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Energy as a Service on the Efficacy of Multimedia Cloud Computing to Save Smart Phone Energy-Ffmpeg

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Abstract: *Due to increase in variety of mobile applications, the energy consumption of smart phone devices is a major challenge in retaining the multimedia streaming application. This paper mainly focuses on backlight scaling. The objective is to minimize the energy consumption of the backlight when displaying a video stream without impacting the user's visual experience. First, we model the problem as a dynamic backlight scaling optimization problem.*

In that we calculate SSIM index by comparing the two frames from video. SSIM index is the combination of three parameters as luminance, contrasts and structure comparison. Using this algorithm to solve the battery problem and prove the optimality in terms of energy savings. Finally, based on the algorithms, we present a cloud-based energy-saving service.

Index Terms—Energy-efficient optimization, dynamic backlight scaling, multimedia streaming applications, cloud services, mobile Devices, Smart phone, Cloud, Energy.

Keywords: *Key word1, Key word2, Key word3, etc…*

1. INTRODUCTION

Nowadays Smart phones are becoming more popular due to their specifications like light-weight, unique designs, compact size. Their various features such as many useful applications like multimedia applications, games, video streaming. Due to this various problems like limited battery capacity, memory capacity processing capacity has increased. We have made various researches regarding our problem but we haven't got any satisfactory solution regarding the battery size.

For example while downloading a video more amount of energy is consumed, so to reduce this we have proposed this paper which mainly focuses on reducing the energy consumption of our smart phone device.

This implies that energy efficiency of these devices is very important to their usability. Hence, optimal management of power consumption of these devices is critical. Nowadays modern high-end smart phones combine the functionalities of a pocket-sized communication device with PC-like capabilities, resulting in what are generally referred to as Smart-phone. The rich functionality increases the pressure on battery lifetime, and deepens the need for effective energy management.

First, we will model the problem as a dynamic backlight scaling optimization problem. Then, we propose algorithms to solve the fundamental problem and prove the optimality in terms of energy savings on Smart phone. Finally, based on the algorithms, we present a cloud-based energy-saving service. We have also developed a prototype implementation integrated with existing video streaming applications to validate the practicability of the approach. The output of experiments conducted to evaluate the vigour(efficacy) of the proposed approach are very encouraging and show Energy savings on commercial mobile devices.

Mobile consumer-electronics devices, especially phones, are powered from attires which are limited in size and therefore capacity. This implies that managing energy well is paramount in such devices. Smart phone devices derive the energy required for their operation from batteries. In the case of many consumers electronics devices, especially mobile phones, battery capacity is severely extricated due to constraints on size and weight of the device. This implies that energy efficiency of these devices is very important to their usability. Hence, reduce management of power consumption of these devices is critical.

1.1 Proposed Work

In this paper firstly User request a video from browser to cloud server along with the device configuration. Then download the video from YouTube which link send by the user and store on the cloud server. Gets the users screen size and backlight settings of the user device. Once got the screen size and backlight settings convert the video into suitable formats then this downloaded video is spilt into number of frames for applying backlight optimization algorithm. Using this algorithm find SSIM index by comparing the two frames of the video SSIM contain three parameters like as luminance, contrasts and structure. SSIM index is used for changing (modify) the brightness of the video.[2]

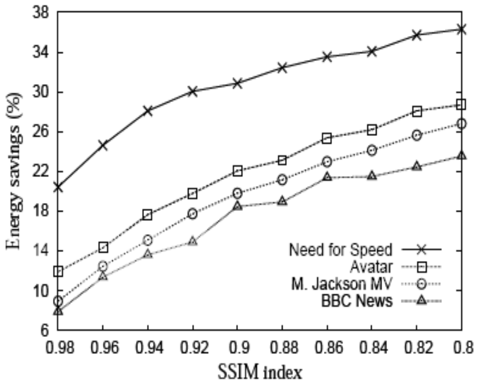

Fig. *Impact of SSIM Index*

Now user can download video from cloud server with optimized video along with the backlight file. Manage the downloading and changing the brightness of the video on cloud server. This project user can upload video on cloud server using with back light settings. So using this algorithm save the Energy on commercial android mobile or smart phone devices.

