Intuitive Redirect: A Smart Application For Intelligent Photo Transfer Under Restricted Bandwidth Conditions

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ABSTRACT

The issue that is given concentration in this paper is the confined transfer speed requirements amid transmission of many pictures. Initially, a framework that evaluates the quality of photographs based on accessible metadata was created to deal with the above issue. The current framework was, in any case, a non-automated half-duplex association that was used in processing crowd-sourced photographs to provide a more enhanced GUI experience in various applications. The suggested framework aims at solving issues identified with the field of news coverage and the media business by utilizing this procedure, but with included features. The proposed system, along these lines, utilizes an automated Peer-to-Peer association to transfer metadata along with the image ID. The metadata is extracted and processed by implementing algorithms that were proposed after conducting a study on optimization problems like Max-Utility problem, the online Max-Utility problem and the Min-Selection problem. The optimal images are then sent to the server by an automated process that selects the photos at the client's side based on the corresponding image ID and automatically transfers them to the server when bandwidth requirements are met. This intuitive sending operation is facilitated by the Services component provided by Android.

Keyword *automatic image sending, metadata generation, efficient bandwidth usage*

1. INTRODUCTION

The need of the hour is “the smartphone”. Equipped with a variety of features ranging from the simple calling/messaging facilities to the complex computer-like features, the smartphone has evolved from a luxury to a necessity in today’s society. Multi-national software companies support this notion by discharging enhanced phones every now and then. It is thus safe to state that the smartphones are replacing desktops and laptops in many areas.

A common use of the smartphone, as stated earlier, is the messaging facility either through the network or using mobile data such as 2G, 3G and 4G. With advancements in the architecture of a phone, it is now possible to click pictures that are almost as good in quality as that of a picture clicked using a camera. Consider fields like photography, journalism and other media industries that give great importance to photos. In these, fast transfer of the photos that were captured, is necessary. Unlike the traditional method of capturing an image, transferring it to the

computer and then sending them via the internet, this process is significantly simplified when using a mobile phone and sending it using mobile data.

It is also important to note that in today's society, sharing of images are quite common. A number of platforms have emerged on the internet for this purpose. Instagram, Flickr are some of them. This has led to the introduction of photo tourism [14], recovery and management of disasters [8], etc.

An important issue that arises during image transfer is the bandwidth constraint. A good-quality image can be of size 2MB (approximately). So when we consider the media industry, say the newspaper industry where a reporter needs to transfer photos taken at a crime scene, the transfer will consist of a minimum of 10-20 photos. This amounts to about 30-40MB, which when transferred via the network may take quite some time. Also it is important to note that if this was during a natural disaster, the availability of 4G may not be guaranteed. Thus the images need to be transferred over a feeble 2G or 3G connection which will further decrease the transfer speed. This is an unwanted waste of time and bandwidth as not all of the photos sent will be selected. It is therefore advisable to send only those photos that the technical advisor or administrator deems good enough.

Another issue to be handled is the reliability of the data. In times of disaster, both natural and man-made, the news that is published to the public need to be reputable.

To handle all these we propose a handy mobile application to overcome the above. This paper mainly focuses on the issues encountered in the media and journalism industry and solutions to overcome it. This is performed by transferring the metadata of the image and then sending only those images whose metadata values are optimal, according to the technical advisor.

2. LITERATURE SURVEY

A variety of concepts and methods have been studied regarding this. They have been used to develop this application and are illustrated below:

M.Y.S.Uddin et al.[15] discusses about a framework in a similar situation as that dealt with in this paper. He proposes an efficient image delivery service in the absence of a strong communication infrastructure. Many of the concepts described here are used in removing redundancy in the pictures and it promotes diversity in view of event coverage.

On the other hand, Chia-Hao Yu et al.[5] gives a detailed study on Device-to-Device communication. They talk about achieving optimality on various constraints such as minimum and maximum spectral efficiency restrictions and energy limitation.

Yi Wang et al.[2] developed a mobile application for crowdsourcing photos and studying their relevance based on algorithms like Max-Utility problem, Min-Selection problem, Greedy selection and online Max-Utility problem. Here, they discuss about transferring the metadata of crowdsourced images rather than the image itself. The server computes the relevance of each image and selects one that is most useful. However the methodology used here is a simplex association, that is, it is used for uploading or using only the relevant images on the internet for various purposes like pictorial maps, etc.

R.Datta et al.[4] performed analytical studies on important theoretical and empirical contributions that have been made in the field of image retrieval. They discussed various content based image retrieval systems and automatic image annotation. These methods are useful in testing the quality of the images.

Kok Sheik Wong et al[6] discussed about data embedding methods to store GPS information in images. Since in our proposed system, we intend to tackle the problem of false information, the methodology discussed here can be used to prevent that by providing an efficient way of detecting the current location of where an image was taken.
Apart from these, the concepts of sensors and services[3] available in the android SDK played an important role in developing the project.

3. PROPOSED SYSTEM

Consider the following scenario:
A journalist/reporter is required to couple their article with two-three photographs. So he or she goes to the scene and clicks about 10-20 photos on their smartphone and needs to transfer them to the head office. He is aware that out of all the photos, a maximum of two may be selected and sent for print. Therefore instead of sending all the images, we propose a framework for sending the metadata of these images.

