# Dealing with Fragmented Recollection of Context in Information Management

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**Abstract.** It is important to find new ways to manage our personal digital information, because as the quantities of information we possess continue to grow, existing tools, which place burden on the user's memory systems will become progressively inefficient. This paper reports our work to develop a multi-dimensional interface for re-accessing objects within personal information spaces. We describe a small scale examination of the recollection of contexts in which photographs were taken or used. Our aim is to utilise contextual recollections as a means of making the re-accessing of information more intuitive and more akin to natural human recollection. This paper outlines our theories and illustrates them in the context of a tool for the management of personal photographs. The ideas embodied by our tool show promise and raise a number of issues for further exploration. In future work, these ideas will be adapted to offer support for the management of other types of information object.

## 1 Introduction

Throughout our lives we interact with a wide range of electronically stored information objects; email messages, web pages, digital images, video samples, etc. The sheer quantity of the information we create and use means that we cannot rely solely on our memories to recollect precisely what information we have seen, where we may have stored an object or how we can find it again. Consequently, we rely on tools to support our access and management of digital information. These tools are either dedicated to searching our personal information stores, such as Stuff-I've-Seen [1], or are tools which allow us to manage information objects, e.g. folders on email applications. These management tools are intended to help people find previously stored information by allowing the user to organise their information objects. Both of these approaches, however, place the load for successful recovery of information on the user's memory.

To conduct a successful search on a search system such as [1], for example, a user must remember sufficient details about the information they want to retrieve in order to form a query. That is, the user must remember enough about the object they want in order to create a query to find the object. The current evidence, however, suggests that people have trouble with this [2]. The major alternatives to query-based systems are browse-based systems in which a user looks through information objects in order to

find the objects they want. Browsing systems either show users all the objects available, limiting the approach to relatively small data sets, or force a classification on the objects such as colour distribution for images, concepts for documents, etc.

Similarly, information management tools force a classification on users, either by automatically classifying objects, as in text categorisation systems, or forcing users to classify objects, usually in some form of hierarchical system. For example, photographs and music are generally organised in albums and possibly further subcategorised by artist, date, genre etc. Operating systems manage applications and files in a hierarchical system of folders, email tools provide facilities to group messages hierarchically, and standard webpage book-marking features are hierarchical.

Despite their popularity, hierarchical systems have been shown to have problems. Malone's study of natural office behaviour demonstrated that they are cognitively challenging and that users are reluctant to use them either because they cannot decide how to categorise an item, or because they are not confident in their ability to retrieve a categorised item at a later date [3]. Similar behaviour has been observed with digital documents [4] and email [5]. Another problem with hierarchies for information objects is that items can only appear in one place in the system; forcing users to create strict organisations, when individual items could legitimately fit in many hierarchical positions.

The context in which an information object is manipulated i.e. created, used, or modified influences the way that it is stored within a user's personal information space. In a hierarchical system the categories and relationships between the categories are affected, as well as where an object resides within the hierarchy. The choice of how to create and use a categorisation is determined by several factors including the work task and context at that point. Both of these aspects are dynamic causing many of the problems associated with hierarchies. So, for a user to find a stored information object they must remember the *exact* context in which they obtained and filed the object. As with search systems the burden of recall is placed with the user not the system.

A user's recollection of an object they have encountered in the past, regardless of whether they created it themselves or attained it from an external source, is based on their perception of the document at a particular point in time. This perception is in turn governed by their internal context i.e. the user's existing knowledge, beliefs, attitudes and previous experience etc. at that time, and external context, including the work task, environment, co-collaborators etc. The recollection is rarely complete; normally it consists of partial context information associated with an object or the object's use [2].

In this paper we suggest an alternative approach to the retrieval of personal information, one that supports the user's fragmented recall of the previous contexts in which they used or obtained information objects, and one that is not based on a forced hierarchical representation of information. This is an attempt to exploit differing

encoding representations that result from varying contextual interaction situations. By enabling the user to interact with the system using aspects of context that are easily captured we may facilitate an organic retrieval process, providing facilities that are more allied to natural human information storage. In this paper we introduce our approach, which allows fragmented, multi-type recollections to be used to re-access information objects, and illustrate the interaction principles in the context of an application for the management of personal photographs.

