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MCAM - The AR Photography Composition Education Prototype for Mobile Device Based on Augmented Reality Interactive

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MCAM - The AR Photography Composition Education Prototype for Mobile Device Based on Augmented Reality Interactive

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1.0 Abstract

The current digital age and era where technological advancements and innovation have revolutionized various sectors, photos and videos are the most convenient and direct medium for people to record and share their personal lives today. In this digital era and internet age, mobile phone cameras have replaced cameras as the most widely used photography tools. While documenting personal life with photos, people gradually pay more and more attention to the artistry and aesthetics of photos. Just recording that life can no longer satisfy them, how to present more of their own life is a new pursuit of videos and pictures as it can be seen from the webpage.

Many phone applications and specifically camera apps have a designed filter function that helps people to optimize their photos. These camera apps have gradually filled people's mobile phones. Selecting a filter and then taking a photo-shoot has become a standard process for daily photography. If the image is not satisfactory after the shooting completed, the photos can be re-optimized by light adjustment and liquefaction deformation in the camera apps as it can be noted from the webpage on page 16. Unfortunately, the power of those filter functions cannot change the reality of the release of mediocre images because of the lack of composition skills. Compared to filters and other photo re-optimized functions, photography composition is the skill that people need to learn and master in the earlier stage. However, most people find it difficult to determine.

In this project there will be a demonstration of how AR interactive instruction is rationally helping people in learning photography compositions; give users an enjoyable experience to improve the better skill of photography. This project will present in an interactive interface, and a prototype shows the use of this application.

Keywords:

Augmented Reality Interactive Design; Real-time Guidance; Photography Composition Education; User Experience;

2.0 Introduction

2.1 Situation analysis

It can be frustrating not to shoot a beautiful picture. Additionally, it is difficult for users to think coherently about composition during shooting.

The current photography apps that are in existent today make use of the composition grid as a hidden advanced function of photography, and only those who understand the composition knowledge will actively use it. Most typical users are confused about the composition grid.

The composition guideline is usually a nine-square grid designed for users with a photographic foundation and tiled in the framing screen when you open the software.[1] This feature is not very useful for ordinary users. Because there is no process to guide the users, they are very confused about the grid when shooting, and even feel it blocked their vision. For photographers, the grid represents the rule of thirds, but for average users, it is just a grid with nine squares. The grid should not be used only for people who are familiar with composition but should also be introduced and understood by primary users. This is because; most users are ordinary people who don't understand the grid.

Intricate filters can only improve the depth of the image on the external surface but cannot fundamentally help users improve the understanding and expression of photography. As you can see in Figure 1, the clean frame represents the user who knows composition grids; shooting from a different angle will get a better picture. That's the reason why I want to design this camera app with a composition guidance function to help users learn how to use compositions to shoot better photos as the webpage on page (16) depicts.

Figure 1

[1] Bain, Marc. “Fashion Bloggers and Photographers on How to Take Perfect Instagram Pictures, Every Time.” Quartz, Quartz, 25 July 2015, qz.com/458527/fashion-bloggers-and-photographers-on-how-to-take-perfect-instagram-pictures-every-time/. np

2.2 Problem Statement

The composition grid, as a prominent position in photography, becomes useless in photography apps. This is because a large number of users are beginners. Their requests stay at the basic of photo beautification, and to beautify images by filters can satisfy their needs. The built-in composition grids are designed to meet the needs of advanced users who understand the photographic composition. The limitations of technology determine the composition guideline, which can only be a static 2D guide.

In the recent years, the rapid development of the internet, social media such as Instagram and Facebook have increased the user's requirements for photography. After years of training in photography apps, users have been able to select and use filters skillfully, and the user's understanding and demand for photography have increased.

Many online and creative content creators and bloggers have been consistent in sharing their knowledge of composition grids as people keep asking for me. This phenomenon proves the importance of composition grids and demonstrates that photography apps lack guidance on the composition grid method by the other side.[2] Being able to use excellent compositions quickly will be the new requirement for users of future photography apps. This project will be designed and tested in this direction through augmented reality technology.

