Indian Journal of Science and Technology, *Vol 11(17), DOI: 10.17485/ijst/2018/v11i17/122761,* May 2018

ISSN (Print) : 0974-6846
ISSN (Online) : 0974-5645

Architecture for Image Contrast Enhancement Applications by Altera Quartus II

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Abstract

Objectives: To design the hardware architecture for contrast enhancement applications. **Methods / Statistical Analysis:** Image improvement is the technique utilized to make strides the visible illustration of an image. Histogram equalization is one of the most vital techniques of image improvement. **Findings:** The fundamental idea of histogram equalization is to re-map the gray degrees of the image. Indeed in spite of the fact that these approaches may improve the differentiate of a picture in a successful and proficient way, they ordinarily have a few downsides, like misfortune in data, commotion enhancement and over enhancement. In this extend a modern strategy which performs differentiate improvement may named as adjusted color protecting versatile gamma adjustment. The upgrade is gotten by a combination of altered histogram and its versatile gamma adjustment**. Applications / Imporovement:**The proposed strategy is analyzed for many differentiate test pictures. It works better than existing. In addition to that the VLSI architecture of the algorithm is developed for size 2×2 image using ALTERA QUARTUS II. The same architecture can be extended to entire image.

Keywords: Altera Quartus II, Minimum Mean Brightness Error , Over Enhancement

1. Introduction

Image evaluation enhancement is acquired through the direct approach[1] or oblique technique.Within the direct method the histogram of an image is numerous by means of an algorithm to get more suitable output.2d approach is via making use of the transformation of an original picture[2] then applying the enhancement algorithm.The algorithm needs to be implemented as a architecture by the use of the mathematics and logical circuits.

2. Previous Work

This segment depicts past works in the writing which make utilize of the HE strategy with the reason of brightness protecting. The coloration maintaining set of rules technique the modified histogram[3]. The changed histogram is obtained by using including the original histogram with the uniform histogram[4]. In addition steps for the image enhancement are just like the adaptive gamma correction[5].

3. Proposed Algorithm

3.1 Histogram Modification

The amendment obtained from the Probability Density Function (PDF) value. The changed histogram is represented as,

$$S_{modified} = \alpha \text{ (original image)} + (1\text{-}\alpha) S'$$

Right here the value is saved as 0.5 to obtain the modified histogram is close to the authentic image histogram.

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3.2 Final Luminance Transformation

The very last converted image is =β (agc image)+(1- β) (input image).The β parameter is various between zero to 1.To obtain the colour keeping property.

4. Architecture for Proposed Algorithm

The hardware blocks for appearing every operation inside the algorithm is modeled by way of the usage of mega wizard plugin manager in altera quartus II device. The general block diagram for the set of rules is received as follows, the architecture is developed through the usage of the mathematics circuits like floating point adders,subtractors and multipliers and divider blocks in addition to the combinational logic circuit comparator to test the equality between the pixels and the decimal adder circuit for the calculation of quantity of pixels having equal values. The general block diagram is shown in Figure 1

4.1 Architecture of Histogram of an Input Image

The range of pixels having the equal value is received through the comparator block in that every pixel values are as compared with all the pixel values in the image. In comparator the input pixels are equal manner the output is good judgment 1. Then the comparator output is given