1.2 Algorithm Description:

1.2.1. Dynamic Backlight Scaling Optimization Algorithm:

Let X and Y two NxM arrays representing the (Y) luminance channel of the frames to evaluate; X represents the reference copy, while Y the lousy/distorted sample. Let x and y their mono-dimensional versions, obtained by merging together the columns (or the rows) of the bi-dimensional arrays. This is a useful step in order to eliminate a summation in formulas and to write a cleaner code in numerical software's, but doesn't affect the generality of this treatment. Let N = NxM for simplicity. So, the first step is to measure the luminance of x and y, which is understood as the average of their values, here respectively indicated as :

$$\mu_x = \frac{1}{N}\sum_{i=0}^{N-1} x_i \quad \mu_y = \frac{1}{N}\sum_{i=0}^{N-1} y_i$$

Then, the function for the comparison of the luminance, l(x, y), defined as:

$$l(x,y) = \frac{2\mu_x\mu_y + C_1}{\mu_x^2 + \mu_y^2 + C_1}$$

Where C1 = (K1L)2, with K1 is an arbitrary constant (¡¡ 1) usually set to 0.01 and L is equal to the maximum possible pixel value of the image so, if are used 8 bits per sample, L = 28-1 = 255. Next, luminance's information is removed by calculating the standard deviations of the two images, order to obtain their average contrast:

$$\sigma_x = \left(\frac{1}{N-1}\sum_{i=0}^{N-1}(x_i - \mu_x)^2\right)^{1/2}$$

$$\sigma_y = \left(\frac{1}{N-1}\sum_{i=0}^{N-1}(y_i - \mu_y)^2\right)^{1/2}$$

And now, the contrasts are compared by using the following function:

$$c(x,y) = \frac{\sigma_x\sigma_y + C_2}{\sigma_x^2 + \sigma_y^2 + C_2}$$

As you could expect, C2 is a constant usually equal to (K2L)2, with K2 ¡¡ 1 and usually set to 0.03. The third piece of puzzle is structure difference of function s(x,y), that remembers Pearson's correlation index between two signals:

$$s(x,y) = \frac{\sigma_{xy} + C_3}{\sigma_x\sigma_y + C_3}$$

$$\sigma_{xy} = \frac{1}{N-1}\sum_{i=0}^{N-1}(x_i - \mu_x)(y_i - \mu_y)$$

With C3 = C2/2, and Finally, here is the SSIM Index: The exponents, and, greater than zero, are parameters used to calibrate the weight of the three functions in the measurement; so the SSIM.

Index can be rewritten as follows:

$$SSIM(x,y) = \frac{(2\mu_x\mu_y + C_1)(2\sigma_{xy} + C_2)}{(\mu_x^2 + \mu_y^2 + C_1)(\sigma_x^2 + \sigma_y^2 + C_2)}$$

As the index of structural similarity approaches 1, the greater the degree of fidelity of the encoded copy is close to the original. In evaluating the quality of the all images, however, the given SSIM Index is not applied directly to the entire image its preferred to work locally because the characteristics of a scene are spacevarying. Therefore a circular symmetric Gaussian window of size 1111 and standard deviation of 1.5 is introduced, that moves the entire image pixel by pixel and producing a function with appropriate weights, changing the parameters of brightness, contrast, and covariance as follows:

$$\mu_x = \sum_{i=0}^{N-1} w_i x_i ,$$

$$\mu_y = \sum_{i=0}^{N-1} w_i y_i ,$$

$$\sigma_x = \left(\sum_{i=0}^{N-1} w_i (x_i - \mu_x)^2 \right)^{1/2} ,$$

$$\sigma_y = \left(\sum_{i=0}^{N-1} w_i \left(y_i - \mu_y\right)^2 \right)^{1/2} ,$$

$$\sigma_{xy} = \sum_{i=0}^{N-1} w_i (x_i - \mu_x)(y_i - \mu_y).$$

Let M the number of windows applied to the frames: M previously defined SSIM Indexes are generated, and its possible to define a new index (called MSSIM) by averaging the M measures: The adoption of this last version of SSIM Index is wide spread.

