www.ijecs.in
International Journal Of Engineering And Computer Science ISSN:2319-7242
Volume 4 Issue 7 July 2015, Page No. 13529-13535

An High Equipped Power Constrained Algorithm For OLEDS Based On MSR

Dayaker S (Pg Scholar) [1] ***Yakub M.Tech Assistant Professor*** [2]

Department of ECE, HARSHITH GROUP OF INSTITUTIONS, JNTU (HYD)

ABSTRACT: *This paper presents a power-constrained contrast enhancement algorithmic program for organic semiconductor diode display based on multi scale retinex (MSR). In general, MSR, that is the key element of the planned algorithmic program, consists of power controllable log operation and sub band wise gain management. First, we decompose associate input image to MSRs of various sub-bands, and figure a correct gain for every MSR. Second, we have a tendency to apply a coarse-to-fine power management mechanism, that re computes the MSRs and gains. This step iterates till the target power saving is accurately accomplished. With video sequences, the contrast levels of adjacent pictures are determined systematically using temporal coherence so as to avoid unsteady artifacts. Finally, we gift many improvement skills for data processing. Experimental results show that the planned algorithmic program provides better visual quality than previous strategies, and a consistent power-saving magnitude relation while not unsteady artifacts, even for video sequences*

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

I. INTRODUCTION

MODERN show panels will be classified into emissive and non-emissive displays. The cathode-ray tube(CRT), the plasma board (PDP) and also the organic light-weight emitting diode (OLED) square measure representative emissive displays that don't need external light sources, whereas the thin-film transistor liquid show (TFT-LCD) is non-emissive. In general, Emissive displays have many blessings over r non-emissive ones [1], [2]. First, since associate degree emissive display can close up individual pixels, it will specific complete darkness and win a high distinction quantitative relation. Second, emissive shows consume less power than non-emissive ones as a result of every component in associate degree emissive display will be severally driven and the power consumption of the pixel is proportional to its intensity level. Note that non-emissive displays ought to activate their backlight despite component intensity. Thus, the OLED is thought to be the foremost promising candidate for the next-generation show [3], [4], which can replace the TFT-LCD displays presently dominating the business market. Even if the OLED is especially used for small panels in mobile devices, its mass-production technology is being developed quickly. Therefore large-size OLED panels may soon be adopted in a very wider vary of devices like high definition TV (HDTV) and radical video [3].Note that show modules consume most of the facility in digital media devices [5]. Therefore techniques to attenuate power consumption within the show square measure inevitably needed. Several image process techniques for power saving in show panels are projected, on the far side circuit-level power savings. Unfortunately, such techniques specialize in reducing backlight intensity for TFT-LCDs whereas conserving a similar level of perceived quality [6]–[10]. In order that they can't be applied to power saving in emissive show devices like OLED. Lee et al. projected a power-constrained contrast enhancement algorithmic rule (PCCE) for emissive displays based on bar graph deed (HE) [11], [12] They developed a power-consumption model for OLED displays and formulated an objective operate that consists of the HE term and the power term. By minimizing the target operate based mostly on the bell-shaped optimization theory; they tried to simultaneously achieve distinction improvement and power savings. However, with HE-based distinction improvement there's associate degree inherent risk of overstretching. Also, since their methodology depends on certain parameters it cannot mechanically, systematically and accurately provide the power-saving level desired by a user. On the opposite hand, numerous distinction improvement techniques have been developed for dozens of years [13]–[20]. Mutually of them retinex may be a well-known non-linear improvement method used for distinction improvement further as dynamic range compression. The retinex theory was projected by Land and McCann [13], and Jobson et al. custom-made their theory to single scale retinex (SSR) [14] and multi-scale retinex (MSR) [15].Retinex theory assumes that the human sensory system has three freelance ways that to understand short, medium, and long wavelengths within the actinic radiation spectrum. supported the retinextheory, SSR utilizes mathematician low pass filter (LPF) and log operation to intensify a selected wavelength vary of the image, associate degreed MSR offers an output image because the weighted total of the retinex output pictures by victimization many linear LPFs having different support regions. This paper proposes a power-constrained distinction improvement algorithmic rule employing a sub-band rotten MSR (SD-MSR) [16] for OLED show. First, we have a tendency to designed modified log operate for dynamic power saving. Second we have a tendency to propose a coarse-to-fine power management mechanism based on SD-MSR, that together achieves distinction enhancement and dynamic vary compression victimization associate degree adaptation weighting strategy correct for associate degree input image. Finally, we have a tendency to gift power management theme for a continuing power reduction ratio in video sequences by victimization temporal coherence in video sequences. Experimental results show that the projected algorithmic rule provides higher visual quality than previous ways, and a consistent power-saving quantitative relation while not flicker artifacts for video sequences.

