$\bar{I}$ is the reconstructed image.
2. Automatic contrast enhancement: Contrast matching is converted to the optimization problem based on the guidance image and the fused image as follows:

   $$(\alpha^*, \beta^*) = \operatorname{argmin}_{\alpha^*, \beta^*} \left(\left| F(I_g) - F\left(\frac{I + \alpha \,.I_f + + \beta \,.I_s}{1 + \alpha + \beta}\right) \right| + \lambda \left| S(I_g) - S\left(\frac{I + \alpha \,.I_f + + \beta \,.I_s}{1 + \alpha + \beta}\right) \right| \right) (5)$$

   Here the parameter λ balances the magnitude and importance between the complexity measure and skewness measure. α and β are the optimized values that lead to an appropriate enhancement level.

D. Firefly Optimization

In today's global optimization world, the nature inspired meta-heuristic algorithmsform an important part in computational intelligence and soft computing.The firefly algorithm idealizes several aspects of firefly in nature. First, real fireflies flash in discrete pattern, whereas the modelled fireflies will be treated as always glowing. There are three idealized rules which are made to govern the algorithm and to create a fireflysbehavior. They are as follows:

- All the fireflies are considered to be unisex and hence potentially attracted toany of the other fireflies.
- Attractiveness is determined by brightness, a less bright firefly will move towards a brighter firefly, as the distance increases the attractiveness and brightnessboth will decreases. The firefly will move randomly, if the brightness of all fireflies are equal.
- The value of the function which is being maximized is proportional to thebrightness of a firefly.

There are two most important points which should be taken in account in fireflyalgorithm. These are:

- Light intensity will be varying

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- The attractiveness will be calculated.

IV. RESULT

Here we implement a guided image contrast enhancement framework based on cloudimages, in which the context-sensitive and context-free contrast is jointly improved for solving a multi-criteria optimization problem. Also automatically determined thecontrast enhancement level, the parameters in the optimization process are estimatedby taking advantages of the retrieved images with similar content. For the purpose ofautomatically avoiding the involvement of low-quality retrieved images as the guidance, no-reference image quality metric is adopted to rank theretrieved images from the cloud. Implement a firefly optimization method too inorder to consume time.

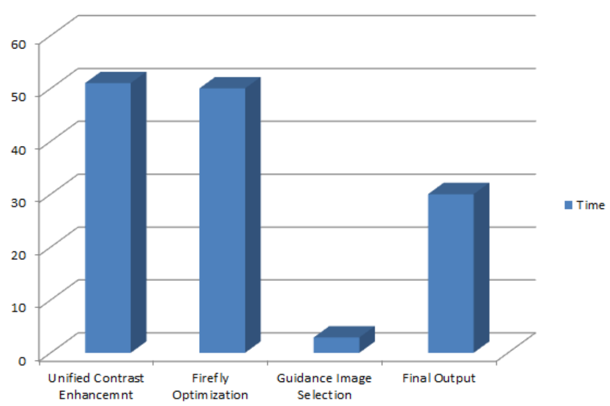

Fig.4:Perfomance Analysis of Proposed System

Performance analysis of our system is given in Fig.4.The modules used for the performance analysis are Contrast enhancement of image, guidance image selection and production of Finalimage or output.To do performance analysis starting time and ending time for eachmodules are calculating, then finding the time difference and storing it in a databasetable, then plot the performance graph by taking the time from database table. Inthis graph X-coordinates are various modules used in this system and Y-coordinatesare time taken in seconds used to complete each module.

V. CONCLUSION

Here we proposed a guided image contrast enhancement framework based on the retrievedimages from cloud, targeting at automatically generating enhanced image. The summary of this paper lies in the unifying of context-sensitiveand context-free contrast enhancement methods, and automatically estimating theenhancement level by matching the extracted features in visual salient region. The optimization problem is formulated as generating an image that is closeto the input, context-free enhanced, as well as the context- sensitive enhanced images.

REFERENCES

1. ShiqiWang,KeGu,Siwei Ma,Weisi Lin,Xianming Liu andWen Gao, 'Guidedimage contrast enhancement based on retrieved images in cloud', IEE Trans. Onmultimedia,Vol.18, Issue: 99, pp.199-210,February 2016.
2. X. Wu, 'A linear programming approach for optimal contrast-tone mapping',IEEE Trans. Image Process., vol. 20, no. 5, pp. 12621272,May 2011.
3. G. Deng, 'A generalized unsharp masking algorithm', IEEE Trans. Image Process.,vol. 20, no. 5, pp. 12491261, May 2011.
4. Y. Li, F. Guo, R. T. Tan and M. S. Brown, 'A contrast enhancement frameworkwith JPEG artifacts suppression',in Proc. Eur. Conf.Comput. Vis., 2014,pp. 174188.
5. E. Peli, 'Contrast in complex images', J. Opt. Soc. Amer. A, vol. 7, no.10, pp.20322040, 1990.
6. G. Ramponi, 'A cubic unsharp masking technique for contrast enhancement',Signal Process., vol. 67, no. 2, pp. 211222, 1998.