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ARGroup

1. a 500-word description of your project

We collaborated with Samantha Siu of the CGUI lab in the development and testing of her Making & Knowing Augmented Reality (AR) application. The areas of help she requested was in the testing of her application and the development of a test database in which the entire process of following a recipe and the corresponding user's annotation at each step is readily available.

The technical aspect our project was the database construction. The main objective was to upload data from a local csv file to CGUI's Google Cloud so that Sam's application had real-time access to the information without needing a large amount of memory space.

First, we preprocessed the local csv files to refine the column names and eliminate any extraneous formatting of the data. Next, we converted the csv file into a SQL table using an external application, called MySQLWorkbench, in order to avoid any later data collisions and to test the best SQL format of the data that preserves the integrity of its content. Then, we exported the data file into a SQL dump file so that we can upload it to the database directly. After successfully uploading the table to the our annotations database, we executed a query to test it.

The secondary goal of our database construction was to create a separate notes database so that Sam's application had a space to upload notes written on the app to Google Cloud. We created a notes.csv file, added dummy data to it, and then converted it to a SQL table using the same methods we did for the annotations table. Then, we exported the table to a SQL dump file and uploaded that to the database. We tested to see if we can write to the table and we did so successfully.

And lastly, we had to use Sam's app to create a few different user-case scenarios. After multiple sketches of different personas, we ultimately decided on three very specific ones. First, we focused on Tianna Uchacz, a researcher in the Making and Knowing lab, who was tasked with taking photos and writing annotations on making a dry flower; Taewan Shim, a student participating in the Making and Knowing Project, who had to understand the steps taken by Tianna and ultimately replicate the process of making a dry flower; and lastly, Mark Kim, a Ms. Fr. 640's reader not located in New York, who tried to make a dry flower for himself by following Tianna's steps from a distance by accessing the cloud and database storage.
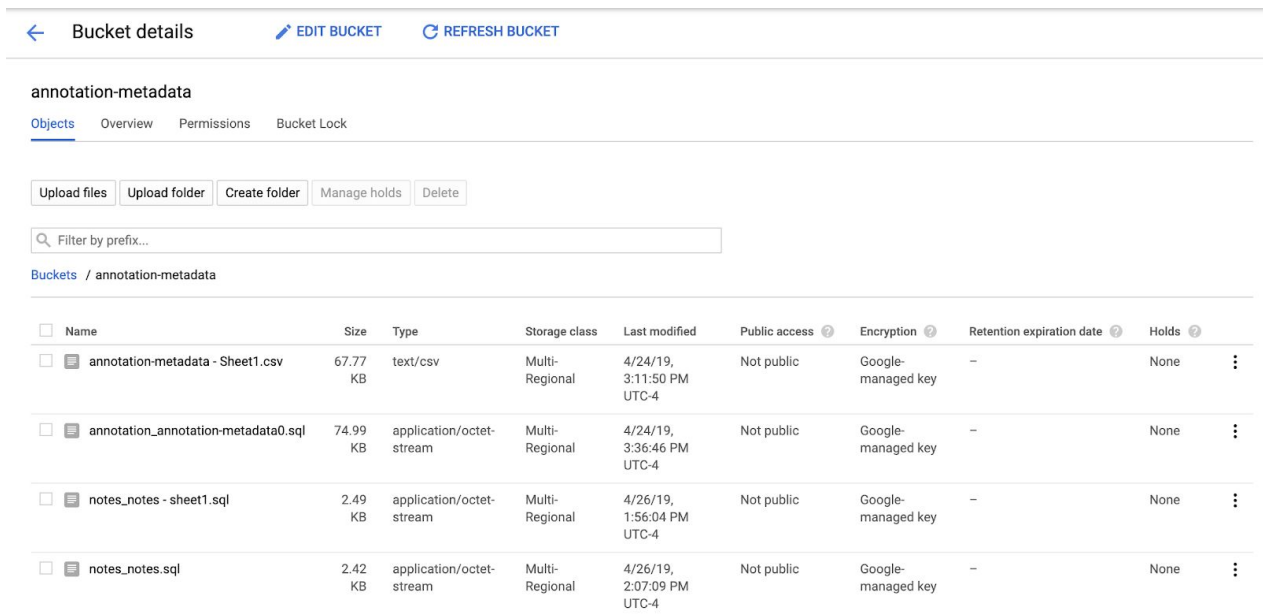
The main goal of testing Sam's app was to first learn the process of running a mobile AR application. Most importantly, we were tasked with finding potential solutions to the bugs we encountered throughout the process. We gave detailed comments on the usability and suggestions on feature in terms of User Interface.

