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A NOVEL APPROACH FOR VITALITY CONSTRAINED CONTRAST ENHANCEMENT ALGORITHM USING SD-MSR

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ABSTRACT:

In this propose A Novel calculation for imperativeness obliged differentiation upgrade Algorithm utilizing SD-MSR . As a rule, MSR, which is the key segment of the proposed calculation, comprises of force controllable log operation and subbandwise increase control. To start with, we decay an info picture to MSRs of distinctive sub-groups, and figure a fitting addition for every MSR. Second, we apply a coarse-to-fine power control system, which recomputes the MSRs and additions. This step emphasizes until the target force sparing is precisely fulfilled. With feature successions, the differentiation levels of adjoining pictures are resolved reliably utilizing fleeting soundness as a part of request to abstain from glinting antiquities. At long last, we display a few improvement aptitudes for ongoing preparing. Test results demonstrate that the proposed calculation gives preferable visual quality over past techniques, and a steady power-sparing degree without glimmering ancient rarities, actually for feature arrangements.

***Index Terms*—Power consumption, contrast enhancement, OLED, multi-scale retinex**

I. INTRODUCTION

Current showcase boards can be ordered into emissive and non-emissive showcases. The cathode-beam tube (CRT), the plasma presentation board (PDP) and the natural light radiating diode (OLED) are illustrative emissive presentations that don't oblige outside light sources, though the dainty film transistor fluid precious stone showcase (TFT-LCD) is non-emissive. When all is said in done, emissive showcases have a few preferences over non-emissive ones [1], [2]. To begin with, since an emissive presentation can kill singular pixels, it can express finish obscurity and accomplish a high difference proportion. Second, emissive showcases devour less power than non-emissive ones on the grounds that every pixel in an emissive presentation can be autonomously determined and the force utilization of the pixel is relative to its force level. Note that non-emissive showcases ought to turn on their backdrop illumination paying little mind to pixel power. Therefore, the OLED is viewed as the most guaranteeing possibility for the cutting edge show [3], [4], which will supplant the TFT-LCD shows as of now ruling the business market. Despite the fact that the OLED is chiefly utilized for little boards as a part of cell phones, its large scale manufacturing innovation is being produced quickly. So expansive size OLED boards might soon be embraced in a more extensive scope of gadgets, for example, highdefinition TV (HDTV) and ultra HDTV [3]. Note that show modules devour the vast majority of the force in advanced media gadgets [5]. So methods to minimize power utilization in the presentation are unavoidably needed. A few picture handling procedures for force sparing in showcase boards have been proposed, past circuit-level force funds. Tragically, such procedures concentrate on decreasing backdrop illumination force for TFT-LCDs while saving the same level of saw quality [6]–[10]. So they can't be connected to power sparing in emissive showcase gadgets, for example, OLED. Lee et al. proposed a force obliged difference improvement calculation (PCCE) for emissive presentations in light of histogram leveling (HE) [11], [12] They built up a force utilization model for OLED shows and figured a target work that comprises of the HE term and the force term. By minimizing the target capacity in view of the arched advancement hypothesis, they attempted to all the while accomplish contrast upgrade and force funds. Be that as it may, with HE-based complexity upgrade there is a characteristic danger of overstretching. Additionally, since their system relies on upon specific parameters it can't consequently, reliably and precisely give the force sparing level craved by a client. Then again, different difference improvement procedures have been produced for many years [13]–[20]. As one of them retinex is

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a remarkable non-straight improvement technique utilized for differentiation upgrade and in addition element range pressure. The retinex hypothesis was proposed via Land and McCann [13], and Jobson et al. adjusted their hypothesis to singlescale retinex (SSR) [14] and multi-scale retinex (MSR) [15]. Retinex hypothesis accept that the human visual framework has three autonomous approaches to see short, medium, and long wavelengths in the obvious light range. In light of the retinex hypothesis, SSR uses Gaussian low pass channel (LPF) and log operation to highlight a particular wavelength scope of the picture, and MSR gives a yield picture as the weighted aggregate of the retinex yield pictures by utilizing a few direct LPFs having diverse bolster loca

