Virtual Reality Lifelog Explorer: A Prototype for Immersive Lifelog Analytics

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***Abstract*—The Virtual Reality Lifelog Explorer is a prototype for immersive personal data analytics, intended as an exploratory effort to produce more sophisticated virtual or augmented reality analysis prototypes in the future. An earlier version of this prototype competed in, and won, the first Lifelog Search Challenge (LSC) held at ACM ICMR in 2018.**

1. Introduction

In this demonstration paper we present the Virtual Reality Lifelog Explorer (VRLE) [1], a prototype for immersive analysis of lifelog data, which participated in and won the first Lifelog Search Challenge (LSC) [2] held at ACM ICMR in 2018. Unlike the majority of lifelog interaction applications, which typically appear on personal computers, and a few other mainstream platforms [3], [4], VRLE is designed for lifelog interaction in virtual reality. It was developed as a baseline for common lifelog interaction use cases and how they might be migrated to virtual reality to explore their effectiveness in comparison to more conventional lifelog interaction systems.

2. User Interface

VRLE's primary user interface is a virtual 3D interface designed to provide a quick and efficient means for a user to generate a filter query within the virtual environment. The interface consists of two sub-menus, one for selecting lifelog concepts of interest and the second for adjusting the temporal aspect of the query (e.g. hours of the day or days of the week). A typical lifelog query, such as 'using the computer on a Saturday afternoon' could be generated by using the concept sub-menu to select the appropriate visual descriptors (e.g. computer or laptop) and the temporal sub-menu to select the range of time (afternoon) and the day of the week (Saturday). The querying interface is available for the user to access at any time by pressing a dedicated button on either of the two VR handsets. When the user submits their query, the interface disappears and the user is free to explore or browse the results within the virtual space.

To interact with visual elements within the virtual environment, we implemented a very direct form of interaction, where the user can physically touch the virtual interface using their controllers. To facilitate this process, the controllers are outfitted with a virtual drumstick-like appendage protruding from the head of each controller (see Figure 1). This object was added to enhance precision and fidelity when contacting interface elements. This method of interaction is reminiscent of a more conventional style of lifelog browsing where the controller drumstick mimics how our fingers interact with a keyboard or touchscreen. Tactile feedback is provided through the handsets' rumble settings to signify hitting the keys.

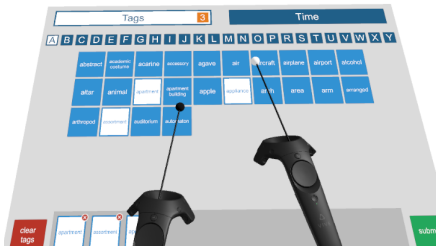

Figure 1. Contact-Based User Interaction

3. Data Visualisation

VRLE was designed to target the LSC test collection [2] which contains a continuous stream of images captured from the perspective of an individual lifelogger. Any one of these thousands of images could represent a potential cue to promote autobiographical memory, or in the context of the LSC, serve as the goal of a known-item search task. The latest iteration of the VRLE prototype uses an event-based visualisation strategy where an event is defined as a sequence of lifelog images and metadata that corresponds to semantically and temporally related real-life activities. The search engine which supports the ranking of events for the VRLE prototype is provided by Duyen et al. [5] and follows an architecture which is typical of state-of-the-art lifelog search engines [6] as depicted in Figure 2.

When visualising the lifelog data within the virtual space, we determined that due to the quantity of visually similar images within a typical event, displaying every image to the user at once can inhibit effective retrieval rather

than assist it. A simple solution to this is to summarise an event's content using a subset of its images, described as an event preview (see Figure 3), which can then be further explored if the user considers the event to be relevant. To interact with an event preview, we established the concept of a contextual interface that would only be exposed when necessary. This type of contextual interface is common in event-based lifelog applications [7], [8] where it is typically achieved simply by hovering over relevant images.

In Figure 4 we can observe a user pointing at a specific image with the contextual interface rendered slightly above the controller and providing two options based on the current target of interest. To navigate between these options the user uses their thumb on the controller's touchpad to highlight and make their selection. The context menu currently provides three possible functions depending on what image is being targeted. The first and most important function is 'Explore', which enables the user to explore all the images in an event. These explored images are presented in a line in front of the previously rendered results (see Figure 4) and can be navigated or scrolled through in an identical fashion by gripping the controller and performing a throwing gesture in the chosen direction.

The remaining two functions provided by the contextual interface are 'Zoom' and 'Search Tags' which are intended as secondary features provided to improve accessibility for some users. The 'Zoom' option increases the scale of a target image to make it easier to examine. The 'Search Tags' option copies all of the concepts the target image is labelled with and reloads the main menu with those concepts prepared for submission.

4. Conclusion and Future Work

In this paper we have presented the latest iteration of VRLE, a baseline prototype for immersive analysis of lifelog data in virtual reality. It is our intention to continue its development by designing native virtual reality interaction paradigms that may provide new and improved methods of lifelog interaction and evaluate their effectiveness at future LSC competitions.

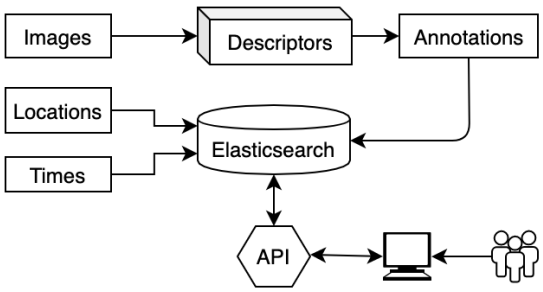

Figure 2. Search engine pipeline [5].

Figure 3. Ranked list of Event Previews

Figure 4. Exploring Event with Image Metadata

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