Combining Multitouch Gestures and Sketches to Explore Photo Collections

Paulo Gonçalves
Dept. of Computer Science and Engineering
INESC-ID/IST/TU Lisbon, Portugal
Email: paulo.goncalves@ist.utl.pt

Manuel J. Fonseca
Dept. of Computer Science and Engineering
INESC-ID/IST/TU Lisbon, Portugal
Email: mjf@inesc-id.pt

Abstract—In this paper we present an approach for interactive exploration of photo collections, which combines seamlessly multitouch gestures and sketches. Multitouch gestures are used to navigate through the photo collection, while sketches are used to filter the images presented to the user, according to their properties and metadata. The different gestures provided for interaction, their correspondent actions and how they are invoked are described in the remainder of this paper.

I. INTRODUCTION

The digital era and the wide spreading of Internet have had a tremendous impact on media information and the way people handle it. The amount of information stored has grown exponentially while tools and applications to deal with it have not. Photography is a perfect example of this situation. Nowadays, people take and keep more photos than ever before, and as the collection grows in size people tend to neglect its organization [1], ending up with a huge amount of unorganized data.

People can do two distinct activities to locate photos: one is searching and the other is browsing. Searching for a photo, implies that the user has the photo that she/he is looking for clearly on her/his mind. Usually this kind of task, also called rediscovery [2], aims at deciding if a desired photo is present in the collection or not. Browsing, on the other hand, relies on ill defined and changing goals. Browsing is characteristic of a discovery [2] task where there might be several photos that match the desired image to various degrees, giving an exploratory character to the activity. Another aspect associated to browsing is serendipity, where people are easily sidetracked by serendipitous, accidental, discoveries during browsing activities, often changing their minds about what they were looking for [3], [4].

More recently, Marchionini proposed the concept of Exploratory Search [5], where querying and browsing strategies are combined to foster investigation. This exploratory behavior is quite common with media collections. People tend to spend more time in browsing-like filtering rather than in explicit search tasks [6], and the addition of querying tools to its browsing nature aims to enhance the experience by allowing to filter out unwanted objects. As browsing tools usually try to maximize the use of the available space on the screen showing as many photos as possible, this filtering capabilities also provide a useful and efficient way of maximizing the relevant amount of images to be shown.

There are some solutions for the exploration of photo collections that provided us with some crucial insight about this issue. Time Quilt [7] emphasizes the importance of a photo collection based on the principle that people most commonly want to browse their photos by event. On a different perspective, the work from Strong, Hoeber and Gong [2] introduces the concept of interactive panning and zooming, allowing more images from the search space to be dynamically displayed. This solution also compares the use of a messy and a neat approach in photos spatial distribution.

Beside these solutions for desktop computers there are also some solutions for multitouch tables, like the work from Hilliges et al [8] that makes use of a tangible interface. Again, this work shows the importance of a time-based navigation as well as the ability to be able to ask for photo details on demand.

Although these solutions solve some of the exploration problems, they still present some issues, mainly when dealing with the optimization of the available space. In our opinion, one essential factor that has been neglected and can massively contribute to the evolution of this kind of systems is the use of the meta-information associated to the photos.

Therefore, we propose a solution for photo exploration in a multitouch table that uses in a seamless way multitouch gestures for navigation and sketched commands for filtering the images presented to the user, according to their metadata (tags and Exif).

II. PHOTO EXPLORATION PROPOSAL

The main goals for our solution are to provide users with a natural and easy mechanism for exploring large collections of photos, while being able to reduce the number of presented photos by applying filters, which consider the information associated to them, like for instance, their location, shutter speed, aperture, use of flash, presence of people, etc.

While the information needed for filtering is easy to extract from the metadata associated to photos (tags and Exif), choosing the best interaction mechanism for the specification of the filter is not. We could have done as other solutions did by using contextual menus or toolbars, but that would steal
screen space that is valuable when we need to present a large number of photos in the screen.

Our solution complements seamlessly the set of already existent multitouch gestures [9] with sketched gestures, allowing users to issue commands to the system. To reduce the learning curve, we use the multitouch gestures that are already "standard" for typical operations, like zoom, drag, pan, etc. Although they are commonly known, the actions triggered by these gestures might be slightly different from what would be expected. In this case, drag will be used to expand a set of photos, unveiling more photos from the wanted time span, while pinch is not used to literally zoom but to improve the detail of the timeline for a specific set, refining its granularity between years and days or even hours. On a more straightforward approach, double tap maximizes the desired photo and four finger drag allows to pan through the collection.

Regarding the filtering of the collection, the simplest approach to apply the filtering would be to have contextual menus or icons, in a desktop like fashion. However, this solution has three obvious downsides: it does not take advantage of the touch nature of the device, creates unnecessary visual clutter and reduces the available area to show relevant content, photos in this case. The use of multitouch gestures was the first alternative to the referred approach. Although, the use of multitouch gestures has one compromising hindrance: the absence of a semantic relation between the gesture and the filter action. This drawback leads to a necessity for the user to learn and remember the mapping between the gestures and the desired filter actions. On the other hand, sketches allow the creation of a semantic relation with the concept behind the filter and consequently are simpler to understand, learn and remember.

Therefore, the different symbols used for each type of filter were identified through user experience sessions. Users were asked for simple sketches that they would associate with the given concepts. This approach allowed the creation of a unanimous set of sketches (Table II). Although there are only six gestures at this time, the used sketch recognizer is flexible enough to allow the integration of new gestures.

In order to enable the use of filters, a new multitouch gesture for sketching was added (see Two finger drag on Table I). When users enter the sketching mode, everything they draw is considered a sketched command (see Table II). After users finishing a stroke a timer is launched. If they continuous drawing, the new stroke is considered to be part of the current gesture. If not, the filter is applied or, in the case it has some parameters that are needed to be given by the user, a pop-up menu is shown. This way, users do not need to know if they are in multitouch mode or sketch mode. They just need to know that when they want to apply a filter, they only have to draw a sketch using two fingers.

<table>
<thead>
<tr>
<th>TABLE I</th>
<th>MULTITOUCH GESTURES FOR BROWSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drag (left/right)</td>
<td>Double tap</td>
</tr>
<tr>
<td>Pinch</td>
<td>Four finger drag</td>
</tr>
<tr>
<td>Two finger drag</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE II</th>
<th>SKETCHES USED TO TRIGGER FILTERING OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>People</td>
</tr>
<tr>
<td>Aperture</td>
<td>Shutter speed</td>
</tr>
<tr>
<td>Flash use</td>
<td>Landscape/Portrait</td>
</tr>
</tbody>
</table>

III. Conclusion

We presented an approach for photo collection exploration that combines multitouch gestures with sketches to allow a richer interaction. Users can seamlessly use both types of gestures without the need to explicitly change modes, since our sketches are the continuation of a multitouch gesture. Standard multitouch gestures are used for navigation tasks, while sketches are used to apply filters to the metadata associated to the photos. This approach is currently being applied to a prototype for photo exploration in a multitouch table.

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REFERENCES