II.SUB-BANDDECOMPOSEDMULTI-SCALERETINEX

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

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

where

$$R_n(x,y)=logI(x,y)-\log\big(F_n(x,y)*I(x,y)\big) \qquad (2)$$

Here $R_n(x,y)$,denotes a retinex output associated with the n-the scale for an input image $I(x,y)$.Note that gain wn is determined so that it can satisfy the condition of $\sum w_n=1$. The symbol "*" in Eq. (2) denotes the convolution operation and Nis the number of scales. $F_n(x,y)$ Denotes a surround function and is given by

$$F_n(x,y)=K_n e^{(x^2+y^2)}/\sigma_n^2 \qquad (3)$$

Where K_n is determined so that $F_n(x,y)$ can satisfy $\sum\sum F_n(x,y)=1$. σ_n^2 denotes the variance of the Gaussian kernel at then-the sub-band. Under the condition $\sigma_n>\sigma_{n-1}$ every SSR, we can derive successive frequency sub-bands. Note that a small is suitable for enhancing fine details, whereas a Largent is suitable for improving tonality. Thus, it is important to select an appropriate value of an 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 [16] (see Fig. 1). The modified log (mlog) is defined as

$$mlog\big(I(x,y)\big)=\begin{cases} w_L\log(I(x,y)+1) & I(x,y)\le\tau \\ -w_H\log(D-I(x,y))+logD) & I(x,y)>\tau \end{cases} \qquad (4)$$

Where τ is a user-defined threshold and D denotes an image dynamic range. For example, D is 256 for an 8-bit image

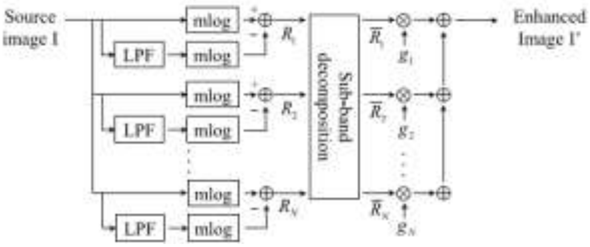

Figure1 :block diagram of conventional SD-MSR

w_L And w_L denote weighting parameters according to and are defined as

$$w_L=\frac{\frac{\tau}{D-1}logD}{\log(\tau+1)},\ w_L=\frac{(1-\frac{\tau}{D-1})logD}{\log(D-1)} \qquad (5)$$

s a result, the mlog function of Eq. (4) 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 nonoverlapping spectral bands. The following equation accomplishes this sub-band decomposition:

$$\bar{R}_1 = R_1 \qquad n = 1$$

$$\bar{R}_n = R_n - R_{n-1} \qquad 2 \le n < N \qquad (6)$$

As n increases, Rn corresponds to the low frequency region n more and more. Here, Rn is computed by replacing the log of Eq. (2) With the mlog of Eq. (4) Next, the space vary in g sub-band gain at then-the sub-band is defined as

$$g_n(x,y) = \left(\frac{1}{NR_n(x,y)+\varepsilon_g}\right)^{1-\frac{\sigma_n}{\sigma max+\varepsilon\sigma}} \qquad (7)$$