2. a description of the use cases that your project addresses

As mentioned in the description of the project, we ultimately came up with three different personas, who could use Sam's app in conjunction with Ms. Fr. 640.

1) Tianna Uchacz is a 35-year-old post-doc at Columbia University participating in the Making and Knowing lab. Tianna is reconstructing the objects included in the Ms. Fr. 640. manuscript. She focuses mostly on following a recipe on making a dry flower presented on folios 120v-121r. Her task is to create a process that is replicable by taking photos and writing detailed annotations for each step of the recipe.

2) Taewan Shim is a 23-year-old junior studying Comparative Literature at Columbia University. Taewan is currently taking "Transforming Text: Textual Analysis" class. As a student, he tries to understand and ultimately replicate the process Tianna did to make a dry flower.

3) Mark Kim is a 23-years-old, who is Taewan's friend located in Korea. He has some understanding of French and studied History in college. He wants to further explore Ms. Fr. 640 by using Sam's app and take a closer look at Tianna's steps for creating a dry flower. He wishes to ultimately make a dry flower himself by accessing the cloud and database storage, as he lives far away from New York and has never been to the Making and Knowing lab. *This user-case scenario was never actually tested because the cloud and database storage are not yet connected to Sam's app.*

3. any accompanying diagrams, sketches, mock-ups, prototypes, or texts relevant to your project (i.e., your deliverables)

Figure 1: Content contained within the 'annotations' database in Google Cloud

Figure 2: SELECT query result to annotations database table on Google Cloud Shell

Figure 3: INSERT query result to notes database table on Google Cloud Shell

Figure 4: Unity console output after sending SELECT query to Google Cloud database

Figure 5: User testing of Sam's application in the Making and Knowing lab

Problems Associated:
Multiple red boxes are present, and the screen looks rather cluttered. It is not intuitive for users to close each red box prior to taking another photo.

Potential Solutions:
Automate the closing of photos--every time the user takes another photo, the previous photo/box must be closed. And in order for a user to tell a closed box from an opened box, have two different colors. For example, a closed box can be in red, and an opened box can be in green.

Figure 6: User testing of Sam's application in the Making and Knowing lab

Problems Associated:
There are two red boxes in the screen; however, it looks as if there is only one. Red boxes can easily be overlapped.

Potential Solutions:
Make sure images whether they are photos or red boxes do not overlap. The application should tell the user to not take a photo in that particular location because of a potential overlap. Also, it would be beneficial to have a zoom-in and zoom-out function to spatially navigate and ultimately find each and every red box in the screen.

Figure 7: User testing of Sam's application in the Making and Knowing lab

Problems Associated:
The button to take the photo/video is grayish white, and the text box is also white. Thus, the button becomes quite hard to see when a few text boxes overlap. The photo function works. The video function, however, does not work at all. Whether we hold down the button for a few seconds or click on it once, it does not do anything. Not even a photo is taken.

Potential Solutions:

We believe that the text box should be white; however, the photo/video button can be dark gray so that it is clear that the button exists. Video function must be added, as it does not work at all.

