

***MiAlbum*—A System for Home Photo Management Using the Semi-Automatic Image Annotation Approach**

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MiAlbum© (v1.0) is a system developed at Microsoft Research China for managing family photos with the help of a semi-automatic image annotation approach. It provides functionalities to import (from scanner, digital camera, disks, PC, CD, web, etc.), label (keywords, name, place, etc.), index, browse, and search (by several means), categorize (by automatic classification into some predefined classes), manipulate (in some ways), and export (send or print) family photo images. In this demo, we show the efficiency of the semi-automatic image annotation method and its help in improving the image retrieval accuracy.

As a large number of family photos and other images of personal use have been accumulated, management tasks, including search, browse, and classification of these images are severe problems encountered by the users. Home photo images, which mainly come from scanners or digital cameras, are considered as having no initial annotation at all. Efficient image search requires the help of image annotation. Annotated images can be found using keyword-based search, whilst un-annotated image cannot. Since content-based image retrieval is still at a low performance level, keyword-based image search is more preferable and image annotation is therefore unavoidable.

The system utilizes the semi-automatic image annotation method we proposed [1] to avoid the labor-intensive and tedious manual annotation and the uncertainty of automatic annotation. The semi-automatic image annotation process is embedded in the image retrieval and relevance feedback process based on the integrated semantics and feature based image retrieval and relevance feedback approach, to be presented in our paper in the ACM Multimedia 2000 Proceedings [2]. When the user submits a query of a set of keywords intending to search those images that are semantically relevant and provides relevance feedback while browsing the search result, the association of these keywords and the feedback images are updated. The coverage and quality of image annotation in such a database system is improved progressively as the practice of search and feedback increases.

As we demonstrated, the semi-automatic image annotation method

is effective to annotate images with names, places, objects, events, and other descriptive keywords for different concepts and make future image search more efficient.

The main user interface is shown in Figure 1 and typical scenarios are presented as follows.

When the user imports some images from peripheral devices, the system can automatically search from the album for those visually similar images using the traditional content-based image retrieval. The keywords of high frequency in these similar images can be used as annotation of the imported images. However, the automatic image annotation is not confirmed by the user until in the future retrieval-feedback process, in which they could be either confirmed or rejected. Another important function of the system is to automatically classify the input images into a number (could be specified by the user) of categories using the algorithm proposed by Platt (2000). The user is able to modify the classification later.

If a user wants to use keyword-based search for, for instance, Kaifu's pictures, he/she can type "Kaifu" in the textbox on the bottom-left of the UI page and hit the return bar or click the button "Go". The user will see some images displayed in the browser on the right hand side of the UI page. The user can scroll the browser to see more images. In many cases, especially when the system is used for the first few times, the user may see many irrelevant images. In this case, the user can confirm some of those relevant images by clicking on the "up thumb" button and those irrelevant images by clicking on the "down thumb" button below each image, and then click on the button "Refine" on the bottom-left of the page. The user will then get much better result after several iterations of feedback. Whenever the user provides feedback images, the system automatically updates the association between the keywords and each image based on these feedbacks, e.g., those positive images are annotated as the person's name "Kaifu" and the Kaifu's name is removed from those irrelevant images (if they were previously annotated as "Kaifu"). The annotation process is accomplished in a hidden/implicit fashion, without the user's notice. The user can use the same procedure to annotate places, date, time, event, and other semantic concepts. The image annotation can help improve the retrieval accuracy in the future.

The system also support query by example. They user can only drag an image in the browser to the bottom-left pane and press "Go" and similar images are ranked in the browser. The user may also use the feedback interface to find more similar images. The query image example can also be one outside the album. This can

be done by pressing the button “Image” and following the instructions to get the query image.

The system supports both physical folder organization and logical category organization. Both organization schemes can be easily modified using the user interface. The image retrieval process can be specified within each sub-folder or sub-category. Images can also be browsed randomly within each sub-folder or sub-category.

Manual annotation interface is also provided in case some user wants to use it to do some initial annotation, which can help expediate further semi-automatic annotation.