## 2 Related Work

Extensive literature is available on interfaces for information management in general, as well as the more specialised topic of photograph management interfaces. We provide a brief overview of these fields below.

Traditionally, interfaces rely on spatial recollection to access information objects. A good example of this are the hierarchical systems described above, including the familiar desktop metaphor. Alternative metaphors have been proposed that utilise other types of recollection. The dimension of time has been advocated by several scholars to account for the fact that users are often able to distinguish temporal relationships between objects, events and dates [6, 7, 8]. For example "I remember writing that report roughly around the same time as I attended the conference in Sweden". Information object properties have also been suggested as means to store and access personal information [9, 10, 11]; this represents a semantic dimension exploiting recollections such as "That paper is very long, but highly related to Jim's work".

Although there is good evidence from cognitive psychological research endorsing the recollection modes utilised by the systems above, restricting interaction to any single dimension is counter productive, perhaps hindering re-access. We believe it would be more profitable to support multiple forms of recollected context rather than relying on any single mode. The experiments described in this paper attempt to validate this hypothesis.

Improving photograph browsing interfaces is an active research area and has been for some time. Systems developed have generally followed the same trends as those for other objects; exploiting spatial, temporal, and semantic recollections. However, photographs have additional properties that can allow utilization of additional memory types such as visual recollection, strong autobiographic recollection etc. Further, photographs have characteristics that can be used for automatic classification, as well as inducing re-accesses e.g. colour histograms, time-stamps etc. Each of these has been considered in retrieval interfaces. PhotoTOC [12], for example, examined the use of time and colour based clustering. PhotoMesa [13] exploited visual perception skills for recognition and recollection of personal images to create a zoomable photo access interface. Rodden [14] also utilizes a specific type of visual recollection in her

evaluation of the usefulness of grouping images by colour similarity, while the Shoe-Box interface [15] incorporates recollections of colour, texture, shape and sound.

The wide variety of interface examinations emphasizes a need for a greater understanding of the features of photographs recollected by users during the re-retrieval process. The following section describes a small user study to analyse how people annotate their photographs, determine what features are recollected and what issues affect recall. The results influenced the design of our interface.

## 3 Pre-Design Investigation of Memory for Personal Photographs

We investigated the ability of 9 subjects to remember contextual details of 12 randomly selected photographs from their personal collection. The population consisted of a mix of undergraduate and postgraduate computer science students, as well as 5 non-academic participants. All of the participants volunteered in response to a blanket email invitation. A two-stage process examined firstly, how personal images could be annotated and secondly, the users' recollection of the annotation process.

### 3.1 Analysing the Annotation of Personal Photographs

Subjects were asked to provide textual descriptions for each photograph detailing, for example, the contents, location, date etc. They were also asked to group photographs semantically, for instance, holiday photographs could be placed in a grouping termed 'Holidays'. The grouping of images was not restricted, so any single image could be placed in multiple groups. For example, a photograph on the beach with friends in Spain could be placed in a group for holiday photographs, photographs of friends, sunny pictures etc.

### 3.2 Analysing Recollections for Personal Photographs

Approximately one week after the annotation, each participant was asked to describe, in the greatest possible detail, the photographs they could remember from the first session. When participants were satisfied they could not remember any further details of photographs, they were shown the photographs that they had recalled, to determine whether these could cue further recollection. For example, we thought that this may prompt recollection of other images that were within the same group. We wished to determine whether participants were able to recall the annotations they made and establish whether or not images serve as cues for other images. Sessions were recorded and transcribed for analysis.

### 3.3 Aims

The small scale user study had the aim of providing answers to the following: 1) What features were annotated? 2) Did individual users tend to annotate same features? 3) Did free recall performance vary? 4) Did descriptions of recollected photographs match those given as annotations? 5) Did performance vary with different cues?