[2] Zagrobelna, Monika. 2016. “What Is Composition, and Why Is It So Important in Drawing?”

3.0 Context

My project is known as “MCAM”, which means it is a master of mobile camera applications. The project is mainly presenting as an iOS app in this thesis. Based on situation analysis, the objective of this project focuses on the problem of how to effectively guide users to use composition grids. First, I need to analyze and deconstruct the user demand group by understanding their usage scenarios and user goals to find out the most suitable guidance process and methodology. Then, through the above results, the information structure and task flow will be formulated, which will then express the color scheme and draw the interface form. Finally, I will present a thoughtful app prototype that meets the user needs.

3.1 Composition Learning Function

It is important and of essence to recognize and appreciate the fact that photography is a complex skill and involves some science and needs a lot practice and learning. You need to learn aperture, shutter speed, ISO, exposure, depth of field, motion blur, digital noise, and light. Even when you are a master of all these, and you considered all these elements when you shoot a photo, there still has to be something wrong with it. This elusive factor is called composition.[3] Both painting and photography are visual arts. The same principle applies to all visual arts, including photography. Proper layout of elements creates a sense of harmony, movement, and tension. Composition speaks a thousand words, tells a story, and encourages the viewer to scan your photo, to stay in it. For some photography genres, like portrait, macro, or still nature, we can take our time to build compositions, while for landscape photography, we take whatever the environment is, and we need to decide fast before the light changes. It’s even worse for street and sports photography; sometimes a photographer has a split second to make a decision.

For the give users an enjoyable experience in AR guidance, the process should be the top priority. This is because of the complexity of professional photography, which explores compositions in three different modes.[4] As shown in Figure 2, relates to the user shooting process in composition grid learning. The establishment of the composition learning function allows the system to identify composition grids more accurately and precisely and enhances the understanding of the user to the compositional differences in

[3] Dunlop, Joshua. 2011. “Photography for Beginners: A Complete Guide

[4] Stepanoff, Marat, et al. “Photography Composition: The Definitive Guide - Landscape Photography: Real Estate Photography.” Landscape Photography | Real Estate Photography, 5 Oct. 2019, antongorlin.com/blog/photography-composition- definitive-guide/#why-composition-is-important. np

relation to various photographic subjects. Assume that the designer has trained the AI to study the angles and methods of photography composition in depth from a large number of excellent photographic compositions and world-famous paintings. The objective is to explore the AR interactive instructions and design a mobile camera prototype to improve users' photography experience.

