FaceLog: Capturing User’s Everyday Face Using Mobile Devices

Abstract
Lifelogging services are emerging as promising mobile applications, pursuing to build a user’s autobiographical memories. To date, initial attempts of lifelogging services have been proposed, capturing what I see, hear, meet, and visit. These empirical and environmental contexts, surrounding contexts, may help a user reminisce about the past. On the other hand, we focus on an important key feature of lifelogging which has been unexplored so far, i.e., appearance context. The appearance context is about one’s facial expression, body image, gaze, posture, gesture, etc. Appearance monitoring in a fine-grained and momentary manner enables total recall of a user, i.e., not only what the user perceives but also how the user is perceived by others. In this poster, we propose FaceLog, a face logging service which automatically and opportunistically captures user’s everyday face.

Author Keywords
Face logging; lifelogging; appearance; facial expression; total recall

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H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.
Introduction
Life monitoring services are emerging as promising mobile applications. The key direction for lifelogging lies in encompassing what the user perceives and experiences, such as what I see, hear, and visit, for the user’s whole life [1, 3, 4, 6]. For example, SenseCam [3] takes a picture of what we face every 30 seconds to help us reminisce about the past. Another application, CrowdSense@Place [1], monitors everyday user’s places to support location based services like geo-reminders. Such lifelogging services thoroughly monitor user’s experiences, episodic/autobiographical memories.

While today’s lifelogging services capture and utilize what the user perceives, these services are still devoid of the notion how the user is perceived by others. We address that it is an important missing part, as in our everyday social life we do care about how we would be perceived by other people, e.g., we try to make friendly facial expressions, conduct desirable social behaviors, select appropriate dress codes, etc.

In this poster, we envision monitoring and logging how we appear as an initiative toward a fully inclusive lifelogging. The appearance logging encompasses diverse facets of one’s own appearance context such as facial expression, body image, posture, gesture, etc. These appearance contexts are associated with one’s everyday events, which we call surrounding contexts. With capturing surrounding and appearance contexts closely associated each other, total recall of a user will be completed.

Motivating Scenarios
Imagine that you can record a moment when you fall in love with your girl/boyfriend including time, location, companion, what you see, your emotion, facial expression, eye contact, your reaction to confession her/his love, etc. It may help you vividly reminisce about the invaluable moment that you can never catch again. Later on, you may easily and quickly browse ‘your moments of joy’ from tons of your lifelogging data based on appearance contexts. Moreover, not only vivid lifelogging services but also appearance context-aware applications are enabled by monitoring appearance in a fine-grained and momentary manner. For example, let us say that you are in an important meeting with a buyer to whom you must show positive impression. An appearance monitoring service may detect that you are unintentionally not feeling good with the buyer, judging from your stiff facial expression or often diverted eye-contacts. Upon such detection, an intervention application may inform you of such momentary appearance contexts so that you can immediately adjust your facial expression right away.

FaceLog
Among various parts of appearance, as a first step, we focus on a face logging service, FaceLog. FaceLog opportunistically and automatically captures facial expression, which is one of major appearance contexts. A facial expression would be an easy and intuitive clue for us to reminisce about our emotion or thought associated with our smartphone activity at that moment, e.g., a picture of our face when we checked a text message from someone. Moreover, a facial expression would be an external mirror from which a lifelogging service can infer her momentary emotion. Figure 1 shows a concept of Facelog with a location logging services. Associated with surrounding contexts such as location, a user can more clearly reminisce
about her emotion in the place through her face pictures captured by FaceLog.

Preliminary Test
To figure out design considerations for FaceLog, we conducted a preliminary test. In the test, we want to explore possible problems in opportunistically and automatically taking face pictures of a user using the user’s smartphone. A prototype for the preliminary test takes a picture of the user’s face using the front camera of his smartphone when he turns on the screen on his smartphone. A moment, ‘unlocking the screen’, implies that his face would be in viewing angle of the front camera. Figure 2 (left) shows this moment for capturing the user’s face using mobile devices.

In a simple one-day test, we collected 49 pictures from a participant using FaceLog. Figure 3 shows the example pictures among the captured data. Most of the pictures are insufficient in terms of image quality due to motion (Figure 3 (b)), posture of the participant (Figure 3 (d)), and low brightness (Figure 3 (c)). Moreover, there are some pictures which do not include a partial or the whole face of the user due to narrow viewing angles of the front camera (Figure 3 (e)). Even though FaceLog took a qualifying picture, most of the pictures contains an expressionless face of the user upon unlocking the smartphone screen.

Design Considerations for FaceLog and Future Works
Based on the preliminary study, we propose design considerations of FaceLog. The problems of face pictures collected by the preliminary study come from taking face pictures without any user’s awareness. To rule out such low quality images and meaningless moments, detecting appropriate cues is important to FaceLog; quality cues and meaningfulness cues. It may be possible to filter such pictures a posteriori by image processing techniques. However, such techniques require heavy computation and energy consumption for mobile devices, i.e., triggering the camera and performing heavy computation for facial expression recognition. Predictive filtering of inappropriate moments, i.e., without actually taking the picture, makes FaceLog run more energy efficiently as less activating the camera which is a major sink of energy consumption.

Ruling out moments resulting low quality face pictures
Moments resulting low quality face pictures such as shaking (Figure 3 (b)), dark (Figure 3 (c)), and slanting (Figure 3 (d)) are closely related to movement, environmental brightness, and orientation of the user’s smartphone. These moments can be detected by low power sensors of the smartphone, i.e., accelerometer and light. For example, blurry pictures can be avoided by detecting the jerky motions of the smartphone based on its accelerometer readings. The luminosity sensor may help avoiding dark images under low-light conditions. Additionally, a 3-axis accelerometer gives a
clue to estimate the slanting angle between the user's face and the front face camera. When the user is interacting with his smartphone, there is a range of angles at which he hangs his head down to watch the screen of the smartphone comfortably. The slanting angle can be calculated by subtracting the comfortable viewing angle from the angle of phone orientation with respect to the gravity [5, 7].

Detecting moments resulting meaningful face pictures
The preliminary study revealed that, the user's face pictures captured upon unlocking the screen are mostly expressionless. This means that, simply unlocking the screen might not be an appropriate moment to capture the user's vivid facial expressions. One possible approach to capture various facial expressions would be to leverage the moments of specific user-to-phone interactions. For example, the user's face would be much expressive at the instances checking certain incoming messages, or more specifically, certain keywords or smileys within.

For further advanced FaceLog, capturing face pictures would be possible by not only a single device but also multiple colocated devices of mutually interacting people. Especially in conversations, others' mobile devices naturally closely co-located with a user [6]. To be more specific, the devices such as Google glass [2] and SenseCam [3] are highly likely facing each other. Using these opportunities, the two FaceLog services of both users can exchange the other's face pictures (See Figure 2 (right)).

In our future work, we will conduct user studies with advanced FaceLog reflecting design considerations to explore the use cases of everyday face pictures. To support face expression aware services like motivating scenarios, vision techniques for facial expression recognition will be integrated into FaceLog [8].

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References