### 3.4 Outcomes

The performance of participants differed greatly in both stages of study. The features annotated and levels of detail supplied varied both across photographs for individual users and across population as a whole, with annotations themselves depending on the quality of memory associated with an image and indeed, how useful the images are as an autobiographical cue. Features of photographs annotated included the following contextual information:

- ***The Subject*:** object(s) or actor(s) within a photograph. Often these were referred to by name, however, some participants tended to describe them in relation to themselves e.g. "My fiancée" etc. Other annotations gave personal opinions about the object e.g. "Very picturesque". Occasionally, the subject was described with associated facts e.g. "John in Hannah's room. Hannah's feet were really smelly that evening"
- ***The Environment*:** mostly brief, general descriptions were supplied. Occasionally other features were included such as the weather, reasons for being there, and very rarely general facts about the environment, such as historic facts of a landmark etc.
- ***Events / Activities*:** The event where a photograph was taken or the action being performed by a subject etc.
- ***The Date:*** Very frequently temporal information was supplied for a photograph. This was mostly given in the form of the year it was taken and regularly in conjunction with event / activity information.

Contextual annotations were highly subjective and personal, often relating strongly to autobiographical experience. The groups chosen by participants also had a wide semantic range, mostly consisting of the concepts defined in descriptions above. Groups detailed: events (temporal / episodic – categorical or specific); subjects or objects (semantic – singular or grouped entities); description of mood (semantic); environmental location or description (semantic); action or task (semantic).

Free recollection performance i.e. based on memory alone was reasonably comprehensive and accurate (mean number of photos recollected was 7.78 / 12 stdev = 1.47). We assume that this performance would decrease overtime and with larger collection sizes. The details of freely recollected descriptions, however, did vary noticeably with some participants describing recollections in more detail than their original descrip-

tions, while others could only recall small elements. The fact that many subjects recalled the annotation process and that recollections partially overlapped with earlier descriptions illustrates both strengths and weaknesses of annotations; the process elaborates encoding, however, retrieval requires specific recollection rather than the actual high level semantic nature of memories. Through analysis of the recollection process, it was observed that some participants performed better when recollected photographs or contextual fragments were used as cues, as opposed to using the physically offered images as group prompts. For other participants, however, the opposite was true, underlining the heterogeneous nature of memory and the need for flexible tools that can be personalised for specific recollections of objects. Section 4 describes an interface for re-accessing personal digital photographs that was designed to support our findings.

## 4 The PhotoMemory Interface

Based on our multi-dimensional hypothesis and the results of our user study a new image browsing interface was created, which we refer to as "PhotoMemory". PhotoMemory was designed in an attempt to minimise the burden placed on the human memory when searching for personal photographs. The PhotoMemory interface was developed as a prototype to evaluate the concept of multi-dimensional retrieval and provide enhanced design information for future applications. The interface is shown in Figure 1.

The application provides facilities for the annotation of photographs. Descriptions can be attached to images, images can be placed in semantic groups and concepts can also be assigned to images. Photographs can be annotated as they are added to the system or annotated in parallel with the browsing process. The focus of this paper, however, is not on annotation. Rather, we concentrate on the methods of interaction that the system promotes when re-accessing photographs. The premise is that when the user initiates a search they will have access to at least some contextual information about the photograph(s) they wish to find e.g. they may remember that a certain individual was in the photo or the time at which the photo was taken. Unlike many other photograph management tools the PhotoMemory interface allows a wide variety contextual fragments to be used during the search. Recollected information may be visual, temporal, semantic, spatial etc. which relate to filter options described in section 4.3.