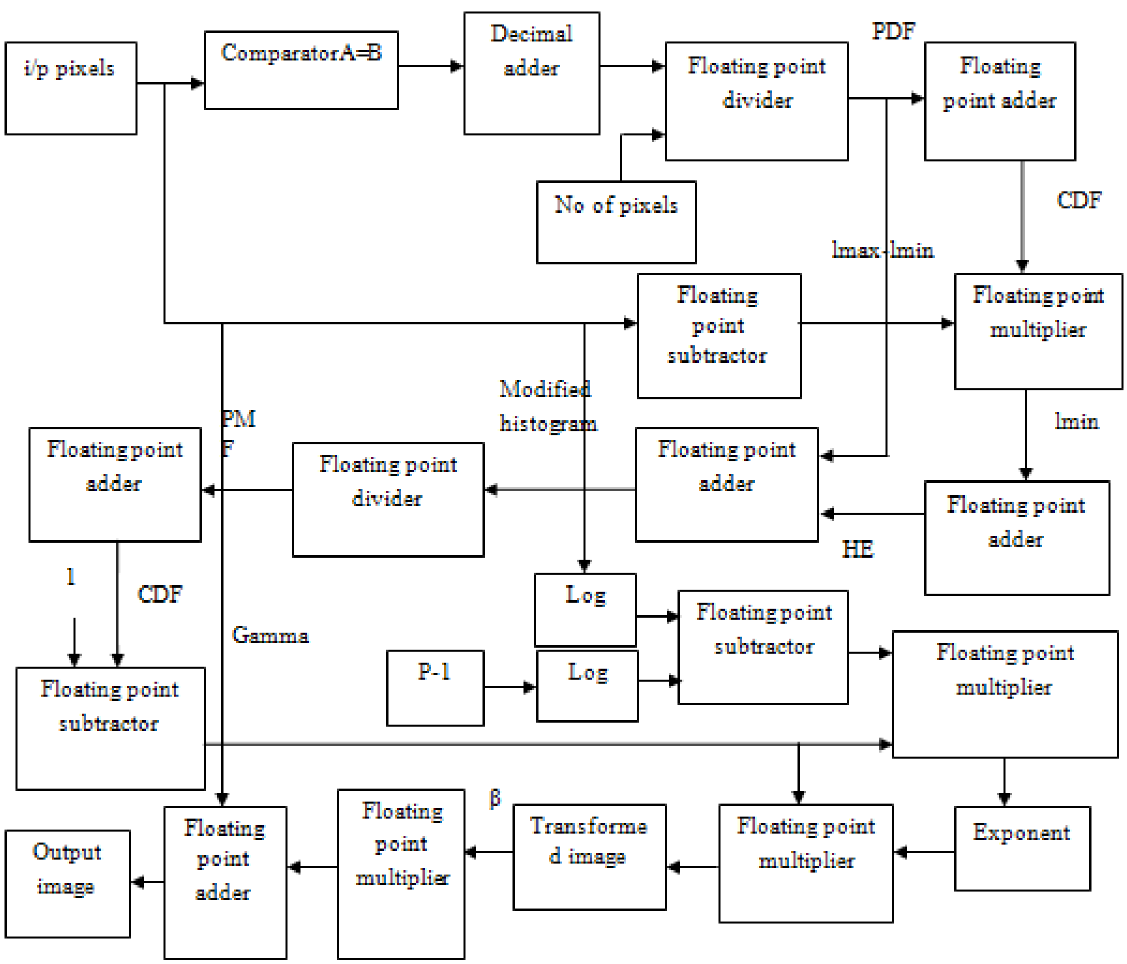

Figure 1. Block diagram for color preserving AGC algorithm.

to the decimal adder. Then the output of the decimal adder is given to the floating factor divider circuit to obtain the enter image histogram. The block is shown in Figure 2

4.2 Architecture of Histogram Equalization of an Input Image

The CDF must be elevated with lmax-lmin the end result from the multiplier is the equalized histogram. The block is shown in Figure 3.

4.3 Architecture of Modified Histogram

The original histogram is expanded with α value via floating point multiplier. And (1- α) is accelerated with equalized histogram. The above two multiplier effects are delivered by way of floating factor adder to acquire the modified histogram. The block is shown in Figure 4.

4.4 Architecture of Probability Mass Function Calculation

The PMF is acquired from the changed histogram. Every pixel within the changed histogram is divided with the aid of sum of the pixels within the changed histogram so the PMF is calculated via floating point adder and floating point divider block. The PMF module is shown in Figure 5.

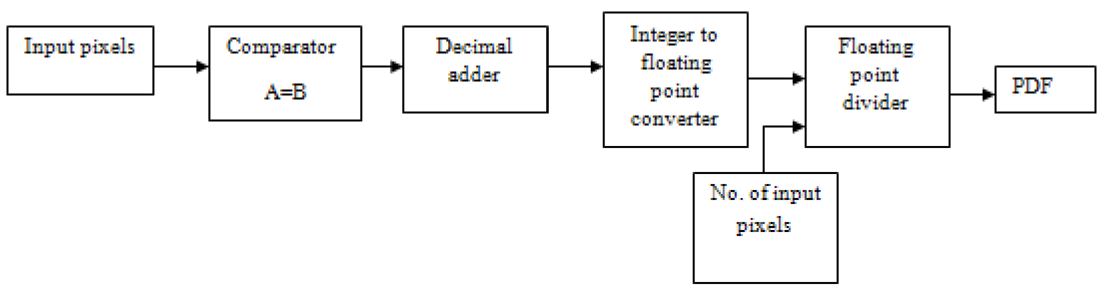

Figure 2. Block Diagram for Histogram of an Input image.

