

000 Lifelog Moment Retrieval Web Application

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012 **Abstract**

013 This paper presents an approach for a lifelog moment retrieval applica-
014 tion able to provide a visual and interactive environment to the user.
015 This application is divided into three main modules: 1) the user uploads
016 images, as well as eventual textual data annotations; 2) the user interacts
017 with the application introducing relevant words to retrieve a specific moment
018 and, consequently, the application retrieves the images associated
019 to the moment with a certain confidence; 3) a visual environment is provided
020 with two different views, in the form of an image gallery or data
021 tables organized into timestamp clusters. Experimental results confirms
022 the ability to retrieve images from desired moments in personal lifelogs
023 and was used with success in the ImageCLEFlifelog challenge.

024 1 Introduction

026 Lifelogging is the process of tracking and recording personal data
027 created through our activities and behaviour [1], consisting of a unified
028 digital record of the totality of an individual's experiences, captured mul-
029 timodally through digital sensors and stored permanently as a personal
030 multimedia archive. Personal lifelogs have a great potential in numer-
031 ous applications, including memory and moments retrieval, daily living
032 understanding, or disease diagnosis, as well as other emerging applica-
033 tion areas [2]. For example: in Alzheimer's disease, people with mem-
034 ory problems can use a lifelog application to help a specialist follow the
035 progress of the disease, or to remember certain moments from the last
036 days or months.

036 One of the biggest challenges of lifelog applications is the large amount
037 of data that a person can generate. The lifelog datasets, for example the
038 ImageCLEFlifelog dataset [3], are rich multimodal datasets which consist
039 in one or more months of data from multiple lifeloggers. Therefore, an
040 important aspect is the lifelog data organization in the interest of improv-
041 ing the search and retrieval of information. In order to organize the lifelog
042 data, useful information has to be extracted from it. Other important as-
043 pects are the visualization and user interface of the application.

043 This paper proposes a new concept for a lifelog web application de-
044 signed and developed for the participation in the ImageCLEF lifelog task
045 [3], more specifically in the Lifelog Moment Retrieval (LMRT) sub-task.
046 This web application was developed in order to visualize and provide an
047 interactive tool to the users. The application is divided into three blocks,
048 namely upload, retrieval and visualization. Each block provides interac-
049 tion with the user.

050 2 Related Work

052 Over the last few years, the term lifelogging has received significant
053 attention from both research and commercial communities. In order to in-
054 crease the interest on this topic, several challenges started to emerge pro-
055 viding test collection for personal lifelog data [3, 4, 5]. These challenges
056 promote a comparative evaluation of information access and retrieval sys-
057 tems operating over personal lifelog data.

058 In a Microsoft research project, a lifelog retrieval engine based on
059 an underlying database system, named MyLifeBits [6] was developed.
060 This is generally considered as the first lifelog retrieval system. Zhou *et*
061 *al.* [7] proposed an iterative lifelog search engine, called LIFER, that is
062 queried based on several different forms of lifelog data, such as visual
063 concepts, activities, locations, time, etc. A retrieval and exploration tool
064 was presented by Leibetseder *et al.* [8], called lifeXplore, that allows to

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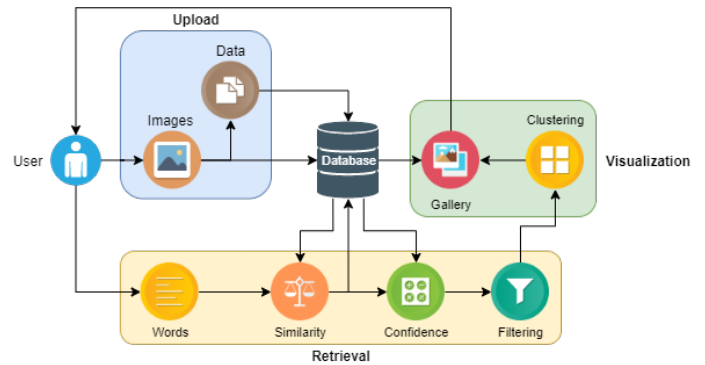


Figure 1: General representation of the developed application. The user interacts with the three blocks: Upload, Retrieval and Visualization.

search and browse features that have been optimized for lifelog data. In addition to these works, several others works were presented in lifelog challenges, such as Exquisitor [9] and LifeSeeker [10].

3 Web Application

The first version of a web application was developed in order to visualize and provide an interactive tool for users. As a proof of concept, the data provided by the ImageCLEFlifelog organizers [3] was used in the application. This web application was divided into three main modules, such as upload, retrieval and visualization blocks, which provide interaction with the user in each one. In Figure 1 is presented a general representation of the web application.

3.1 Upload

The user uploads the images into the application. Initially in order to test and save time on this module, the textual data annotations provided by the ImageCLEFlifelog organizers are automatically uploaded and organized in the application database associated with uploaded images. However, our application is able to extract annotations from the input images using several methods for image classification, object detection and scene recognition.