Where

$$\sigma_{max} = \max_{n\epsilon[1,2,3\ldots N]} \sigma_n$$

$$NR_n(x,y) = \frac{|\bar{R}_n(x,y)|}{\bar{R}_{n_{max}}} \qquad (8)$$

In a high spectral band of small, 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. (7), the final enhanced imageIis output as follows

$$I' = \sum_{n=1}^{N} g_n \widetilde{R_n} \qquad (9)$$

III.THE PROPOSED ALGORITHM

We propose a power governable distinction enhancement algorithm for OLED show primarily based on SD-MSR. Fig. 2 describe the projected formula that consists of three stages. the primary stage coarsely reduces the facility of Associate in Nursing input image nearer to the target power with distinction improvement, and the second stage finely controls the image power such that it's terribly near the target power. If the input could be a video sequence, the ultimate stage adjusts the facility of every image so that it is like those of its neighbors by considering the temporal coherence of the input video sequence. The projected formula is differentiated from previous methods in the following 3 aspects. First, we tend to control the target power level mechanically. Second, we tend to avoid theflickering development by keeping the facility levels of adjacent images constant for video sequences. Third, we tend to come through time period process of the projected formula on a all-purpose graphics process unit (GPU) even for full HD video sequences

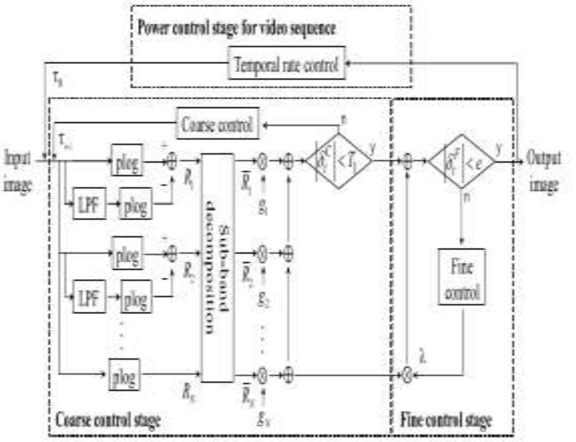

Figure 2: block diagram of proposed algorithm

Image nearer to the target power with distinction improvement and the second stage finely controls the image power such that it's terribly near the target power. If the input may be a video sequence, the ultimate stage adjusts the ability of every image so that it's the same as those of its neighbors by considering the temporal coherence of the input video sequence. The projected algorithmic program is differentiated from previous methods within the following 3 aspects. First, we have a tendency to control the target power level mechanically. Second, we have a tendency to avoid the flickering development by keeping the ability levels of adjacent images constant for video sequences. Third, we have a tendency to bring home the bacon real-time process of the projected algorithmic program on a general purpose graphics process unit (GPU) even for full HD video sequences.

A. Power Modeling in OLED Display

Before presenting an in depth clarification of the projected algorithmic program, we want to model power for associate OLED show. Dong et al. conferred a pel-based power model that estimates the ability consumption of OLED modules supported the red green-blue (RGB) specification of every pixel [21]. the ability consumption of associate OLED show with K pixels, i.e., P is

$$P_{OLED} = C + \sum_{i=1}^{K} (f_R(R_i) + f_G(G_i) + f_B(B_i)) \qquad (10)$$

Also, we consider only the Y-componentbecause it dominates the entire overall power. Note that theY-component indicates the luminance component in YUVcolor format. So we use the Y-component power consumption(YP) of an OLED display with Kpixels [11] as

$$Y_P = \sum_{i=1}^{K} Y_i^{\gamma} \qquad (11)$$

Where γ is a parameter for gamma correction for a given display device

B. The Proposed Algorithm

This section details the proposed algorithm.1) Coarse Control Stage: The mlog of conventional SD-MSR plays a role in enhancing the contrasts of highlights and shadow regions. In other words, contrast in the dark region becomes high by increasing the intensity level of the pixels in the region, and contrast in the bright region also becomes high by decreasing the intensity level of the pixels in the region. However, the increase of the intensity values in the shadow region results in the increase in power consumption for the OLED display. So, for low power consumption as well as contrast enhancement, even in the shadow region, we redefine a so-called power-constrained log (plog) from them log of Eq. (4) as follows

