Photocopain - Annotating Memories For Life

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ABSTRACT

Photo annotation is a resource-intensive task, yet is increasingly essential as image archives and personal photo collections grow in size. There is an inherent conflict in the process of describing and archiving personal experiences, because casual users are generally unwilling to spend large amounts of effort on creating the annotations which are required to manage their collections.

This poster outlines Photocopain, a semi-automatic image annotation system which combines information about the *context* in which a photograph was captured with information extracted from the *content* of the image. These automatically generated annotations are then presented to the user for extension or alteration as need be. This work is presented as an initial investigation into the applicability of surreptitiously captured metadata to describe the events of a person's observable life.

1. INTRODUCTION & MOTIVATIONS

In this poster we present the Photocopain [3] multimedia asset management system, which is designed to reduce the effort of the annotation task by taking advantage of as much information as possible from readily available sources of information. We have adopted a strategy of semi-automatic annotation; while human-authored annotations are expensive, they are seen as a *'Gold Standard'*, and have considerable value by virtue of their provenance. In this poster, we describe an architecture that can (a) integrate a number of existing tools and focus them on the annotation task, and (b) integrate as much information as possible from highly heterogeneous sources. This poster aims to highlight how the captured metadata can be used to aid the task of *multimedia knowledge management*.

Photocopain integrates a variety of annotation, information extraction and integration, and user interface tools from the Advanced Knowledge Technologies project[1] (AKT), a six-year interdisciplinary collaboration working in the general area of technology and infrastructure development for the Semantic Web.

In Photocopain photographs are viewed as externalised additions to human memory; many exercises of the human memory rely on collections of photographs, even if only shoeboxes of photographic prints. Furthermore, as digital technology has dramatically increased the numbers of photographs taken (it has been estimated that up to 375 petabytes of information is created in photographic form annually), the problems associated with archiving and managing these photographs have become more pressing (describing their content, storing and retrieving them, and developing narratives to link them together).

[1]AKT IRC: *http://www.aktors.org/*

2. PHOTOCOPAIN

The current trend of publishing personal information to the web, in the form of calendars, photo collections, GPS data, and the adoption of standards such as iCal files, the MBOX family of file formats[2], and the abundance of web accessible services such as **flickr**[3] or **plazes**[4] , is presented as liberation of personal information. This liberation is seen as a social shift towards the self publishing and archival of personal information.

The design and development of Photocopain has been motivated by the ideas brought forward in the first Semantic Web article in the *Scientific American*, stressing the notion of assembling, and integrating personal information into web accessible resources. At his keynote speech during the International Semantic Web Conference 2003 [1] Tim Berners-Lee identified the *'Killer App for the Semantic Web'*, not as a single application but the successful integration of information, or to use his blunt words, *'Its the integration, stupid!'*.

In an attempt to avoid sounding too evangelical, we present work that integrates a number of sources of information to build up a personal metadata chronology. This personal metadata chronology is combined with content based annotations to enrich one's personal photo-collections by proposing automatically generated metadata.

3. ARCHITECTURE

Photocopain combines context-based information captured by the Semantic Logger[5] (SL) with content-based annotations, and then presents them to the user using the AKTive-Media [6] image annotation tool so that the user may apply the *'Gold Standard'* of annotations.

[2]Mbox Specification: *http://www.qmail.org/man/man5/-mbox.html/*
[3]Flickr: *http://www.flickr.com/*
[4]Plazes: *http://www.plazes.com/*
[5]Semantic Logger: *akt.ecs.soton.ac.uk:8080*
[6]AKTiveMedia *www.dcs.shef.ac.uk/∼ajay/html/cresearch.html*

3.1 The Semantic Logger

The Semantic Logger [4] is presented as an infrastructure for the capture and housing of autobiographical metadata. The SL operates by periodically parsing the below listed sources of information into RDF[7], and then passed into a web accessible knowledge base so that context-based services may harness the autobiographical log. One such context-based service is Photocopain.

The Semantic Logger, allows for the capture of the following sources of contextual information:

- Calendar Entries
- Geo-Data: GPS and Network Gazetteer
- Music Playcount
- Firebox bookmarks, downloads, and navigation history
- Email
- File System Information
- Weather Information
- News Headlines

3.2 Image Analysis and Content-Based Annotations

Most of the current work on the semantic annotation of images focuses on attempting to solve the computer vision problem. Our guiding principle with Photocopain has been simplicity [3]. The system is extensible so that new feature extraction algorithms can be included to extend its breadth of recognition, or its classification accuracy. For prototyping purposes four feature extraction techniques have been implemented, these are used in conjunction with EXIF information, and some basic knowledge of photography to generate feature vectors describing the images:

- A CIELab Colour-Map
- Hue, Intensity, Texture (HIT) map
- Edge Direction Coherence Vector
- A Focus Map

Classifiers are trained using images harvested from **flickr** to propose annotations such as natural, artificial, indoor, outdoor, landscape, cityscape, portrait, group-photo, and so on.

3.3 AKTiveMedia

The annotations produced by the image classifiers and the context-based annotators as treated as candidate annotations; while human-authored annotations are expensive, they are seen as the *'Gold Standard'*. The AKTive Media Tool [2] (see Figure 1) is used as an interface to easy the burden of annotating the images by hand, before uploading the metadata to the user's personal knowledge base.

[7]Resource Description Framework *www.w3.org/RDF/*

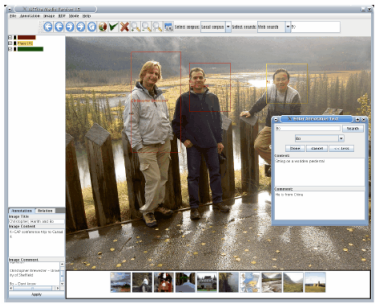

Figure 1: The AKTive Media Interface

4. CONCLUSIONS

This research aims to identify and exploit personal information to help enrich one's personal photos collection. The surreptitious nature the context gathering is highlighted; for a user should not ever have to reproduce information they authored elsewhere. The mSpace[8] facetted browser has been adapted for Photocopain to allow users to navigate through the metadata generated, allowing for users to navigate through their personal photo-collections. Work is currently underway to evaluate the utility of the various forms of metadata captured with respect to the task of searching, and browsing personal photo-collections.

5. ACKNOWLEDGMENTS

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6. REFERENCES

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[8]mSpace: *www.mspace.fm*