### 4.1 Growing Paradigm

In the PhotoMemory interface the user's full collection is visible on screen at all times. Photographs are never removed from the screen completely, only reduced in size. When filters are applied based on recollected contextual fragments, images that match the criteria grow while the remainder shrink, providing a powerful interaction

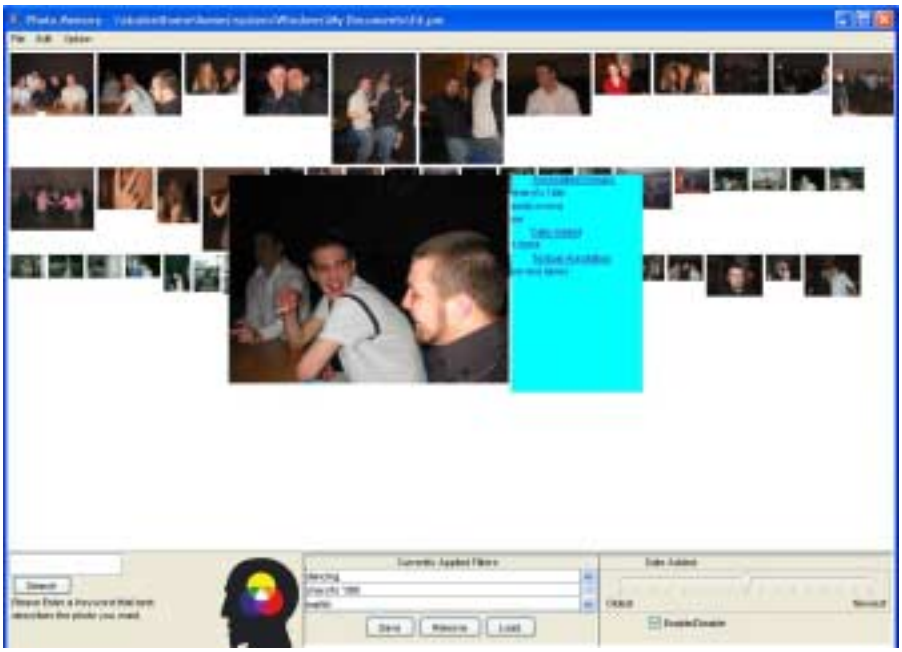

**Figure 1: PhotoMemory User Interface, showing the Growing Paradigm and Feedback mechanism**

paradigm that should make it instantly clear which photographs meet the filter criteria without eliminating any data from the user. This is an attempt to maximise the potential for serendipitous acquisition of retrieval cues.

### 4.2 Offering Feedback to Users While They Search

In an effort to build a fuller recollection of target photographs our interface provides users with stored contextual information based on their actions. For example, on mousing over a photo, a display is generated [Figure 1] containing a magnified version of the thumbnail, as well as its description and a list of other annotations including group classifications and time stamp information. Offering visual, contextual cues in this manner, in combination with drawing attention to growing images is hypothesized to subtly reacquaint users with previous experiences with images including making annotations.

### 4.3 Filtering Options

A range of filter types can be applied to the collection to grow a particular set of images. These correspond to particular contextual fragments and are described below:

- ***Visual Filtering:*** to exploit human visual perception mechanisms and strong recognition of visual stimuli users can skim and select photographs they deem appropriate. Grouping photographs can also be achieved in this fashion, combining annotation and retrieval phases.
- ***Semantic Filtering by free-text:*** recollected keywords can be used to filter photographs, although this relies on accurate recollection of the annotation process. Free-text filters match against both group names and annotated descriptions.
- ***Semantic Filtering by groups:*** by right-clicking on any thumbnail an option can be selected to filter the collection by groups associated with that image. The user is presented with a menu of checkboxes for each group and when a group is selected all of the images within that group are deemed appropriate.
- ***Temporal Filtering via date line:*** a scrollbar is available that relates to a timeline. When the scrollbar is activated, images within a time frame close to that selected are deemed appropriate. This incorporates temporal recollections.
- ***Spatial Filtering by screen location:*** to support accurate spatial recollection i.e. recollections of where images are located in relation to the screen or to other images, the PhotoMemory interface is designed so this information stays consistent throughout the search process.
- ***Smart Filtering:*** Filters are applied and combined iteratively. Combinations can be saved and reapplied at later points in time. Saved filter combinations can be applied / removed in the same manner as the core filter types.

