Adaptive Visual Summary of LifeLog Photos for Personal Information Management

Hyowon Lee, Alan F. Smeaton, Noel E. O'Connor and Gareth J.F. Jones

Adaptive Information Cluster & Centre for Digital Video Processing
Dublin City University, Glasnevin, Dublin 9, Ireland
`hlee@computing.dcu.ie`

As the cost of taking a photo drops, due to the use of digital cameras, and the incentive to take photos increases, due to the ubiquity of camera phones and easy ways to share them with a large number of viewers, the average number of personal photos produced has increased dramatically. The need for supporting *access* to a large number of photos by efficient browsing and searching has become more crucial than ever, and the use of context information such as GPS location and time of capture are currently being researched to reduce the user's annotation burden and to aid retrieval.

Enter *passive capture* - the user attaches a camera the size of a button on her chest. The camera automatically and regularly takes photos whenever an interesting event happens throughout the day while the user goes about her daily activity or holiday trip. The *SenseCam*, developed by Microsoft Research, is a small digital camera that a user wears around her neck. It contains a number of sensors including infra-red and motion sensors to automatically trigger photo capture in such a way that the photos taken are not blurred. On a typical day, the SenseCam will take 3,000 - 4,000 photos throughout the day capturing meaningful and significant images of the wearer's activity, in effect chronicling most of the day's events.

At the end of the day, the wearer can download all the photos from the SenseCam to their computer as a detailed visual record of the day. The fact that everything is captured for reviewing or searching is comforting on the one hand, yet going through over 3,000 photos for each day can take a long time and much effort, and when multiple days are captured it becomes prohibitive to try to extract anything of use from this number of photos.

We use various content-based image analysis techniques on SenseCam photo collections spanning multiple days to automatically detect visual events. For each event we detect a landmark photo as a kind of "keyframe". We then automatically compose an interactive browser that summarises, emphasises and can replay thousands of SenseCam photos on a *single page* in an efficient and comfortable way so as to not overload the viewer (see Figure 1). Significant events are detected among each day's photos and their uniqueness or importance scores are calculated by examining how frequently and for how long similar events have occurred during the previous 1-week period. For example, the wearer working in front of a computer for 2 hours in the morning would appear almost every day, and thus such a visual event scores as less important; whereas a 15-minute unexpected meeting with a colleague on a corridor which happened only once in

the whole week, is given a higher importance score. The first day's desk work in a different university lab for a research visit would be determined as an important event as this is unique among the visual events of the preceding week, but as the days pass the desk work at the same lab will bear less and less importance as it becomes a common activity. Thus, the system adaptively re-ranks the importance of each event as the day's photos come into the database using a 7-day window. The current day's photos are presented as a comic book style interface with different size photos according to their ranked importance.

At the poster session, the overall information flow and processing of images will be presented with the SenseCam device and a few sample collections of its photos. The prototype of the interactive browser under development will be presented which dynamically summarises a large number of photos in a highly inviting, simple, and enjoyable way.

Figure 1. Interactive browser for reviewing a day's SenseCam images

Acknowledgments