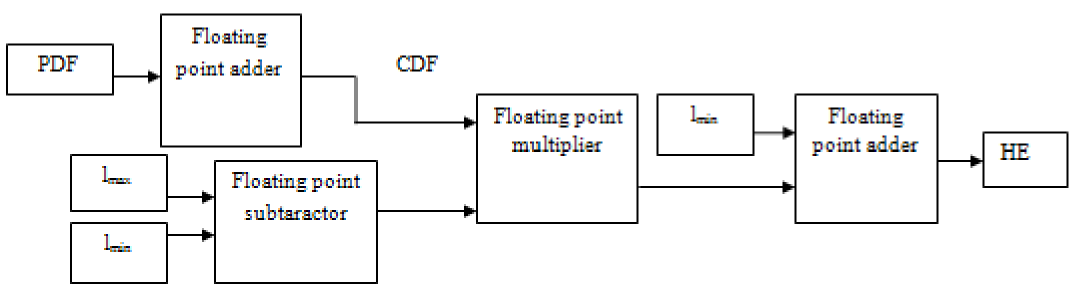

Figure 3. Block diagram for histogram equalization.

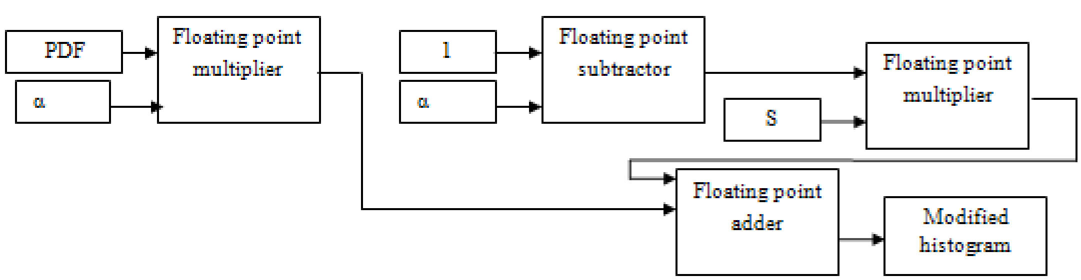

Figure 4. Block Diagram for Modified histogram.

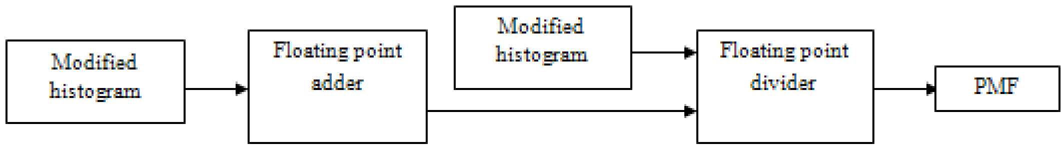

Figure 5. Block diagram for PMF calculation.

4.5 Architecture of Cumulative Distribution Function Calculation

With the aid of including the PMF values with every different so floating point adder block is used for CDF calculation. The CDF module is proven within the determine Figure 6.

4.6 Architecture of Gamma value Calculation

Gamma is obtained as 1- cdf (p) so each CDF values of the histogram are subtracted from good judgment 1 cost to obtain the gamma value. The floating factor subtractor is gives the gamma value. It is shown inside the Figure 7.

4.7 Architecture of Adaptive Gamma Correction Block

For simplification the adaptive gamma correction step is changed by means of, t (P) = (P-1) ×10 γ (log (p)-log (l-P)) in this calculation gamma is various parameter so the variable powers are present inside the calculation to keep away from the complexity of calculation, the log

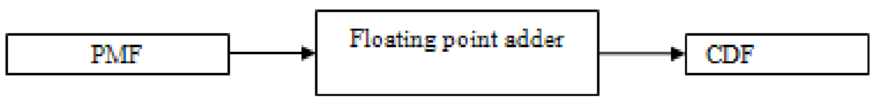

Figure 6. Block diagram for CDF calculation.