## 5 Evaluating the Effectiveness of Multi-Dimensional Interaction

To establish the usefulness of multi-dimensional interaction and exploitation of contextual recollections we tested the PhotoMemory interface (System 1-figure 1) against a standard hierarchical system (the folder structure in which participants organised their photographs – System 3), as well as a restricted version of our software that used the same interface, but had the filtering features disabled (System 2). When using System 2 the only means of searching was by scanning thumbnails and using the magnifying feedback feature. The restricted system was included to determine if any benefits experienced when using PhotoMemory were simply a result of visual browsing.

The remainder of this paper describes a pilot study, which examined participants performing a series of realistic search tasks on the three systems described above. The aim was to extract indications about the usefulness of multi-dimensional retrieval interfaces and attain design suggestions to improve our interface in future applications. The following sections describe our methodology and discuss some of the findings, relating their consequences to future work.

### 5.1 Participants

There were 6 participants (1 female) with varying levels of expertise in photograph management. 3 of the participants described themselves as having good experience of the area, regularly taking and adding photographs and browsing their collections. 2 participants described themselves as having less experience of the technologies available to manage their collections, but still frequently add and browse. The last participant described their collection as being fairly static, but he tends occasionally browse his collection.

Each participant provided a personal set of digital pictures, organised in a fashion that they determined themselves. This organisation represented System 2. The collections ranged from 106 images to 306, the average size was 207 pictures. The images were mainly organised hierarchically by events or time periods. Semantic information was rarely used to organise images, however, some folder names referred to image contents e.g. "Magaluf 2003". In the main, filenames were auto-generated by the camera or camera-phone with which they were taken, although some images had been renamed with meaningful, descriptive identifiers.

### 5.2 Methods

After a short demonstration, participants were given approximately 3 weeks to familiarise themselves with the two new systems, while creating and annotating their test collections. Participants were surveyed before the experiment to establish user characteristics, experience with photo management etc., during the experiment – pre-task, to gauge their recollection of photographs meeting task requirements and post-task, to determine their feelings towards each task and system. Finally, an exit questionnaire was issued to determine subject preferences across the three systems.

### 5.3 Tasks

When a user re-accesses photographs from their personal stores searches are generally of three main types [16]. Searching for:

1. Photographs from a particular event in the collection
2. An individual photograph from the collection.
3. Photographs that spanned across different events.

Our experimental tasks were created within these categories, tailored to suit each collection. For example, type 1 tasks included find images from: "Leanne's 18$^{th}$ Birthday party" and "one particular baseball game". Task 2 examples included "Find the image of you and Ross outside a church" and "Find the image of a Ferrari". Type 3 examples included "Find images from birthday parties", "images with friends" etc. Each subject performed 2 tasks of each type and the tasks and systems were rotated to minimise learning effects.

## 5.4 Performance of Systems

The time taken to perform each task, the number of images retrieved to complete the task and how the retrieved image set matched original recollections (Scale 1-5) were recorded and used to objectively and subjectively compare the performance of the systems. These data are summarized in Tables 1a-c.

**Table 1a-c: Objective data recorded during the study**

| *System 1* | *Task 1* | *Task 2* | *Task 3* | *Average* |
|---|---|---|---|---|
| time to complete task (secs) | 116.5 | 35.25 | 145.25 | 99 |
| number of images retrieved | 12 | 1 | 24.25 | 12.41667 |
| selected group accurately reflected recollections | 1.75 | 1 | 2.75 | 1.833333 |

| *System 2* | *Task 1* | *Task 2* | *Task 3* | *Average* |
|---|---|---|---|---|
| time to complete task (secs) | 100 | 47 | 146 | 97.66667 |
| number of images retrieved | 12 | 1 | 20.75 | 11.25 |
| selected group accurately reflected recollections | 3.25 | 2.5 | 3 | 2.916667 |

| *System 3* | *Task 1* | *Task 2* | *Task 3* | *Average* |
|---|---|---|---|---|
| time to complete task (secs) | 154.25 | 110.25 | 215 | 159.8333 |
| number of images retrieved | 12.75 | 1 | 16.25 | 10 |
| selected group accurately reflected recollections | 3.25 | 1 | 4.25 | 2.833333 |