MiAlbum is implemented using Microsoft Visual C++ on Windows 2000. We use Microsoft Access as our database scheme and ODBC as the database interface.

REFERENCES

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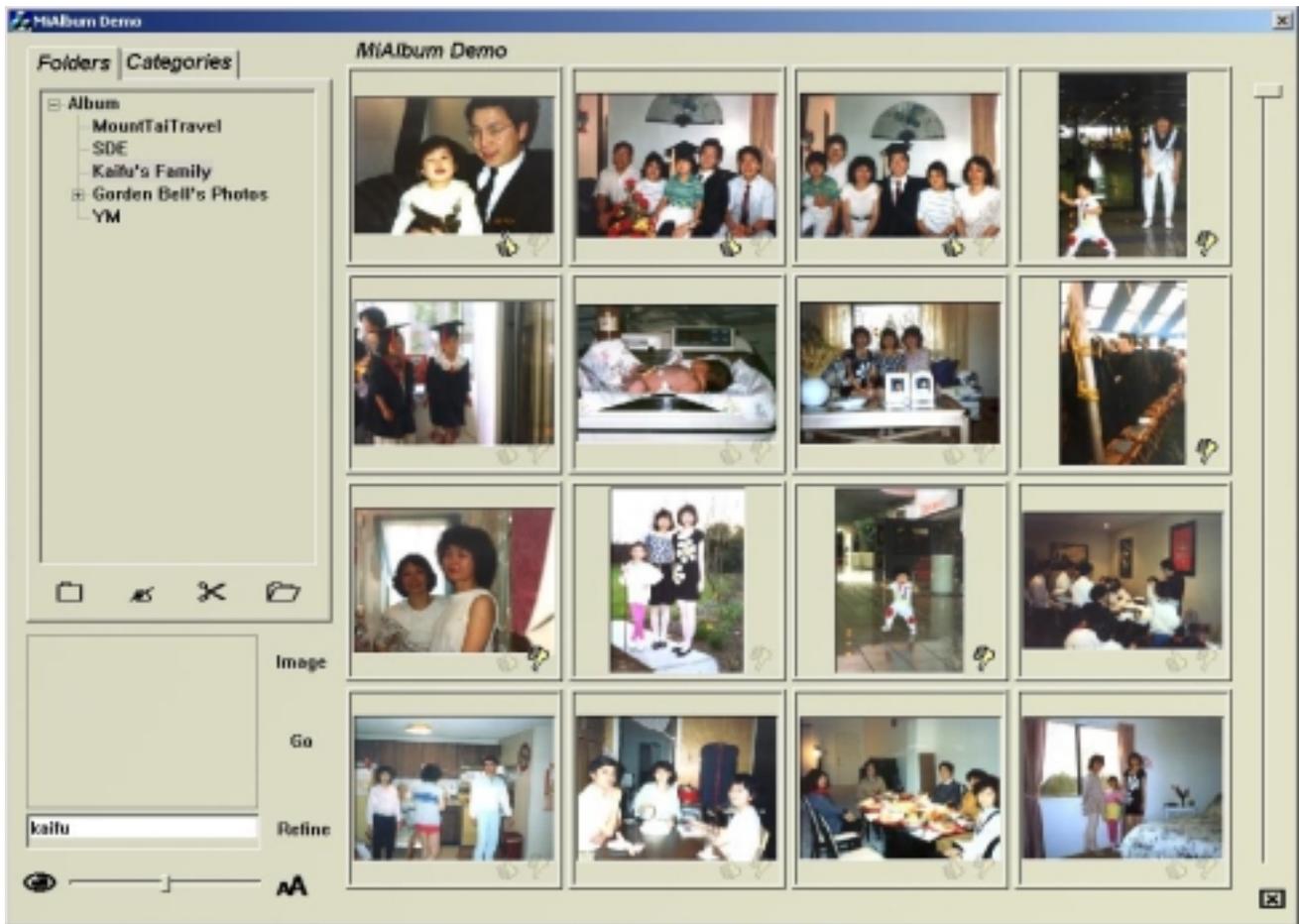


Figure 1. A typical interface page of the *MiAlbum* system.