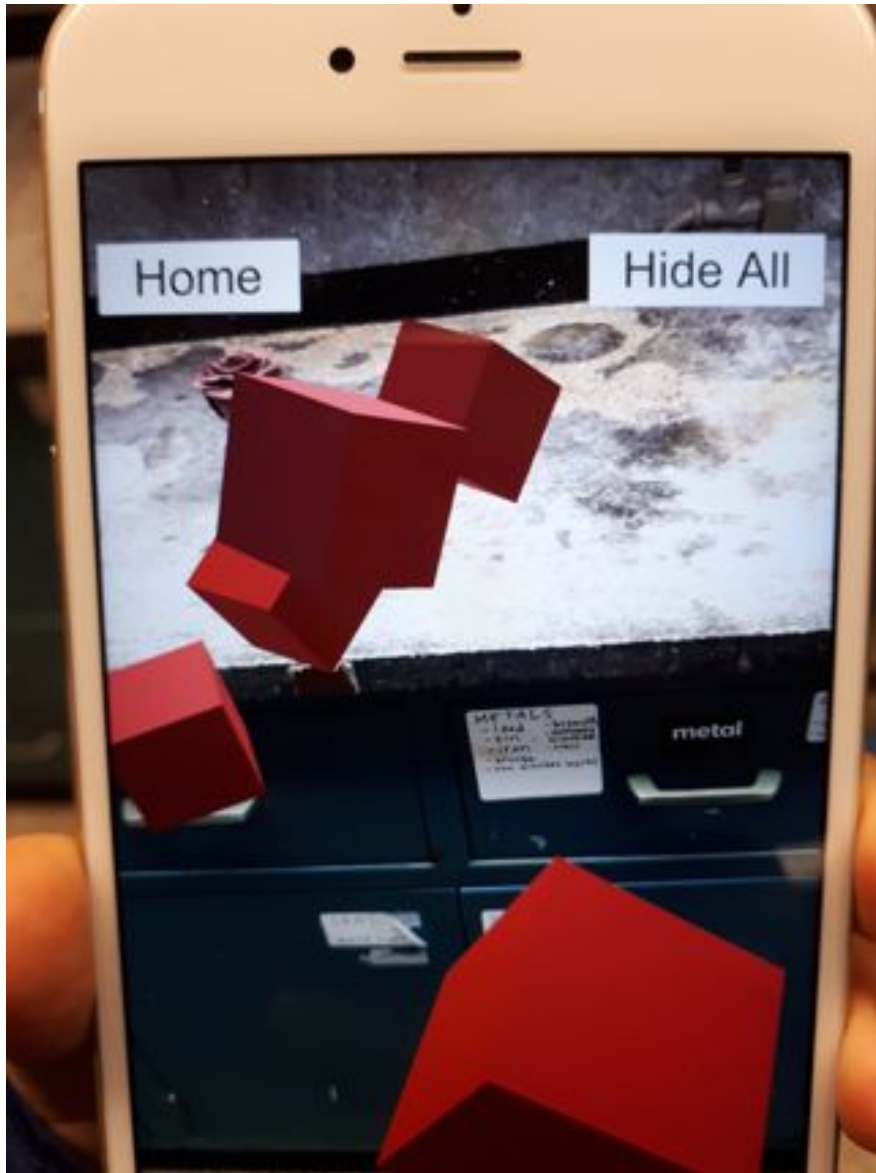Figure 8: User testing of Sam's application in the Making and Knowing lab

Problems Associated:
If a process takes multiple photos, then the process has the potential to fill up the screen only with red boxes, as they can easily overlap on top of one another. Not to mention, from a user's perspective, he will have difficulty knowing which red box to open up first. The sequence of the boxes is not clear.

Potential Solutions:

On each of the faces for each of the boxes, there should be a number written over it. Also, it would be good to have a sequence-related function/button on the interface that closes all red boxes and opens only the very first red box. Lastly,dates and times should be automatically inserted in the text box upon creating one so that the sequence is more visible and readily available.
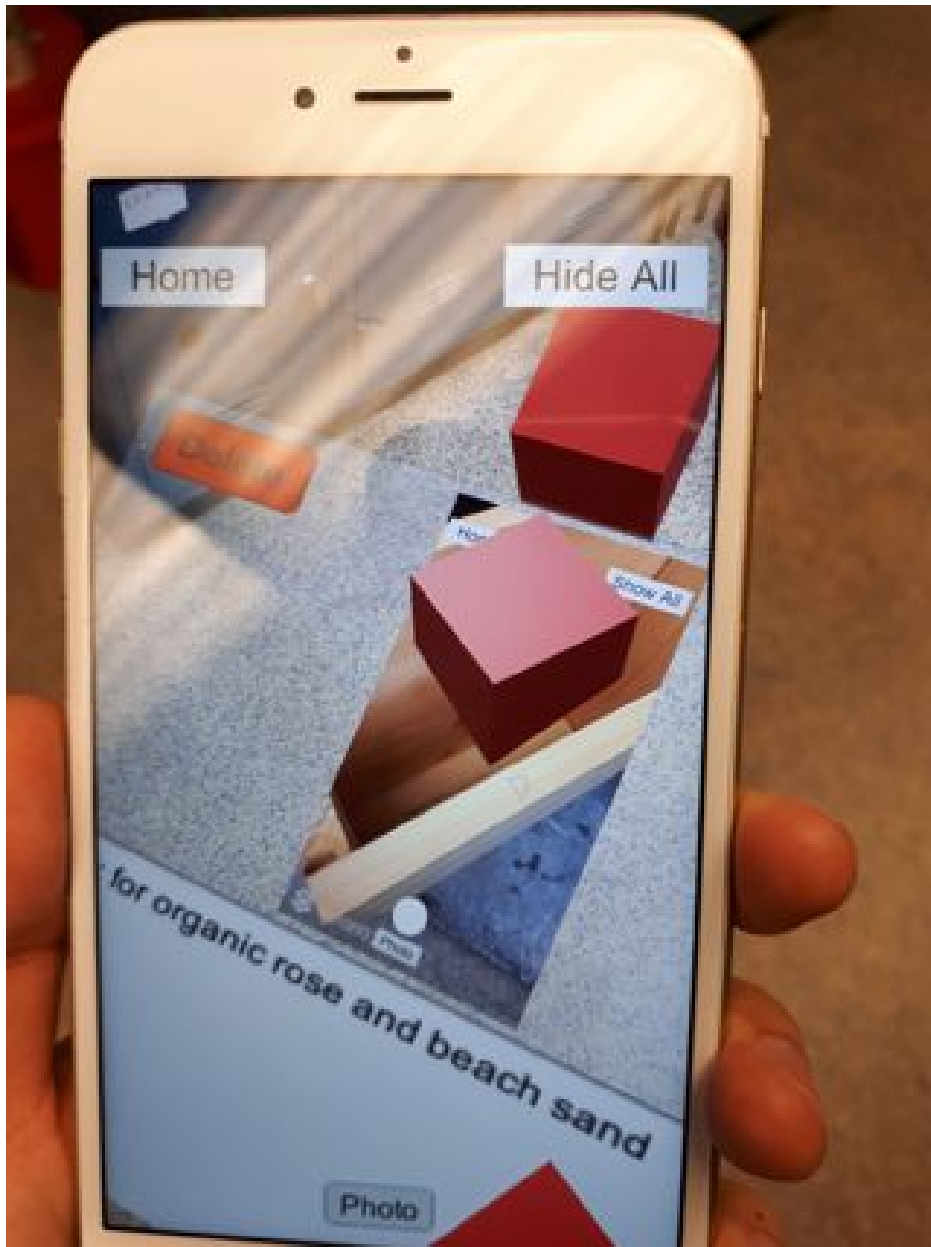
Figure 9: User testing of Sam's application in the Making and Knowing lab

Problems Associated:
Red boxes have the potential to even overlap with a different photo. And thus, user of Sam's app is unable to see what is inside the photo.