**Table 2: Subjective Preferences from Exit Questionnaire**

| | *System 1* | *System 2* | *System 3* |
|---|---|---|---|
| *Preferred System* | 6 | 0 | 0 |
| *Easiest to system to use* | 3 | 2 | 1 |
| *Fastest System* | 6 | 0 | 0 |
| *Most effective when searching for one photograph* | 6 | 0 | 0 |
| *Most effective when searching for multiple photographs* | 6 | 0 | 0 |

The mean search completion times for the three systems were 99s for PhotoMemory (System 1), 97.7s for the restricted version of PhotoMemory (System 2), and 159s for the hierarchical system (System 3). On average System 2 was fastest. However, PhotoMemory was on average faster for tasks 2 and 3. It makes sense that our interfaces were faster for task type 3, which involved searching for images spanning different events, as it cuts across the temporal boundaries defined within many of the hierarchies.

When examining the subjective ratings of how recovered image sets match pre-task recollections (scale 1-5), we found that image sets returned when using PhotoMemory (mean=1.83 stdev=0.99) tended to match memories less than those in system 2 (mean= 2.92 stdev=1.38 and system 3(mean=2.83 stdev=1.57). From observing and interviewing participants we discovered that this was usually a positive outcome and meant larger result sets were obtained than those anticipated from recollections alone. One explanation for this could be that using the multi-dimensional interface facilitated the acquisition of additional cues that allowed images to be found that were not cued by the task.

From the exit survey data [Table 2], we can clearly see that the preferred system was PhotoMemory. All of the participants deemed PhotoMemory to be their favourite system. Further, contradicting the timed data; participants rated PhotoMemory as the fastest system. It was also judged to be the most effective when searching for both single and multiple images. The only category that the multi-dimensional interface was not deemed completely superior was in terms of ease of use. This is perhaps related to the fact that the method of interaction is new and unfamiliar to users and using the system requires the user to make more decisions during retrieval.

## 5.5 Observed Behaviour

The following sections describe observed participant behaviour when performing search tasks and attempt to rationalise the reasons behind it. We identify which features of photographs were remembered and examine if these influenced the users' search strategies.

### 5.5.1 Recollected Features

Features recollected once again consisted of the contextual fragments as described in section 3.4. Because the features correspond to the categories described earlier, in this section we only restate the main points and emphasize any supplementary findings.

The descriptions of memories were often highly visual. For example, "rustic pink coloured railings with snow lining the top". Once more, environmental details were frequently mentioned including weather and location. Personal experiences tended to be accentuated when describing recollected images, possibly indicating that personal connections to images strengthen memories and allow descriptions to be given in extra detail. Further, personal feelings and emotions repeatedly formed part of recalled descriptions e.g. "We were so cold and tired". We feel that these personal aspects should be utilised in some way in order to improve re-access. Additionally, images were often referred to in terms of their relationship to each other e.g. "one was earlier – it was warmer and sunnier, while another was later – you can see that we were getting cold". One participant had expert recollection of the technical features of photos, including their size, resolution and the camera with which they were taken. This information directly affected the way in which he searched.

Overall, the features recollected appeared to influence the participants' search strategies. Nevertheless, not every aspect of the recollected data was used during searches. The following section details the way participants searched and the features of PhotoMemory that were used, relating them to the contextual information supplied before the search task commenced.

### 5.5.2 Features of PhotoMemory that were used

Unfortunately a technical flaw made the analysis of log files charting the participants' system interactions impossible, so the following points are made based on the experimenters' observations alone.

