Taking photos or talking photos?

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ABSTRACT

Photos and videos are two of the most common media formats used to share experiences. In order to offer an alternative to these we wanted to create a new media format encompassing still image and audio. To do this we created an Android app which can take photos and add recorded audio to them and later share them as HD video. We call these memories. We also let users group content together into collections.

1.INTRODUCTION

With the spread of social media, being able to share experiences and opinions in a concise and meaningful way has become increasingly important. From face to face speech, drawings, text, newspapers, audio recordings, video recordings and eventually the internet, which combines all of the above, the shapes these ways of communicating experiences and opinions take are fairly standardized. The goal of this paper is to explore the possibility of creating and sharing experiences in a new format.

1.1.Background

Interaction design and mobile software development are the main areas that are discussed in our paper. More specifically we'll be concerned with user interaction and software development on mobile devices with touch screens and a variety of sensors such as cameras, microphones, GPS, accelerometers, etc. Interaction design as a whole and the processes that leads to good design have been thoroughly described in Marquardt's et al. Sketching User Experiences and Buxton's Sketching User Experiences: The Workbook. Specific guidelines for design on the latest version of Android (Android Lollipop) are covered by Google's Material Design webpage. Examples of best practice and development guides for programming on Android are available on Google's developer website.

1.2.Problem definition

We want to develop an app that can combine a photo with an audio recording and other metadata. The photo and audio should be recorded on location and the user should not be able to change them at later point in time.

Apps that save only photos or only record video exist but the combination of photo and audio is not implemented by any major app nor is it supported by any of the social networks that we have examined, such as Facebook, Instagram, Twitter, etc. Furthermore major social networks today do not support sharing audio at all.

Still photography as a medium lacks the possibility to record conversations, surrounding noises and short voice annotations. Our project could make photography a more powerful and immersive medium comparable to video but with a stronger and more focused theme provided by the still picture.

1.3.Related work

There is, from what we were able to find, no mordern research aimed towards combining still images with audio recordings. The perhaps most similar example comes in the form of a patent from 1990. Scott Kelly patented a camera design based on the the concept of sound added to a photo. This is essentially identical to our concept except that ours is digital.

Fu et al. (2014) have researched how to port the Ffmpeg video encoder to Android and how to use it to encode video with native code as opposed to in the Java virtual machine. This is directly connected to our goal of converting image and audio to video on the fly on a mobile platform.

2.METHOD

We began the project's creative process by brainstorming ideas and thinking about their implementations and uses. After having created about six different application concepts we settled on the audio visual memory collector application and started designing its interface and considered what functionality the app should have. Using Google Draw enabled us to collaborate on the sketches and paper prototypes online in real-time.

After this initial stage we created a simple prototype app with the basic functionality our app was supposed to have and tested it with a heterogeneous group of about a dozen people. This gave us valuable feedback and helped us modify our idea and design to better suit the end-user and add more value to our final application.

We then began with the development targeting Android phones and tablets from API level 16 upwards. We used the Java programming language together with the Android API and tested our app on a variety of Android devices, notably the Nexus 5, Nexus 9, HTC One and Samsung Galaxy SII. We used Android Studio as an IDE and Github for version control and cloud collaboration.

We store files in private app storage and manage data with a SQLite database. To decrease RAM memory usage a custom class is used to scale bitmaps down to appropriate sizes before displaying them on screen and a background thread handles loading these scaled bitmaps to ensure that the UI doesn't freeze up while loading. Additionally the already loaded bitmaps are cached to prevent repeated reloading.

To enable sharing memories as video files we used FFmpeg bundled for Android and produce full HD video files with H.264 encoding to minimize the video size. A frame rate of 1 frame per second causes the render time to be roughly the same as the real audio length which can be considered usable in real life. We also tried an open source library called JCodec where we managed to encode an image to a video output. However, this library had no capability to encode audio which would lead us to use additional libraries to accomplish one simple task. This, in combination with

inadequate documentation, led us to use the seemingly more efficient solution FFmpeg.

Figure 1: Task that loads a scaled Bitmap on the background thread and caches it for later usage

```
function beforeEnteringBackgroundThread(){
       If imageIsCached then loadCachedImage
       else loadPlaceholderImage
}
function onBackgroundThread(){
       If imageIsCached is false then
       scale image
}
function afterExitingBackgroundThread(){
       If imageIsCached is false then
       loadScaledImage and cacheImage
}
```

In the last stage of development we let more people test our app to see what they thought of it and to receive additional feedback for some final touches.

3.RESULTS

The resulting product is an Android app of which screenshots are shown below in figure 5, 6, 7. The first sketches of the app are shown in figures 2 and 3. The prototype which was used for testing is shown in figure 4.

