Dynamic Backlight Optimization for Mobile Streaming Applications using Hadoop (DBOMSAH)

Pranjalee Khandave, Reshma Chapole, Madhuri Kanthe, Shameer Mulla, Krupali Deshmukh

***Abstract*— Nowadays there is increase in demand of mobile devices and its applications, these applications consume lot of energy and resources, therefore to find the solution on this problems is major challenge. To find the solution which minimizing the energy consumption of the device and make available it for efficient use. Phones are powered from batteries which are limited in size and capacity. This means that managing energy well is important in such devices. In this system the technique is introduce that is dynamic backlight scaling optimization for mobile streaming application so that using this technique we can reduce the energy consumption. The model is implement as a video transformation engine. In that model calculate SSIM index by comparing the two frames from video. SSIM index is the combination of three parameters as luminance, contrasts and structure comparison. This algorithm use to solve the battery problem and prove the optimality in terms of energy savings. Finally, based on the algorithms. The expected result of system to evaluate the efficacy of the proposed approach. The approach of the system is encouraging and we come to know that it saves 15-49 percent of energy.**

***Index Terms*— Structural Similarity Index Metric, Backlight Optimization, Energy Saving, Hadoop**

I. INTRODUCTION

Advances in information and communications technology the popularity of mobile devices also increases. This is motivating the development of number of mobile applications and services, which are having a major effect on people's day to day lifestyles. To reduce the energy consumption of mobile devices that utilize the applications and services is a major challenge. Such usage behavior will lead to a significant increase in the energy consumption of mobile devices, especially with the strong demand for higher-resolution screens. We are studying different configurations of mobile devices in which we come to know that the most of the energy is consumed by the backlight while accessing any multimedia streaming application. Backlight consumes 34.49% of total energy of a device [1]. This observation motivates to make such application which reduces the energy consumption of mobile devices while accessing the multimedia streaming applications.

While playing the video on the mobile devices the display subsystem is required to be in active state. The sensible way to reduce energy consumption is to dim the backlight. However the image distortion problem remains while displaying the video [5]. The system will help to save the energy of mobile devices while accessing the video. The system is distributed in different models. The database will be handled by the hadoop system. Hadoop is mainly used for analysis of big data. Hadoop system has many advantages like reliability, scalability and open source. Therefore considering all parameters the system is developed on hadoop for database management.

First model i.e. video to frame conversion is implemented on hadoop cloud. In this module we are going to convert the video into number of frames and after conversion applying the SSIM index algorithm on that frames to get the similarity between that images. The HSB color model is use for the image color model.

II. RESEARCH ELABORATIONS

With development in technologies human life is dependent on mobile devices. The devices have functionalities for playing games, videos and photos. The battery problem is the main and important challenge in accessing video and games. The main purpose of backlight is to provide the brightness for the images to display video with brightness. The detail research is shown below:

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A. Quality- Based Backlight Optimization for Video Playback on Handheld Devices [2]: For accessing any application on mobile device the most of the energy consume by backlight. In this paper author introduce the technique that is "**Quality Adapted Backlight Scaling**" service to save the energy of mobile devices. While, processing on backlight it impact on user's visual experience in this paper they introduce the solution to overcome this problem.

Advantages:
1. Maintaining the user perception while dealing with the backlight scaling is major challenge. The system implements the solution to solve the problem.
2. In this paper they provide the solution in terms of algorithm which is help to save the videos original quality by using the specific threshold.

Limitations:
While playing the video on any handheld device it is required to the subsystem must be in active all the time till video is not stop. The conversion solution is provide but it create some image distortion which bad impact on video.

B. DLS: Dynamic Backlight Luminance Scaling of Liquid Crystal Display [3]: The propose system is deals with the luminance factor of the image. The system propose the technique that is dynamic backlight luminance scaling which is used to reduce the energy of devices while keep the intensity and contrast of the video as close as original. The system is compromises quality of image with the power consumption.

Advantages:
The system saves up to 20 to 80 percent of battery in reducing small amount of image quality.

Limitations:
In this system having one limitation is that while conversion is made the quality of video gets reduces which is impact bad on the user's visual experience.

C. Minimization for LED-backlit TFTLCDs [4]:
In this system they implement the algorithm for led to reduce the energy of device. According to the image histogram of individual channel the system provide the best algorithm which saves power by scaling the luminous intensity of the led backlight red, blue and green respectively.

Advantages: The important advantage of the system is by using the technique of the system we can save up to 76% of energy.