From the same starting point i.e. the same recollected features, participants' search behaviour changed with different systems. Across all systems, however, it was observed that completing individual tasks involved several bursts of searching. During these bursts, participants tended to focus on a single aspect of an image(s) that they had remembered and this determined their search strategy. Only when a search burst failed did they decide to use other recollected features. It was extremely rare for users to utilise multiple aspects of context within a single burst of searching. Only when using PhotoMemory was this evident and even then only when another image triggered improved recollection.

When using PhotoMemory the common practise was to start searches with keyword filters, utilising semantic recollections. This differed from systems 2 & 3 as they provide few features to exploit semantic contextual information. Group filtering was also used, although, not as frequently as keyword searches. One explanation for this could be that the feature required the user to right click on an image before filtering; hiding the feature from the user. PhotoMemory's date filter feature was used very sparingly. Nevertheless, temporal context was used in different ways. For instance, because PhotoMemory orders images temporally, subjects identified key images for a recollected time period and browsed around them, effectively filtering by date themselves.

When searching with PhotoMemory there was evidence of increasing recollection of desired photographs as the search continued and the extra information altering search behaviour. Users started searches using small pieces of information about the photographs they wish to find; these recollections orientated them along their journey. Through interaction with the system, additional information was acquired or recollected, resulting in more detailed search aims and improved awareness of the information space with relation to these aims. For example, if a user was asked to find a photo of a particular friend (John). He may start searching using "John" as a keyword. When this process fails to return an appropriate image (poor annotation), the user may recall a particular experience he shared with John and browse the collection looking for images of that experience. While browsing the user may find images of a football game, which trigger a memory of another time when he and John watched football together shortly after the user had bought a new camera phone. He may remember that all of his camera phone images had been semantically grouped and apply a filter based on this. As he knew images would be early (he had just bought the phone) the user would find an image of John when they watched the football match. There was no evidence of such progression of knowledge and developing strategies in Systems 2 or 3.

It also appeared that, when using System 1, filtering interaction was used to create dynamic groupings of images. Participants referred to the sets as having shared properties and in this way they were treated in similar means to photographs within a hierarchical folder. The difference is there was no dependency on the precise location within a hierarchy to retrieve particular image(s) from the groups.

When using system 2, users were restricted to exploiting visual features alone. This essentially meant mousing over each image until a match was found. This style of interaction tended to frustrate users, with 4 out of 6 subjects remarking that they felt uncomfortable performing searches in this way. One participant stated: "I know that it was when I was in the States, but that doesn't help here (System 2)"

Subjects' behaviour and performance when using system 3 was influenced not only by recollection of the photograph(s) they wish to find, but by their knowledge of their hierarchical structure. Subjects who understood the spatial organisation tended to find images quickly, while others found it difficult to narrow search domain at all. Further, the experts could utilise varying image properties to find images such as sorting images by date or size, while those with little understanding of the information space or file systems relied on folder and file names that were not always present or meaningful.

In the main, we found that the use of recalled context within searches was limited to a small sub-set of that actually remembered and very rarely were multiple aspects used in one search. Users like the idea of exploiting the additional information to their advantage and show signs of practising this when the facilities are made available. Further, search performance when using PhotoMemory did not rely as heavily on expert knowledge of the information space – as was the case for the hierarchical systems. Despite these benefits, work must be done to assist this process by allowing users to interact with the system in a natural fashion while using multiple aspects of context.

## 6 Conclusions

We presented two studies in this paper. The first, conducted in an artificial situation, examined users' recall of contexts in which their photographs were taken, used or annotated. A second experiment looked at how contextual fragments of recollection are used in real search situations. The second experiment shows that although users are normally able to remember several characteristics of photographs they wish to find, in practise they use very few of these during a typical search process. We found that users like the idea of using multiple fragments of recollection in an iterative manner, and use more aspects of context when the interface encourages this.

This work describes early attempts to investigate the role of memory in information management. Future work will investigate the recollection and re-retrieval of objects

with weaker visual properties. As although users claimed they felt uncomfortable when relying solely on visual features, there is no doubt that visual recollection and cues play a large role in re-accessing photographs.

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