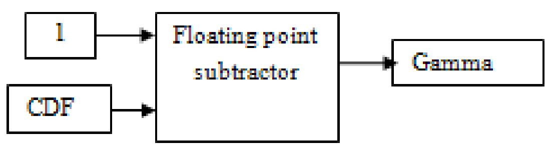

Figure 7. Block diagram for gamma calculation.

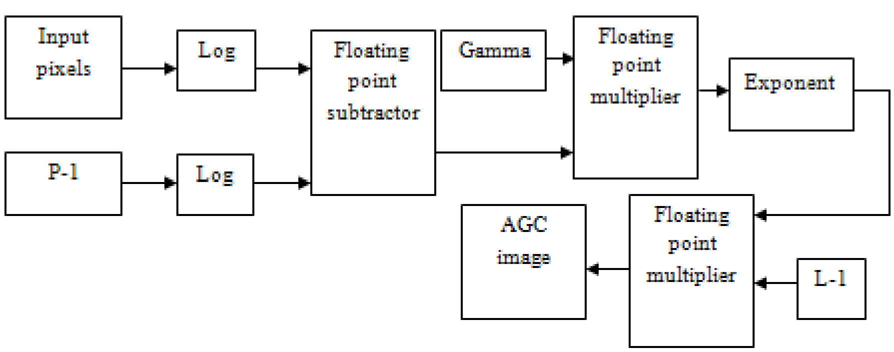

Figure 8. Block diagram for adaptive gamma correction.

operation is converted to multiplication. Then obtained end result is sent to the antilog block to attain the outcomes.The block is shown in Figure 8.

4.8 Architecture of Output Image Calculation

The output image is received by multiplying the transformed image (i.e) the image obtained from the AGC with β value and multiplying the (1- β) value with authentic image histogram and including the above two value by way of floating factor adder block. The output image calculation block is shown in Figure 9.

5. Results and Discussion

The structure devloped in ALTERA result for harware structure color preserving AGC proven inside the Figure 10 and result for color keeping AGC proven in Figure 11.

6. Conclusion

The proposed set of rules keeps the originality of the image with better PSNR and AMBE values. And the architecture for proposed method is developed by using ALTERA for 2×2 image.The architecture can be

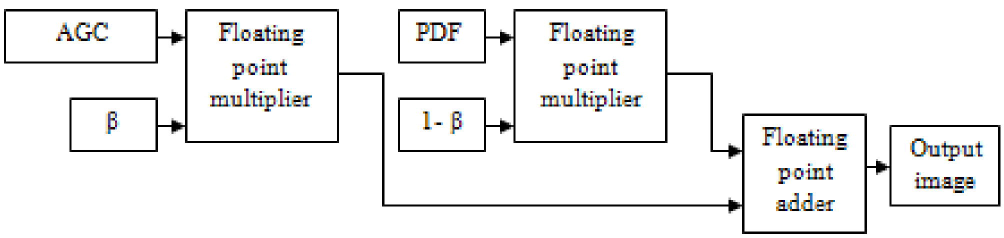

Figure 9. Block diagram for output image calculation.