II. POWER CONSUMPTION:

In electrical building, force utilization frequently alludes to the electrical vitality over the long run supplied to work an electrical machine. The vitality utilized by hardware is constantly more than the vitality truly required. This is on the grounds that no hardware is 100% productive. Force is squandered as warmth, vibrations and/or electromagnetic. Power utilization is typically measured in units of kilowatt hours (kWh). All the more precisely, power is the rate of utilization of vitality, measured in watts or pull. Electric vitality utilization is the type of vitality utilization that uses electric vitality. Electric vitality utilization is the real vitality request made on existing power supply. But in Asia and Middle East, utilizations were lessened in all the world locales. In OECD nations, representing 53% of the aggregate, power interest downsized by more than 4.5% in both Europe and North America while it shrank by over 7% in Japan. Power request additionally dropped by more than 4.5% in CIS nations, driven by a substantial cut in Russian utilization. On the other hand, in China and India (22% of the world's utilization), power utilization kept on ascending at an in number pace (+6-7%) to take care of vitality demand identified with high financial development. In Middle East, development rate was diminished however stayed high, just beneath 4%.

III.CONTRAST ENHANCEMENT:

Contrast is the difference in visual properties that makes an object (or its representation in an image) distinguishable from other objects and the background. In visual perception of the real world, contrast is determined by the difference in the color and brightness of the object and other objects within the same field of view. In other words, it is the different between the darker and the lighter pixel of the image, if it is big the image will have high contrast and in the other case the image will have low contrast.

Figure:1 On the left half low contrast, and on the right half high contrast image.

Chief goal of improvement is to process a picture so the outcome is more suitable than the first picture for a particular application. The statement particular is imperative, on the grounds that it makes at the start that the strategies are arranged to the issue. Accordingly, for instance, a strategy that is very valuable for upgrading X-beam pictures may not so much be the best approach for improving pictures of Mars transmitted by a space test. Despite the system utilized, then again, picture upgrade is a standout amongst the most intriguing and outwardly engaging ranges of picture transforming. Picture upgrade methodologies fall into two general classifications: spatial space techniques and recurrence area strategies. The term spatial area alludes to the picture plane itself, and methodologies in this classification are in view of direct control of pixels in a picture. Recurrence space preparing systems are in view of adjusting the Fourier change of a picture. I utilize the spatial area. Improvement systems taking into account different mixes of routines from these two classes are not unordinary. There is no general hypothesis of picture improvement. At the point when a picture is changed for visual elucidation,the viewer is a definitive judge of how well a specific system functions. Visual assessment of picture quality is a very subjective procedure, in this manner making the meaning of a "decent picture" a slippery standard by which to think about calculation execution. At the point when the issue is one of handling pictures for machine recognition, the assessment assignment is to a degree less demanding. For instance, in managing a character distinguishment application, and leaving aside different issues, for example, computational necessities, the best picture transforming system would be the one yielding the best machine distinguishment results. On the other hand, even in circumstances when an obvious basis of execution can be forced on the issue, a certain measure of

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experimentation normally is needed before a specific picture improvement methodology is chosen.

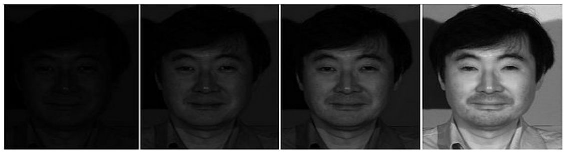

Figure:2 contrast enhancement images

IV.OLED:

