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Smartphoto: An Approach for Low-Quality Image Sensing and Feature Matching with Smartphones

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Abstract

Many crowdsourced photo applications like Flickr and Instagram are popular in online photo sharing. Due to the restrictions in communication bandwidth, storage and processing capability it become diffcult to transfer the huge amount of crowdsourced photos. Another problem is how to abolish the redundancy and find the most indicative photos. To solve this problem a framework called SmartPhoto is developed. SmartPhoto measure the utility of the crowdsourced photos based on the metadata which is accessible geometrical and geographical information including the orientation of the smartphone, position and field-of-view of the camera. From the metadata, we can deduce the location and how the photo is taken, and transmits only the most convenient photos. But this paper did not address the problem with low quality images. I proposed an algorithm called Histogram Equalization algorithm to enhance the resolution of images like dark images and Wiener filter to deblur the blurred images. Max utility and Min selection algorithm are applied to find the most indicative photos and to abolish the redundancy in photos. Feature matching are done to the selected photos by applying Haar-cascades. Panorama of the photos is constructed and sends to rescue center for further action. This system is applicable to post-earthquake recovery, map service provider etc.

Keyword: Smartphones, Histogram Equalization, Wiener Filtering, Haar-Cascades.

1. INTRODUCTION

Mobile computing is human-computer interaction by which a computer is expected to be transported during normal usage, which allows for transmission of data, voice and video. Mobile computing involves mobile communication, mobile hardware, and mobile software. Communication issues include ad hoc networks and infrastructure networks as well as communication properties, protocols, data formats and concrete technologies. Hardware includes mobile devices or device components. Mobile software deals with the characteristics and requirements of mobile applications. In mobile computing, a set of distributed computing systems or service provider servers participate, connect, and synchronize through mobile communication protocols. It provides decentralized (distributed) computations on diversified devices, systems, and networks, which are mobile, synchronized, and interconnected via mobile communication standards and protocols. Today Smartphones not only change the way people communicate with each other, but also the way they interact with the world. The popularity of online photo sharing services such as Flickr and Instagram indicates that people are willing to take photos and share experiences with others. The major challenges faced by these applications is how to characterize the quality (usefulness) of crowdsourced photos in a way that is both meaningful and resource friendly. Existing solutions from description based techniques either categorize photos based on user defined tags, or prioritize them by the GPS location. Tagging each photo manually is not convenient and may discourage public participation. GPS location itself may not be suffcient to reveal the real point of interest. Even at the same location, smartphones facing different directions will have different views. To solve this problem a framework called SmartPhoto is developed. SmartPhoto measure the utility of the crowdsourced photos based on the metadata which is accessible geometrical and geographical information including the orientation of the smartphone, position and field-of-view of the camera. From the metadata, we can deduce the location and how the photo is taken, and transmits only the most convenient photo. The main disadvantage of Smartphoto is that it also sends the metadata of low-quality photos like blurred, dark etc. Photos can be of low quality due to various reasons. Over-exposure or under-exposure causes photos to be too bright or too dark; camera movement and shutter speed affect how severe the image is blurred; the quality of lens and digital sensors is also important. These factors can only be analyzed by image processing. Thus, before photo selection, some efficient image processing techniques may be applied at the server end to filter and enhance the low quality photos. Existing system is not meant to address the problem with low quality photos. In the proposed system server first send the location data to the smartphones. If the smartphones have the photos related to the location data then they will notify the server. After getting the positive response from the smartphones the server then send the remaining three attributes which is effective range, FOV, and orientation to the smartphones. The smartphones then send the photos related to the received metadata. The server measures the quality of the photos by using the metric called PSNR (Peak Signal to Noise ratio). PSNR is used to measure the quality of photos. The peak signal-to-noise ratio metric (PSNR) which is an objective image quality evaluation measure, has shown the best advantage almost overall objective image quality metrics

under different image distortion environments and strict testing conditions. If the server finds the low quality photos then it applies Wiener filter and Histogram Equalization to those photos. To deblur the blurred photos Wiener filter and to enhance the dark photos Histogram Equalization is used. After the server has finished its processes Haar-cascade is applied to the selected photos to detect the humans. This work also includes building the panoramic view of the selected photos for easy identification of the humans.

2. RELATED WORK

In the work of Md Yusuf Sarwar Uddin [2] describes a picture delivery service called PhotoNet for camera sensor networks. The protocol runs on mobile devices, handling opportunistic forwarding (when they come in contact) and in network storage.
Huei-Yung Lin propose a novel approach [4] for vehicle speed detection based on a single motion blurred image as opposed to the most commonly used RADAR and LIDAR devices for traffic law enforcement. Image is restored using Wiener deconvolution [5] (it works in the frequency domain, attempting to minimize the impact of deconvoluted noise at frequencies which have a poor signal-to-noise ratio
In [10] Aftab Khan and Hujun Yin says Blind image deblurring is limited by the unavailability or in many cases little information about the PSF.

3. EXISTING SYSTEM

Existing system called SmartPhoto measure the utility of the crowdsourced photos based on the metadata which is accessible geometrical and geographical information including the orientation of the smartphone, position and field-of-view of the camera. From the metadata, we can deduce the location and how the photo is taken, and transmits only the most convenient photo. The main disadvantage of Smartphoto is that it also send the metadata of low-quality photos like blurred, dark etc. Photos can be of low quality due to various reasons. Over-exposure or under-exposure causes photos to be too bright or too dark; camera movement and shutter speed affect how severe the image is blurred; the quality of lens and digital sensors is also important. These factors can only be analyzed by image processing. Thus, before photo selection, some efficient image processing techniques may be applied at the server end to filter and enhance the low quality photos.

4. PROBLEM DEFINITION

In the existing system no method is employed to deal with low-quality photos. They only serve as an important complement to improve the utility of collected photos, especially when there are resource constraints. SmartPhoto is mainly applicable in post-disaster recovery for identifying the potential survivors in the building. If we enhance the low-quality photos there is a chance that some photos will contain the potential survivors.

5. PROPOSED SYSTEM

In the proposed system called IntelligentPhoto, the server first send the location data to the smartphones. If the smartphones have the photos related to the location data then they will notify the server. After getting the positive response from the smartphones the server then send the remaining three attributes which is e_ective range, FOV, and orientation to the smartphones. The smartphones then send the photos related to the received metadata. The server measures the quality of the photos by using the metric called PSNR (Peak Signal to Noise ratio). If the server finds the low quality photos then it applies Wiener filter and Histogram Equalization to those photos. To deblur the blurred photos Wiener filter and to enhance the dark photos Histogram Equalization is used. After the server has finished its processes Haar-cascade is applied to the selected photos to detect the humans. This work also includes building the panoramic view of the selected photos for easy identification of the humans.

6. CONCLUSION

In this paper a framework called SmartPhoto is analysed that optimize the selection of crowdsourced photos based on the accessible metadata of the smartphone is analyzed. Its Potential problems with low quality images are identifed. The proposed uses an algorithm called Histogram equalization (HE) which is one of the widely used image enhancement techniques. Based on the image's original gray level distribution, the image's histogram is reshaped into a different one with uniform distribution property in order to increase the contrast. The essentiality of histogram equalization is to decrease the number of gray levels so that the contrast of the image can be enhanced. To deblur the photo taken by the smartphones Wiener filter is used.

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