$$plog\big(I(x,y)\big) = \begin{cases} \frac{\tau log D log(\alpha I(x,y)+1)}{(D-1)\log(\alpha\tau+1)} & I(x,y) \le \tau \\ mlog\big(I(x,y)\big) & I(x,y) > \tau \end{cases} \qquad (12)$$

Therefore, the $plog$ of Eq. (12) has the effect of controlling the increase in power consumption while partially lowering the contrast in the dark region. From Eq. (7) and MSRs computed by $plog$, i.e., {Rn}, we can derive the following output image

$$\tilde{R}_t = \sum_{n=1}^{N} g_n \grave{R}_n \qquad (13)$$

On the other hand, basin YP on Eq. (11), the power reduction ratio of an input image and its output image is defined as follows

$$p_t = 1 - \frac{YP(\hat{\hat{R}}_t)}{YP(I)} \qquad (14)$$

IV. SIMULATION RESULTS

In this paper, $\bar{R}_n$ can be computed with Eq. (15) as in [16].

$$f(X) = X^N = \frac{X-m}{M-m}(L-1) + l \qquad (15)$$

Let δ_t denote the difference between p_t and P as in Eq. (16)

$$\delta_t = P - p_t \qquad (16)$$

Eq. (17) because such a condition indicates an excess of power reduction over P.

$$\tau_{t+1} = \tau_t + {}^{(D-\tau_t)}\!/_2 \qquad (17)$$

we increase τ relatively small as in Eq. (18) because δCt weakly over runs P

$$\tau_{t+1} = \tau_t + {}^{(D-\tau_t)}\!/_4 \qquad (18)$$

So we approach P by decreasing τ relatively small as in Eq. (19).

$$\tau_{t+1} = \tau_t + {}^{\tau_t}\!/_4 \qquad (\,19)$$

So we rapidly approach P by decreasing τ significantly.

$$\tau_{t+1} = \tau_t + {}^{\tau_t}\!/_2 \qquad (20)$$

On the other hand, the low-frequency region is rarely related to image details, but it dominates image power as a whole. So we try to approach P by finely controlling the proportion of the lowest-band MSR which may have most of the image power. In detail, we control the gain of RN as follows:

$$R^{\wedge} = \sum_{n=1}^{N-1} g_n \bar{R}_n + (\,g_N + \lambda)\,\bar{R}_N \qquad (21)$$

Where λ indicates a control parameter for the lowest-band MSR.λ, which is updated according to Eq. (22) enables the FCS to approach the target power with little change of contrast

$$\lambda_{t+1} = \lambda_t - \delta_t^F \qquad (22)$$

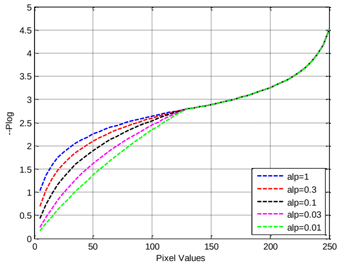

Figure 3: Profile of the proposed algorithm

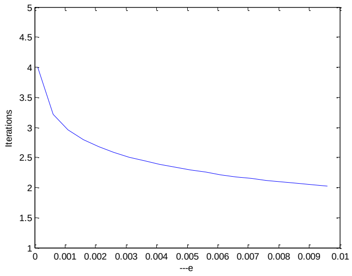

Figure 5: Error analysis w.r.t. no of iterations

Figure 4: Output results of the proposed algorithm, Linea algorithm and PCCE algorithm

The performance of the proposed algorithm can be evaluated by choosing the 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: container(500 frames),football(90 frames), Paris(300 frames), foreman (300 frames), bus(500 frames),Stefan(90 frames) and five 720p sequences: big ship (60 frames), crew (60 frames), jets (60 frames), night(60 frames), raven (60 frames), and four 1080p sequences: crowd run(500 frames), park joy(60 frames), toys and calendar(60 frames) traffic (60 frames). 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.