A natural light-emanating diode (OLED) is a light-transmitting diode (LED) in which the emissive electroluminescent layer is a film of natural compound which emanates light because of an electric current. This layer of natural semiconductor is arranged between two terminals; commonly, no less than one of these anodes is straightforward. OLEDs are utilized to make advanced shows in gadgets, for example, TV screens, PC screens, convenient frameworks, for example, cellular telephones, handheld amusement reassures and PDAs. A noteworthy range of examination is the advancement of white OLED gadgets for utilization in strong state lighting applications. There are two principle groups of OLED: those in light of little particles and those utilizing polymers. Adding portable particles to an OLED makes a light-transmitting electrochemical cell (LEC) which has a marginally diverse mode of operation. OLED presentations can utilize either detached matrix(PMOLED) or dynamic network tending to plans. Dynamic framework OLEDs (AMOLED) oblige a dainty film transistor backplane to switch every individual pixel on or off, yet consider higher determination and bigger presentation sizes. An OLED showcase lives up to expectations without a backdrop illumination; therefore, it can show profound dark levels and can be more slender and lighter than a fluid precious stone display(LCD). In low encompassing light conditions, (for example, a dim room), an OLED screen can accomplish a higher complexity proportion than a LCD, paying little mind to whether the LCD uses chilly cathode fluorescent lights or a LED backdrop illumination.

Advantages

The different manufacturing process of OLEDs lends itself to several advantages over flat panel displays made with LCD technology.

1. Lower cost in the future

OLEDs can be imprinted onto any suitable substrate by an inkjet printer or even by screen printing, theoretically making them less expensive to deliver than LCD or plasma shows. Be that as it may, manufacture of the OLED substrate is more expensive than that of a TFT LCD, until large scale manufacturing strategies lower cost through adaptability. Move to-move vapor-affidavit systems for natural gadgets do permit large scale manufacturing of a great many gadgets every moment for negligible expense, in spite of the fact that this method additionally affects issues in that gadgets with numerous layers can be trying to make as a result of enrollment, coating up the diverse printed layers to the obliged level of exactness.

2. Lightweight and flexible plastic substrates

OLED showcases can be created on adaptable plastic substrates prompting the conceivable manufacture of adaptable natural light-discharging diodes for other new applications, for example, move up presentations inserted in fabrics or apparel. As the substrate utilized can be adaptable, for example, polyethylene terephthalate (PET),[61] the presentations may be delivered reasonably. Further, plastic substrates are smash safe, not at all like glass showcases utilized as a part of LCD gadgets.

3. Wider viewing angles and improved brightness

OLEDs can enable a greater artificial contrast ratio (both dynamic range and static, measured in purely dark conditions) and a wider viewing angle compared to LCDs because OLED pixels emit light directly. OLED pixel colors appear correct and unshifted, even as the viewing angle approaches 90° from normal.

4. Better power efficiency and thickness

LCDs filter the light emitted from a backlight, allowing a small fraction of light through. So, they cannot show true black. However, an inactive OLED element does not produce light or consume power, thus allowing true blacks.[62] Dismissing the backlight also makes OLEDs lighter because some substrates are not needed. This allows electronics potentially to be manufactured more cheaply, but, first, a larger production scale is needed, because OLEDs still somewhat are niche products.[63] When looking at top-emitting OLEDs, thickness also plays a role when talking about index match layers (IMLs). Emission intensity is enhanced when the IML thickness is 1.3–2.5 nm. The refractive value and the matching of the optical IMLs property, including the device structure parameters, also enhance the emission intensity at these thicknesses.

6. Response time

OLEDs also have a much faster response time than an LCD. Using response time compensation technologies, the fastest

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modern LCDs can reach as low as 1ms response times for their fastest color transition and are capable of refresh frequencies as high as 144 Hz (frame interpolation on modern "240Hz" and "480Hz" LCD TVs is not a true increase in refresh frequency). OLED response times are up to 1,000 times faster than LCD according to LG,[65] putting conservative estimates at under 10µs (0.01ms), which in theory could accommodate refresh frequencies approaching 100 kHz (100,000 Hz). Due to their extremely fast response time, OLED displays can also be easily designed to interpolate black frames, creating an effect similar to CRT flicker in order to avoid the sample-and-hold behavior used on both LCDs and some OLED displays that creates the perception of motion blur.