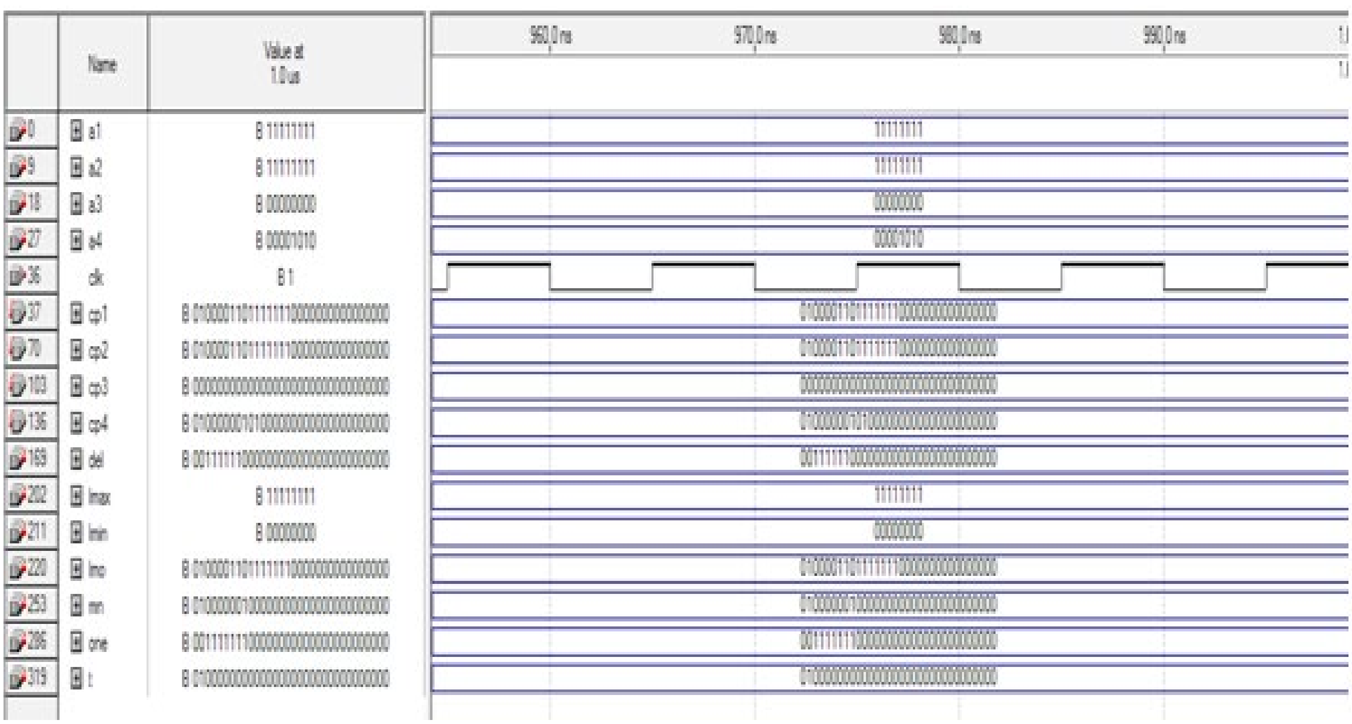

Figure 10. Result for architecture of color preserving AG.

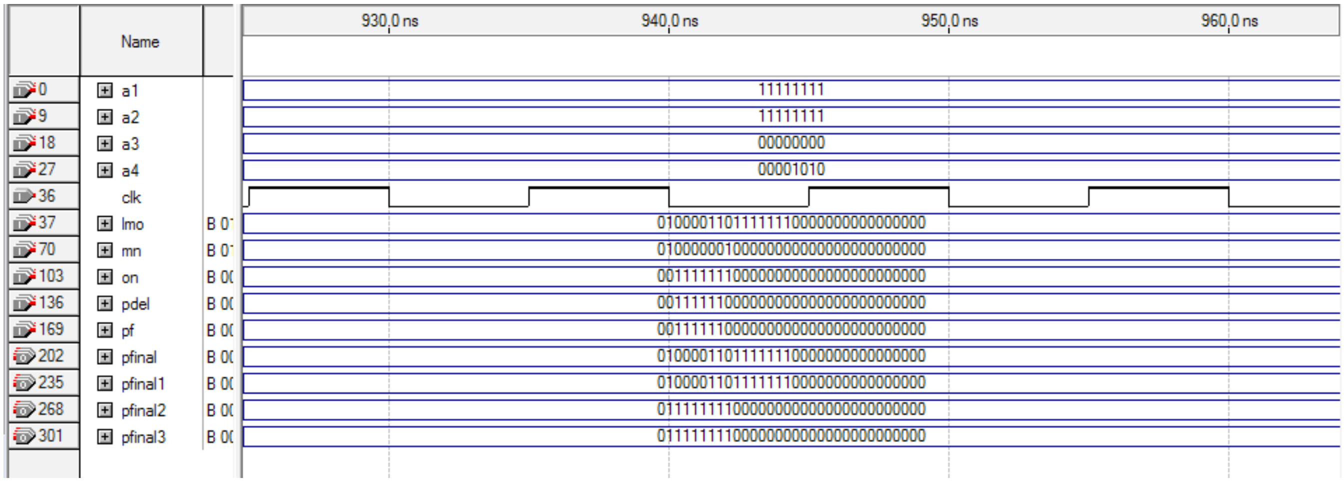

Figure 11. Result for architecture of modified color preserving AGC.

extended for an entire image.The proposed algorithm changes the representation of an test image by applying the modification rules.

7. References

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