This framework will capture the date and time, the resolution, whether the photo was out of focus or not, the exposure and white balance levels and the GPS location of the scene[2,6]. These are then transferred to the server side. This process is pretty fast considering the fact that the size of text is lesser than that of the equivalent image.
If suppose this was during a natural disaster such as floods, hurricanes, etc., the availability of 2G network is guaranteed whereas 4G isn't. Hence it is all the more efficient to send the text rather than the image.

Once these details reach the server side, the administrator or technical advisor compares them to the optimal value that each property must have. The selected few are then requested. When the server clicks on the selected photo, an automated process is initiated wherein the image ID of requested image is matched to the image residing in the phone and it automatically send that image alone with no intervention from the journalist's side. This was one feature that wasn't available on the system suggested by Yi Wang et al.[2].

To handle the problem of accuracy, each journalist is required to type in the location
where the image was taken and this is cross-checked with the GPS location obtained by the proposed system. Thus GPS location is sent through the metadata [6]. This prevents the dispersion of false news where an image on one place is mistaken to be another.

Also to prevent plagiarism, system information of each journalist is taken into account and is stored in the database. This is available to the administrator. The framework runs with the help of the Services component available on android [3].

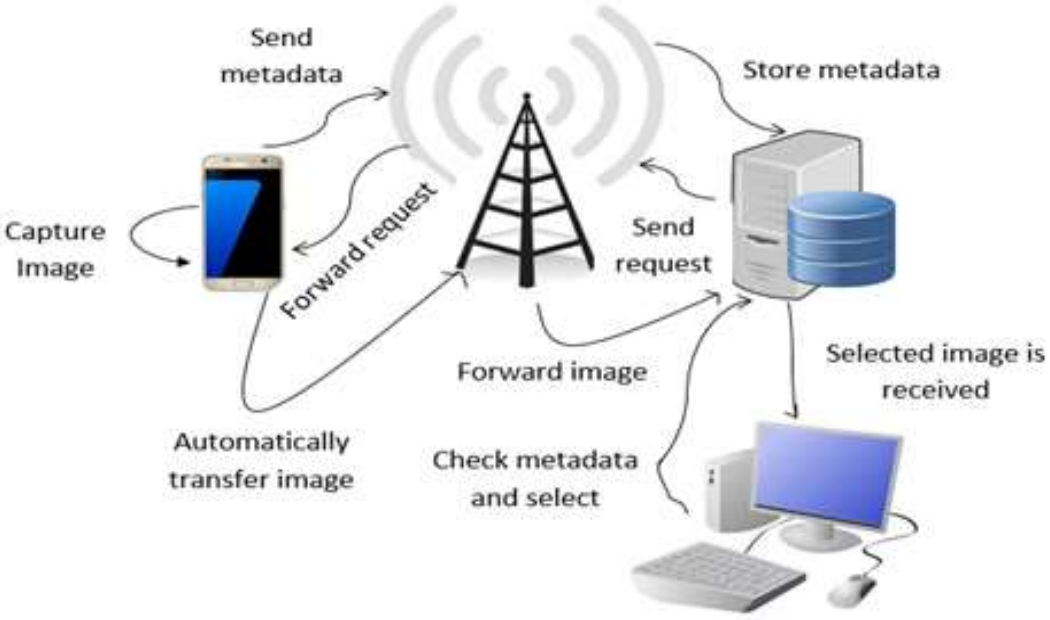

Fig-1: Architecture Diagram

The above picture depicts the procedure in which the metadata of images captured by the smartphone are transmitted through a network. The image metadata is stored in the server which then is analyzed by the admin for accuracy. The shortlisted photos by the admin are requested to the uploader, who responds with the original images when bandwidth constraints satisfy.

3.1. Modules

The above details can be consolidated to the following five modules used to describe and design the entire proposed system:

• User Interaction module: User registration, user login, app usage by user.

• Metadata acquisition Module: Generating metadata for the captured photos .

• Data transfer Module: Transmitting data over to server side through a network.

• Image selection Module: Perusal and selection of the image by technical advisor.

• Automatic transmission Module: Transmission of selected image without user intrusion

3.2. Algorithm

The base algorithms for this framework is similar to that proposed by Yi Wang et al.[2]. They are Max-Utility problem, used to select photos whose utility values are highest; and Min-Selection problem, used to ensure that the number of relevant photos selected are minimum. Other techniques that were proposed there to evaluate metadata are relevant here as well [2] (all the intricate details are described in depth in [2]).

3.2.1. Automated transfer algorithm

The above is used to select and retrieve images without user intervention. The techniques for implementing these are provided by Android SDK [1,2,9]. The main concept used in the proposed algorithm is the Services component[3]. A service[3] is an application component that can perform tedious operations in the background even if the user switches to another application. It does not provide an interface for user interaction. Additionally, a component can tie to a service to collaborate with it and perform interprocess communication (IPC) with it as well.

4. CONCLUSION & FUTURE WORK

We proposed an automated framework to facilitate efficient photo transfer in the field of journalism and other media industries. With this system, there is no need of user intervention on client side and images are seamlessly transmitted. It also ensures the dissemination of truthful and valid information, be it through paper or the internet via social media. The future work involves converting the system into something that can be used by all users, i.e. generalizing it so that a user can transfer the pictures from the smartphone to the computer, or sending photos from smartphone to the business organization, etc.

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