V. MULTISCALE RETINEX:

In general, MSR, which is the key component of the proposed algorithm, consists of power controllable log operation and sub band wise gain control. First, we decompose an input image to MSRs of different sub-bands, and compute a proper gain for each MSR. Second, we apply a coarse-to-fine power control mechanism, which recomputed the MSRs and gains. This step iterates until the target power saving is accurately accomplished. Which jointly achieves contrast enhancement and dynamic range compression using an adaptive weighting strategy proper for an input image? Finally, we present a power control scheme for a constant power reduction ratio in video sequences by using temporal coherence in video sequences. Experimental results show that the proposed algorithm provides better visual quality than previous methods, and a consistent power-saving ratio without flickering artifacts for video sequences. W_L and W_H denote

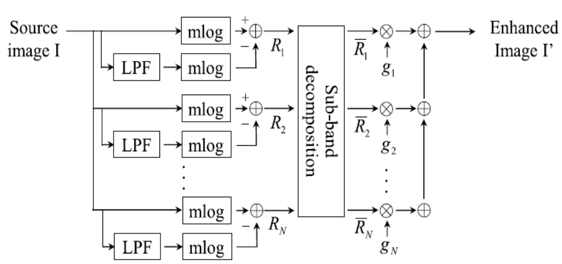

Figure:3 Block diagram of the conventional SD-MSR

weighting parameters accord MSR is an extended SSR with multiple kernel windows of different sizes. MSR output is a weighted sum of several different SSR outputs. The MSR output for a single spectral component can be represented as

$$R^{MSR}(x,y) = \sum_{n=1}^{N} w_n . R_n(x,y) \quad (3)$$

Where

$$R_n(x,y) = \log I(x,y) - \log(F_n(x,y) * I(x,y)) \quad (4)$$

Here, R_n *(x, y)* denotes a retinex output associated with the *n*-th scale for an input image $I_{(x,\ y)}$. Note that gain W_n is determined so that it can satisfy the condition of $\sum W_n = 1$. The symbol "*" in Equation 4 denotes the convolution operation and *N* is the number of scales. $F_n(x, y)$ denotes a surround unction and is given by

$$F_n(x,y) = K_n e^{(x^2+y^2)/\sigma_n^2} \quad (5)$$

Where K_n is determined so that $F_n(x, y)$ can satisfy $\sum_x \sum_y F_n(x,y) = 1$. σ_n^2 Denotes the variance of the Gaussian kernel at the *n*-th sub-band. Under the condition $\sigma_n > \sigma_{n-1}$ for every SSR, we can derive successive frequency sub-bands. Note that a small σ_n is suitable for enhancing fine details, whereas a large σ_n is suitable for improving tonality. Thus, it is important to select an appropriate value of σ_n in the MSR. Based on this rationale, Jang et al. proposed an SD-MSR that consists of a modified logarithmic function, sub-band decomposition, space varying sub-band gain, and an automatic gain/offset control. The modified log (*m* log) is defined as

$$m\log(I(x,y)) = \begin{cases} w_L \log(I(x,y)+1) & I(x,y) \le \tau \\ -w_H \log(D - I(x,y)) + \log D & I(x,y) > \tau \end{cases} \quad (6)$$

where τ is a user-defined threshold and *D* denotes an image dynamic range. For example, *D* is 256 for an 8-bit image.
ing to τ and are defined as

$$w_L = \frac{\frac{\tau}{D-1}\log D}{\log(\tau+1)}, \quad (7)$$

$$w_H = \frac{(1-\frac{\tau}{D-1})\log D}{\log(D-\tau)} \quad (8)$$

As a result, the *m*log function of Eq. (7) enhances the contrasts of dark regions as well as bright regions. In this way, we can enhance image details both in highlights and shadows. Another feature of SD-MSR is to decompose the modified retinex outputs into nearly non-overlapping spectral bands. The following equation accomplishes this sub-band decomposition:

$$\overline{R_1} = R_1, \quad n=1$$
$$\overline{R_1} = R_n - R_{n-1} \quad 2 \le n < N \quad (9)$$