Limitations: In this system having one disadvantage the image distortion is get happen.

D. Power Minimization in a Backlit TFT-LCD Display by Concurrent Brightness and Contrast Scaling [5]: In this paper they introduce the system which is work on the concurrent brightness and contrast scaling techniques. The system works at minimum power required to reduce the backlight illumination while, retain the image quality through preserving the image contrast.

Advantages:
The advantage of the system is that it loss only 10% contrast distortion for saving the power.

Limitations:
The system which is introduce in this paper, is only work for image. If it apply for video then the inter-frame distortion gets happen which is result in reducing the quality of image.

E. HEBS: Histogram Equalization for Backlight Scaling [6]: By maintaining the pre-defined image distortion level the function of the system is implement in this paper to maximize the backlight dimming. The pixel transformation function is use to compare the factors between the original image and the new histogram image with the help of lower dimming range.

Advantages:
The advantage of the system is it saves up to 45% of energy by at minimum 5% distortion rate and saves 65% of energy at minimum 20% of distortion rate.

Limitations:
The system having disadvantage that it's become problematic to get the contrast back which is gets destroy while backlight diming and its affect the video's quality.

F. Backlight Dimming in Power-Aware Mobile Displays [7]: The system works on temporarily aware system i.e. TABS. The user-specified ignorance is set on video which maximizes the energy saving by using the technique Dynamic Backlight Dimming.

Advantages:
The system is capable to compare the flickering effect online and simultaneously measure the inter-frame spatial distortion.

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Limitations:

The system is having one limitation, while applying the technique it introduces the inter-frame brightness distortion which has an impact on video's quality.

III. BACKLIGHT ENGINE

The effective way to reduce the energy of backlight system by using the algorithm SSIM that is Structural similarity index metric. The propose algorithm is work on the main three factors of images the contrast, luminance and structural. The system is divided into the different modules and each module perform its task and give the expected output. The hadoop is use in the system for processing and to increase the system throughput.

We implement an android application which is run on the android os. The application having user-friendly gui. When user want to download the video from the YouTube the propose application play the important role to saves the energy.

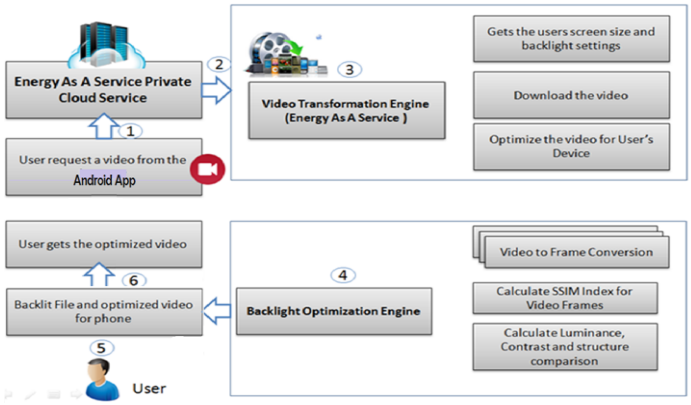

Fig 1.System architecture

The system architecture shows all the flow of process. User needs to install the application on his/her android phone. The hadoop server download the video from the youtude on the hadoop server. Processing on video is done by the video transformation engine. The video transformation engine is perform all the task that is conversion of video to frame by using the openCV image processing tool. The backlit file is created on server which contains all the measure parameters for playing the video on the user's mobile.

The flickering effect is get manage by the ssim algorithm. The user's visual experience is considering while, calculating the ssim index. Taking the video the user can examine that the requsted video saves the energy of mobile device upto 15 to 49 percent.

IV. REAEARCH ANALYSIS

TABLE 1

	PAPER NAMES					
FACTORS	A	B	C	D	E	F
ENERGY SAVE	GOOD	GOOD	GOOD	AVG	GOOD	AVG
EFFICIEN -SIY	AVG	GOOD	AVG	AVG	GOOD	GOOD
SCALBILI -TY	GOOD	AVG	AVG	GOOD	GOOD	AVG
VIDEO QUALITY	GOOD	AVG	AVG	AVG	GOOD	GOOD

In the above table the result analysis is done base on the factors. The result is give the papers in the terms of good and average.

CONCLUSION

We have presented the system that is Dynamic Backlight Scaling Optimization for mobile streaming applications. The proposed system is use for dynamically adjust the backlight levels while accessing the video. We use the algorithm SSIM that is structural similarity index metric for calculate the similarity between two images. In this paper we research the different papers and by referring them we are going to optimize the video.

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