CONCLUSION

This paper proposes Associate in Nursing SD-MSR-based image processing algorithm for fine power management in OLED displays. We designed a power-constrained log perform for effective power saving in dark regions. victimization the power-constrained log function for SD-MSR Associate in Nursing Associate in Nursing adjective weight strategy proper for an input image, we tend to projected a coarse-to-fine power control mechanism for still pictures. Finally, we tend to given a power management theme for a constant power reduction ratio in video sequences by victimization temporal coherence in video sequences. Experimental results showed that the proposed algorithm provides higher visual quality than previous works, and a consistent power-saving magnitude relation while not the flickering artifact even for video sequences. Specifically, the proposed algorithm provides at most twelve months and on average13% higher edge-preserving ratios than the state-of-the-art algorithm (i.e., PCCE [11]). In addition, we tend to tried the possibility of real-time operation by accomplishing Associate in nursing entire execution time of nine ms per 1080p image.

With video sequences, the contrast levels of adjacent pictures are determined systematically using temporal coherence so as to avoid unsteady artifacts. Finally, we gift many improvement skills for data processing. Experimental results show that the planned algorithmic program provides better visual quality than previous strategies, and a consistent power-saving magnitude relation while not unsteady artifacts, even for video sequences

TABULAR COLUMNS

COMPARISON IN TERMS OF SHARPNESS ENHANCEMENT METRIC

NAME	P=10%			P=30%		
	Linear	PCCE	Proposed	Linear	PCCE	Proposed
Bikes	4.9529	5.1946	5.7983	14.8588	15.5796	17.3672
Buildings	5.8787	6.1145	6.7297	17.6361	18.3993	20.2419
Cemetery	4.5727	4.8038	5.3814	13.7181	14.3961	16.1338
House	2.4153	2.8192	2.8618	7.2459	8.3118	8.4986
Light house	3.0829	3.4177	3.5855	9.2487	10.0178	10.6978
Monarch	4.0227	4.5232	5.0317	12.0681	13.3954	15.0005
Ocean	1.9568	2.2376	2.4688	5.8705	6.6398	7.3665
Parrot	2.0217	2.2356	2.3893	6.0652	6.5852	7.0810
Plane	1.9168	2.0040	2.1597	5.7505	5.9876	6.4492
Rapids	3.7163	3.9752	4.3199	11.1489	11.8197	12.8169
Statue	2.5265	2.8698	3.0707	7.5794	8.4867	9.2362
Woman	3.4289	3.7662	3.9799	10.2868	11.1470	11.8233

COMPARISON IN TERMS OF THE EME VALUE

NAME	P=10%			P=30%		
	Linear	PCCE	Proposed	Linear	PCCE	Proposed
Bikes	9.6094	18.2726	63.5924	9.6094	14.9232	63.9642
Buildings	5.1674	7.3984	20.4297	5.1674	6.8914	20.8775
Cemetery	6.3315	15.6733	501756	6.3315	12.2051	48.9967
House	404213	15.3661	27.3182	4.4216	13.1372	26.4888
Light house	6.6490	14.0490	31.0258	6.6490	11.2048	29.5062
Monarch	4.9062	35.8532	57.9589	4.9062	25.8058	56.7810
Ocean	4.8540	29.9294	59.2486	4.8540	25.6026	58.9096
Parrot	7.9361	18.0644	29.4559	7.9361	11.0465	25.8077
Plane	6.6216	10.6665	49.3452	6.6216	10.0051	48.9671
Rapids	7.5434	20.9534	57.9940	7.5434	11.8584	56.5294
Statue	7.7416	11.1254	79.8740	7.7416	9.5645	80.3500
Woman	7.0557	30.0266	80.5296	7.0557	19.3998	80.4561

REFERENCES

[1] J. Jang, S. Lee and M. Oh, "Technology development and production of flat panel displays in Korea,"IEEE Proc. J., Mag., vol. 90 no. 4pp. 501–513, Apr. 2002.