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As *n* increases, R_n corresponds to the low frequency region more and more. Here, *Rn* is computed by replacing the log of Eq. (5) with the m_{log} of Eq. (7) next, the space varying sub-band gain at the ***n***-th subband is defined as

$$g_n(x,y) = \left(\frac{1}{NR_n(x,y)+\varepsilon_g}\right)^{1-\frac{\sigma_n}{\sigma_{max}+\varepsilon_\sigma}} \quad (10)$$

Where σ_{max} = max $n \in \{1,2,...,N\}$ σ_n. Also, E_g and E_σ are two constants to avoid dividing by zero. In this paper, εg and $E\sigma$ are set to0.1 and 0, respectively. *NRn* denotes the normalized SSR at the ***n***-th sub-band and is defined as

$$N\,R_n(x,y) = \frac{|\overline{R_n(x,y)}|}{|\overline{R_n}|_{max}} \quad (11)$$

Where $|\overline{R_n}|_{max}$= max R_n In a high spectral band of small *n*, they make the gain difference between pixels larger, especially for the pixels with low NR_n *(x, y)*. This is because this spectral band has large high-frequency components representing image details. Meanwhile, they lower the gain difference between pixels in a high spectral band of large *n* to maintain the characteristics of a natural scene. Thus, using Eq. 10, the final enhanced image *I_* is output as follows:

$$I' = \sum_{n=1}^{N} g_n \bar{R}_n \quad (12)$$

VI. EXPERIMENTAL RESULTS

To evaluate the performance of the proposed algorithm, we chose two images from Kodak Lossless True Color Image Suite1 (*caps* and *beach*) and a high dynamic range (HDR) test image *memorial*. Also, we employed six common intermediate format (CIF) video sequences. We processed only the luminance components in the experiments. More specifically, given a color image, we converted it to the YUV color space and then process only the Y-component without modifying the U- and V-components.

Figure:4 Input video

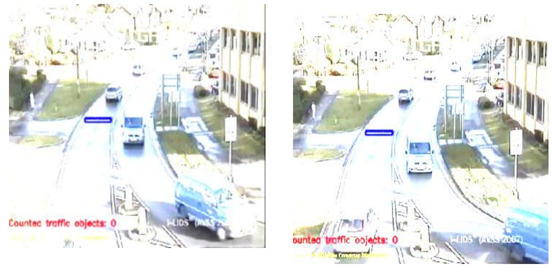

Figure:5 Enhanced fram1

Figure:6 Input video

Figure:7 output video

Figs. 4 and 5compare several algorithms for *night*, *crew*, and *memorial* images, respectively when *P* is 50%. The PCCE is still good for enhancing contrasts in comparison with the other algorithms. Especially observing lights and electric signs we can find that the PCCE outperforms the other methods in terms of contrast enhancement. However, the PCCE loses some details in the dark region. On the other hand, note that the proposed algorithm preserves most of the details of the original image while providing reasonably enhanced contrasts in comparison with the other algorithms the proposed algorithm produces better visual quality than the other algorithms.

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VI .CONCLUSION

This project proposes an SD-MSR-based image processing algorithm for fine power control in OLED displays. In this designed a power-constrained log function for effective power saving in dark regions. Using the power-constrained log function for SD-MSR and an adaptive weighting strategy proper for an input image, we proposed a coarse-to-fine power control mechanism for still images. Finally, we presented a power control scheme for a constant power reduction ratio in video sequences by using temporal coherence in video sequences. Experimental results showed that the proposed algorithm provides better visual quality than previous works, and a consistent power-saving ratio without the flickering artifact even for video sequences. Specifically, the proposed algorithm provides at maximum 36% and on average 13% higher edge-preserving ratios than the state-of-the-art algorithm (i.e., PCCE [11]). In addition, we proved the possibility of real-time processing by accomplishing an entire execution time of 9 ms per 1080p image.

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