The data is organized in the application database into different tables/models, such as images, concepts, locations, activities, scenes, attributes, among others. Each model maps to a single database table. The relationship between models makes our system faster and more efficient. The image model has a many-to-many relationship with the other models. For example: an image can contain several concepts, and a concept can be found in several images.

3.2 Retrieval

This approach only computes the confidence of some images that are selected in a first step for the specific moment by using the cosine similarity of word vectors, which makes this retrieval method more efficient and using less processing time compared with a exhaustive method [11].

In this application, the user retrieves a specific moment from his personal lifelogs by introducing relevant words divided into several categories, such as objects, locations, activities and irrelevant words. If the desired moment contains time ranges, years or days of the week, the user

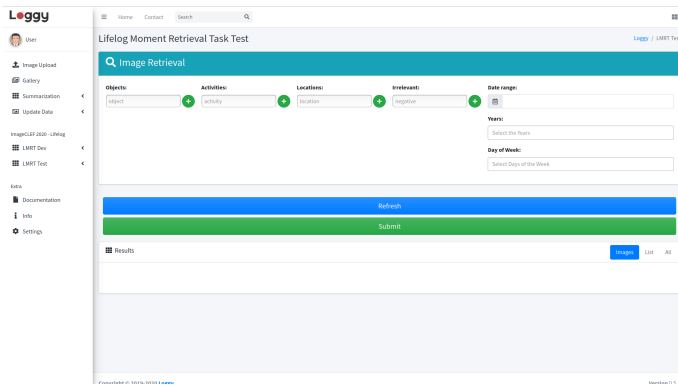


Figure 2: Web application retrieval view.

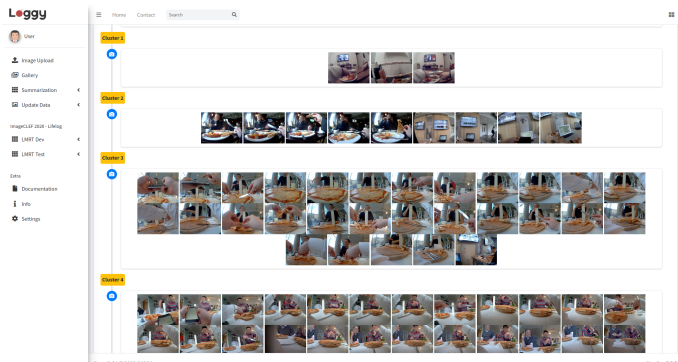


Figure 3: User view of the image clusters in form of image galleries.

can also insert that data in our application to further filter the retrieved images. Figure 2 shows the retrieval view of the web application. In the retrieval block, the input arguments are: objects that appear on the images; activities that the user was practicing; locations or places where the user was; negatives or irrelevant things, activities or locations that should not appear in the images; time ranges, years and days of the week (Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, and Sunday).

The confidence of the selected images is computed using the cosine similarity of word vectors and the score of the labels. For labels without score field, it is only used the similarity to calculate the confidence. As last filtering on the retrieval block, the images are selected based on the confidence threshold, which can be adjustable by the user.

3.3 Visualization

The selected images are organized into different clusters based on images timestamps. The application provides an easy way for users to visualize and identify the clusters that are associated to the specific topic. Figure 3 shows the user view of the clustered images in form of images gallery. Another way of visualization in form of a data table is provided as shown in Figure 4.

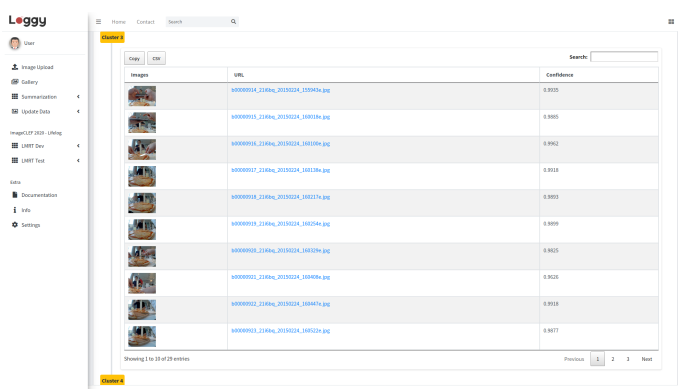


Figure 4: User view of the image clusters in form of data tables.

4 Conclusion and Future Work

This paper presents a proposed concept for a lifelog application, this approach that aims to help people to improve their quality of life. Using only the ImageCLEFlifelog dataset [3] leaves this application somewhat limited regarding the visual concepts extracted from the images. However, using the most recent state-of-art algorithms, a more rich description of the images can be obtained, resulting in an increase of performance. Therefore, it is pretended to implement better scene recognition, object detection, activity and color detection algorithms for the new version of the application.

In future versions, pre-processing methods will be implemented in the application, such as selecting images in upload stage based on low level properties [12]. Moreover, using other metadata acquired together with the images, such as GPS coordinates, it is also possible to improve the performance of the application.

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