[2] K. Suzuki, “Past and future technologies of information displays,” inProc. IEEE IEDM, Dec. 2005, pp. 16–21.

[3] B. Young, “OLEDs—Promises, myths, and TVs, “Inform. Display,vol. 25, no. 9, pp. 14–17, Sep. 2009.

[4] H. D. Kim H. J. Chung, B. H. Berkeley, and S. S. Kim, “Emerging technologies for the commercialization of AMOLED TVs,”Inf. Display, vol. 25, no. 9, pp. 18–22, Sep. 2009.

[5] W.-C. Cheng and M. Pedram, “Power minimization in a backlitTFT-LCD display by concurrent brightness and contrast scaling,”IEEETrans. Consume. Electron. vol. 50, no. 1, pp. 25–32, Feb. 2004.

[6] P. Greef and H. G. Hulze, “Adaptive dimming and boosting backlight forLCD-TV systems,” inside Symp. Dig. Tech. Papers, May 2007, vol. 38, no. 1, pp. 1332–1335.

[7] L. Kerensky and S. Daly, “Distinguished paper: Brightness preservation for LCD backlight reduction,” inSID Symp. Dig. Tech.Papers, Jun. 2006, vol. 37, no. 1, pp. 1242–124.

[8] C.-C. Lai and C.-C. Tsai, “Backlight power reduction and image contrast enhancement using adaptive dimming for global backlight applications,”IEEE Trans. Consume. Electron. vol. 54, no. 2, pp. 669–674, May 2008.

[9] S. I. Cho, S.-J. Kang and Y. H. Kim, “Image quality-aware backlight dimming with color and detail enhancement techniques,”IEEE J.Display Technol., vol. 9, no. 2, pp. 112–121, Feb. 2013.

[10] P.-S. Tsai, C.-K. Liang, T.-H. Huang and H. H. Chen, “Imageenhancement for backlight-scaled TFT-LCD displays,”IEEE Trans.Circuits Syst. Video Technol., vol. 19, no. 9, pp. 574–583, Apr. 2009.

[11] C. Lee, C. Lee, Y.-Y. Lee, and C.-S. Kim, “Power-constrained contrast enhancement for emissive displays based on histogram equalization,”IEEE Trans. Image Process., vol. 21, no. 1, pp. 80–93, Jan. 2012.

[12] C. Lee, C. Lee and C.-S. Kim, “Power-constrained contrast enhancement for OLED displays based on histogram equalization,” inProc. IEEE ICIP, Sep. 2010, pp. 1689–1692.

[13] E. H. Land and J. McCann, “Lightness and retinex theory,”J. Opt. Soci.Amer., vol. 61, no. 1, pp. 1–11, Jan. 1971.

[14] D. J. Jobson, Z.-U. Rahman, and G. A. Woodell, “Properties andperformance of a center/surround retinex,”IEEE Trans. Image Process.,vol. 6, no. 3, pp. 451–462, Mar. 1997.

[15] D. J. Jobson, Z.-U. Raman, and G. A. Woodell, “A multistage retinexfor bridging the gap between color images and the human observationof scenes,”IEEE Trans. Image Process., vol. 6, no. 7, pp. 965–976,Jul. 1997.

[16] J. H. Jang, B. Choy, S. D. Kim, and J. B. Ra, “Sub-band decomposedmultiscale retinex with space varying gain,” import. IEEE ICIP,Oct. 2008, pp. 3168–3171.

[17] T.-C. Jen and S.-J. Wang, “Bayesian structure-preserving image contrast enhancement and its simplification,”IEEE Trans. Circuits Syst. VideoTechnol. vol. 22, no. 6, pp. 831–843, Jun. 2012.