Phorec : Context-Aware Photography Support System Based on Analysis of Big Data of Good Photo with Location, Time, and Weather Condition

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1. INTRODUCTION

The ubiquity of Digital Single Lens Reflect (DSLR) and Mirror-less camera generates a large number of novice photographers, nowadays. However, these professional cameras require some skill and experience in order to thoroughly use them for taking good photos. It is widely known among photographers that keys of landscape photography are location, time, and weather condition, because these factors affect the lightning condition that result in different qualities of photo. Although current digital cameras provide some sophisticated supports, such as auto-focus and auto-exposure mode, which help users to control their camera easily, there is little or no supports for user to frame the good-composition photo.

With the growth of geo-tagged photography in online photo repositories, for example Flickr, many researchers make use of this meaningful data to achieve photography-related novelty. [1] focused on finding city's landmark. In the field of supporting user when taking photo, [2,3] developed a support system for taking and framing photos with mobile phone's camera. They recommended framing and camera parameters according to user's contexts but they did not threat important factors such as weather condition, user's equipments and user's interest.

In this work, we make use of modern mobile devices equipped with various sensors, which can gather user's contexts including locations, to develop a photo recommendation system that suggests a special setting for taking beautiful photos and provides a navigation system based on user's important contexts. Since there are many categories of photography and our system targets on not just photographers but tourists and general users as well, we focus only on landscape photography. We assume that landscape photos can be discriminated by analyzing tags and photo's Exif metadata, and the goodness of photo's can be measured by examining online popularity and user's feedback while using the system. Our major challenges addressing the problem of photo recommender system are 1) The system should be able to suggest the good photo based on the user's contextual information, such as location, time, and especially weather condition, user's equipments and user's interest; 2) the system should guide the user to the best location for taking a similar photo to the recommended one and 3) the photos suggested in the system should be categorized as landscape photos.

2. SYSTEM ARCHITECTURE

In order to reduce the latency of requesting photos and weather data from providers and realize user's feedback analysis, we compose our proposed system of two parts, *a) server-side system* and *b) end-user mobile application*.

a) Server-side system takes responsibility in collecting and processing geo-tagged photos' information from Flickr[1] and weather condition from Wunderground[2] and provides the web-service for end-user application. To the challenges described in Section 1, we developed a novel photograph analysis techniques, which distinguishes landscape photo from variety of photos, clustering photos by its taken location based on mean-shift algorithm and ranks photos according to contextual features. The criteria of scoring are distance between user's and photo's taken

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[1] http://www.flickr.com
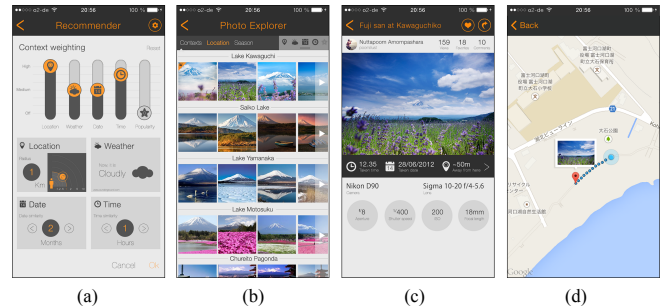[2] http://www.wunderground.com

Figure 1: Application Screenshots. (a) Context configuration. (b) Photo list. (c) Photo viewer displaying photo's metadata and settings, and (d) Map view navigating user to the photo's taken location.

location, similarity between photo's taken date, time and weather condition and user's current contexts. Photo's goodness and correspondence of equipments are also used to calculate the score of each photo.

b) End-user mobile application acts as an interface between back-end system and user's contexts. The application collects user's GPS coordinates, date and time, and user's information and passes them to the server. Finally, the application serves a set of relevant photos and navigation system to the user.

3. IMPLEMENTATION

In the current system, we have collected about 60,000 geotagged photos taken at some famous places in Japan from Flickr and each place's historical weather data from Wunderground. Matching between photos and weather conditions and the previously described processes, except tag and Exif metadata analysis for distinguishing landscape photos from others, were implemented in the server. For the end user, iPhone application has been developed to provide useful functions and comprehensive user interface as shown in Figure 1.

4. CONCLUSION AND FUTURE WORK

In this paper, we proposed a context-aware photography support system aiming for helping novice photographers take professional-like landscape photos by serving good photos, those are relevant to user's contexts, with camera settings and navigating user to the taken location. A number of photos and historical weather data have been collected, processed and displayed on the developed iPhone application. The remaining tasks are analyzing tag and Exif metadata and test the system in a real world scenario.

5. ACKNOWLEDGEMENT

6. REFERENCES

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