Potential Solutions:
There is a way to hide red boxes individually instead of just having "Hide All" function so that nothing overlaps.
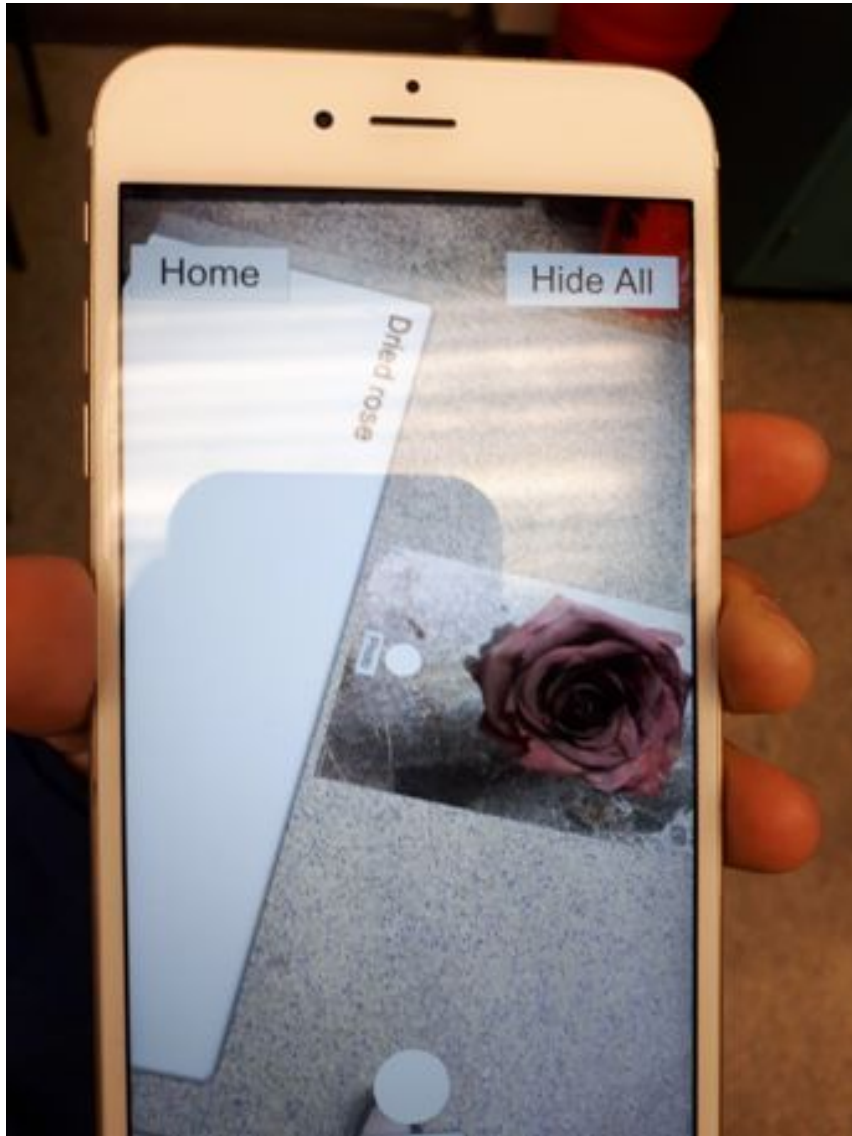

Figure 10: User testing of Sam's application in the Making and Knowing lab

Problems Associated:
Text boxes can be vertically oriented making the reading more difficult. Also, text box is always editable whether a researcher or a student is using the application.

Potential Solutions:
Upon clicking the text box, the text box should orient itself horizontally and cover the bottom third/half of the screen so that user can easily read the text box. It would be good to have a login at the very beginning that determines whether a user is a researcher of M&K lab or merely a student. Not every user should be able to edit every single text box.

4. 300-word description of the insights you gained through your project work with regard to course content and with regard to Ms. Fr. 640 and its content, possible use, and characteristics.

While preprocessing the csv data to fit the format of an SQL table, we carefully considered how to format the columns so that it preserves the integrity of information and has enough space for future adjustments to the data. During this process, we gained insight into how to properly index a table to speed up query calls by reducing the number of data entries needed to be scanned. We also learned how to manage duplicate entries in the table and reorganize formatting so that it is easier to export into a SQL table. While working on user-case scenarios, we not only gained insight into developing personas for a wireframe but also had a firsthand experience of replicating recipes in a manuscript. This was our first time being introduced to the concept of personas and we luckily had a hands-on learning experience by creating them for our project. Not to mention, we really got to understand the process of recreating the different recipes in the manuscript by using Sam's application in parallel with Tianna's demonstration of making the objects. Lastly, once Sam's application is completed and in sync with the Google cloud database, we believe anyone interested in recreating manuscript objects should be easily able to follow and have the enlightening experience that we had while working on this project.

5. How did your project change from proposal to final execution? If you had unlimited time and funds, how would you build on your project?

Originally, one part of our proposal included designing an augmented reality application for the Making & Knowing lab. The application would allow users to scan the lab objects and learn about the process of making the object as relevant manuscript appear immediately to the screen. Our anticipated deliverables were wireframes of the application and its accompanied use case scenarios. Due to time constraints and the feasibility of our deliverable, our project was scaled down to assisting CGUI with the Making & Knowing AR application. If we had unlimited time and funds, we would continue with the database project and integrate it with the app.

When it comes to user-case scenarios, we were not entirely sure how to create personas at first, so we had to go through multiple resources on the Internet and consult with professors. However, once we had a clear idea of the different personas, we were able to execute the project with more ease. If we had unlimited time and funds, we would also want to use Sam's app for android phones as well because all of the testing was done in an iPhone. Furthermore, we would have wanted to test out various objects beyond the dry flower to include more variety in our use-case scenarios.