NP hard , NP-complete analysis :

$$SSIM(x, y) = \frac{1}{M} \sum_{j=1}^{M} SSIM_j(x, y)$$

Our paper is NP- Complete.

2. IMLEMENTATION ISSUES

In this section, we will discuss some implementation issues that arise when integrating the proposed algorithm with existing video streaming services. Determining the backlight assignment for a video is enumeration-intensive; in particular, computing critical backlight levels usually involves analyzing a large number of image pixels. Thus, the energy consumption incurred by the computation could easily abrogate the energy savings gained by the dynamic backlight scaling technique if the assignment is enumerated on mobile devices.

Consequentially, the primary principle is that a designated server is responsible for enumeration the critical backlight levels and running the proposed algorithm. We depict two possible application scenarios. First, if change of the video content is allowed, the server determines the backlight assignment for the video and embeds the information in the corresponding headers of the image frames in advance. Then, when the video is displayed on a android mobile device, the video player in the device simply adjusts the backlight level according to the embedded information. In the second scenario, the video content cannot be change or modified, so the server stores the backlight information in a corresponding text file (called the backlight file) instead. When a video is to be displayed on a android mobile device, the corresponding backlight file is transmitted with the video. The concept is similar to that of subtitles in a video. In the first scenario, the video streaming provider, such as YouTube [6], could determine or found the backlight assignments for the videos, while the second scenario could be developed as a value-added service of the Internet service provider like AT&T [2].

We have implemented a prototype system based on the second scenario3. The prototype system includes an on-line backlight server and a mobile application program based on the Android platform [1]. The backlight server automatically uses the proposed algorithm to analyze the videos on major video streaming websites. Each derived backlight assignment is stored in a space-efficient format and associated with the corresponding video's URL link. However, the accuracy of the power model will only affect the amount of energy saved, not the visual understanding, so other device models could also benefit from the technique.

The wireless bandwidth is adequate for video streaming. It would be ideal if all the videos on streaming websites could be analyzed in advance, but doing so would be tremendously timing-consuming and a huge storage space would be required. Hence, we analyzed the most popular videos on YouTube, and left the remainder to be analyzed on demand. To support on-demand video analysis, we have developed an application program that runs on Android mobile devices. When a user starts to play a video stream on a smart phone(android mobile) with the program instated, the program sends the video's URL link to the backlight server(cloud server). If there is no corresponding backlight file, the server replies accordingly and starts analyzing the video to generate the corresponding backlight file. In this case, the video is played without dynamic backlight scaling and conversely, if the server returns the corresponding backlight file, the program adjusts the backlight dynamically according to the backlight file with the video being played on the Smartphone then produce result with save energy on Smartphone.

3. LITERATURE SURVEY

The 'Cheng-kang' , Suggested Minimizes the energy consumption incurred by the backlight when users access multimedia streaming on smart phone. To solve the problem, we prove that they are optimal in terms of energy savings when the energy consumption increases strictly with the backlight levels. To validate the practicability of our approach, based on the algorithms, we have deployed a cloud-based energy-saving service, called the dynamic backlight scaling service, on CHT cloud[1]. The' Swati Tivari','praveen sen', Suggested The existing development and research in the field of saving the energy of smart phones. Offloading heavy tasks on the cloud may save the energy of smart-phone.[2].The' Sonali Jadhav',' M.B. Limkar' ,Suggested We would be adding the concept of multimedia and text based processing to our system. The final but most important step

in our experiment is to analyze the output from the comparison of offloading heavy application, namely Multimedia Application, from Smartphone as a energy service. After using Multimedia Cloud Computing we obtain reducing Smartphone energy consumptions on multimedia application[3]. The 'Chung Han Lin', Suggested This Topic proposes an approach that minimizes the energy consumption incurred by the backlight when users access multimedia streaming on mobile devices

4. CONCLUSIONS

This paper proposes an approach that minimizes the energy consumption incurred by the backlight when users download video from cloud on smart phone. Specifically, the approach exploits backlight scaling optimization algorithm and minimize energy consumption for downloading video on smart phone . To solve the problem, we propose a backlight scaling optimization algorithm, and prove that it is optimal in terms of energy savings.

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