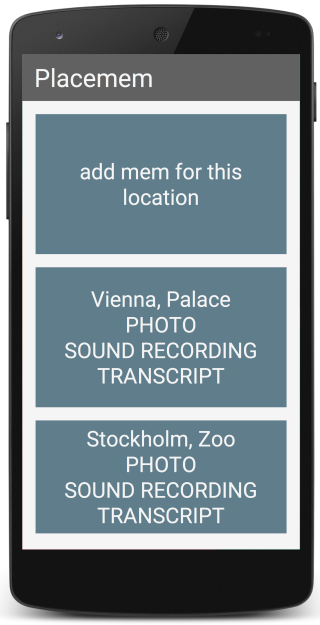

Figure 2: An initial sketch showing a button to add a new memory at the top and listing existing ones below

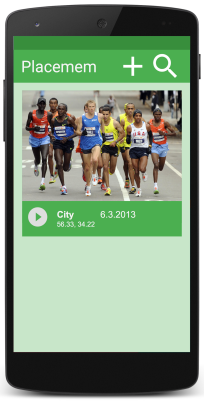

Figure 3: A sketch showing the main app screen which lists all existing memories

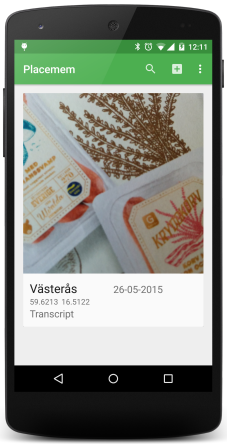

Figure 4: The prototype app - Main app screen when only one memory exists

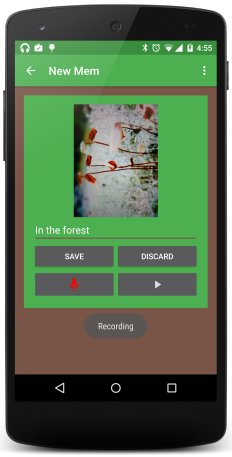

Figure 5: Final app - Creating a new memory (recording audio)

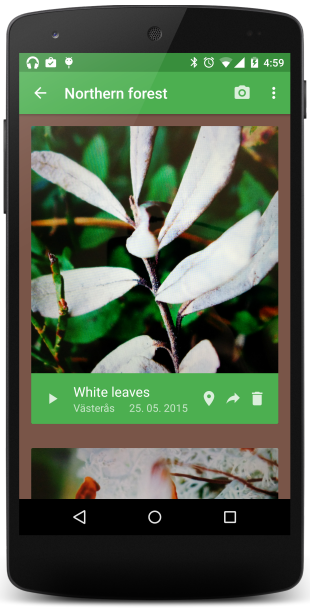

Figure 6: Final app: Inside a collection showing one memory and the option to create a new one

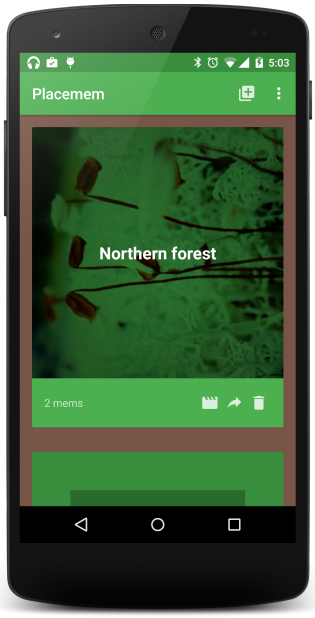

Figure 7: Final app: Main app view showing one collection and the option to create a new one

3.1.User feedback

During testing we received feedback about situations where users would consider using our app:

- Photographing a person and recording what he said to remember it later
- Record something from a lecture or meeting
- Send a talking postcard
- Send memory as MMS or instant message in the form of video
- Taking voice annotated photos of places for the purpose of going back and photographing it later with better camera equipment
- Using the app as a travel journal

The users also had many feature requests which we have implemented into to the final app:

- Sharing as MMS
- Sharing on social media
- Playback button below memory
- Ability to add title
- Larger icons and buttons on tablets
- Grouping into collections or albums
- Displaying a collection as a slideshow with audio
- Warning when removing a memory or collection
- Better layout for tablet devices
- Display some instructions on screen when no collections or memories exist
- Easier way to add new a memory or collection (the small plus sign in the action bar is not immediately apparent)

4.SUMMARY AND CONCLUSIONS

The final app can effectively be used to group photo, audio and other metadata together in an immersive environment. The user can easily view a whole collection of memories in a slideshow where audio and photo is combined and lets the user share both the still photos and a video which contains the photo and the audio. Processing time for creating the video is short enough to be usable in real life and is affected by the length of the audio track.

We experienced complications with implementing the video feature during development. We started with a java video library called JCodec but changed our approach because of library limitations and lack of documentation. Instead of this, we used a native solution with a precompiled Ffmpeg Android library.

4.1.Future work

To enhance the user experience a syncing service and web-app could be constructed to enable users to backup their memories in the cloud and sync them between different devices.

4.2.Rejected alternatives

Some features were rejected during user tests and replaced in favor other features, notably a search function located in the action bar was replaced with a collection system. A login feature was also discussed but was rejected due to its added complexity to users' experiences without sufficient added value. As previously mentioned using JCodec was discarded in favor of Ffmpeg seeing as it was a more efficient and less complex alternative.

5.REFERENCES

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