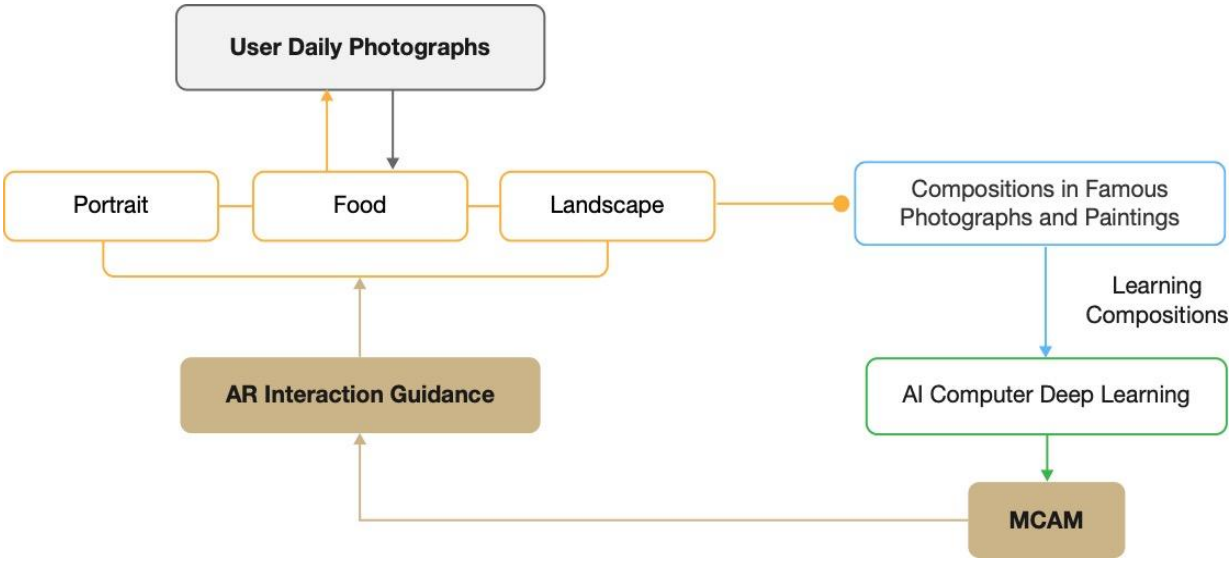

Figure 2: *Composition Learning Process*

3.2 AR User Interaction Design

Augmented Reality (AR) is the technology that expands our physical world, adding layers of digital information onto it. AR appears in direct view of an existing environment and adds sounds, videos, and graphics to it.[5] A view of the physical, real-world environment with superimposed computer-generated images, thus changing the perception of reality, is the AR.[6] AR in the world today uses more in education and entertainment. It involves users to find the right shooting spot by AR and learn from the visual process, which will be more realistic and intuitive than to read a book. In this project, due to the variability of the photographic environment, fast framing is the key and requires AR instructions to be easier to understand and follow. It makes the design of AR instruction more challenging than ever.[7]

[5] "What Is Augmented Reality (AR) and How Does It Work." Thinkmobiles, 2019.
[6] (What is AUgmented Reality(AR) and How does it work n.d.) np

[7] "What Is Augmented Reality (AR) and How Does It Work." Thinkmobiles, 2019.

3.3 User Interface Design

The designing of a user interface for a photography app requires the orientation to be carefully selected so as to keep the users focusing on the shooting screen without any distraction. It is paramount and necessary for the design to keep a clear structure layout that has a clean and straightforward interface. Notably, for the AR interactive interface, it needs to allow the user to follow the AR instruction for each step to be easy.

3.4 Target Audience Definition

From the data and information that is gathered from different sources that influenced my research findings I carefully selected the target audience that I intended to focus on. The target audience of this app is people who are beginners but have an interest in photography or people who feel interrogative about composition grids. There is no preferred gender as the target audience. Moreover, the primary age range of the target audience is 15 to 45. The education level of the target audience is expected as above high school.

4.0 Methods

Since the problem is defined in the early stage of the project, the design flow helps to examine the research and find a feasible design solution. It is divided into three parts, which are function model, interface design, composition analysis design, AR interactive guidance design and final design solution.

4.1 Function Model

Function Model intends to demonstrate how MCAM works internally. The data obtained by the user experience survey indicated that most users shoot a photo with the purpose to quickly record the beautiful scenery and document moments of life that they do not want to miss. AR users experience design as a bridge connecting user behavior and virtual models in the physical world. The AR user experience in the photography app is to associate the virtual model seen by the user with the user's shooting behavior,[8] so that the user can simulate the shooting process in the physical world through the virtual model, thereby establishing a consistent shooting behavior and action memory.

4.1.1 Use Case of Photography in Mobile Devices

Because mobile phones are portable and convenient, more and more users choose to use their mobile phones to record their lives. The user's shooting process is selected using a suitable filter, lock the subject, find the shooting angle up and down, left and right, and press the shutter. The process of finding the shooting angle is the process of the brain constructing the composition. Divide this process into two categories: 1. The mind thinks and contemplates the environment seen by the eyes about the shape of the object, and then feedbacks the most comfortable composition to the brain. 2. The brain retrieves the pictures that are stored in memory, selects the reference image that is most suitable for the current subject and the environment, and mimics the composition angle in it. This project guides the user to a reliable composition angle through the virtual model.

[8] “What Is Augmented Reality (AR) and How Does It Work.” Thinkmobiles, 2019.

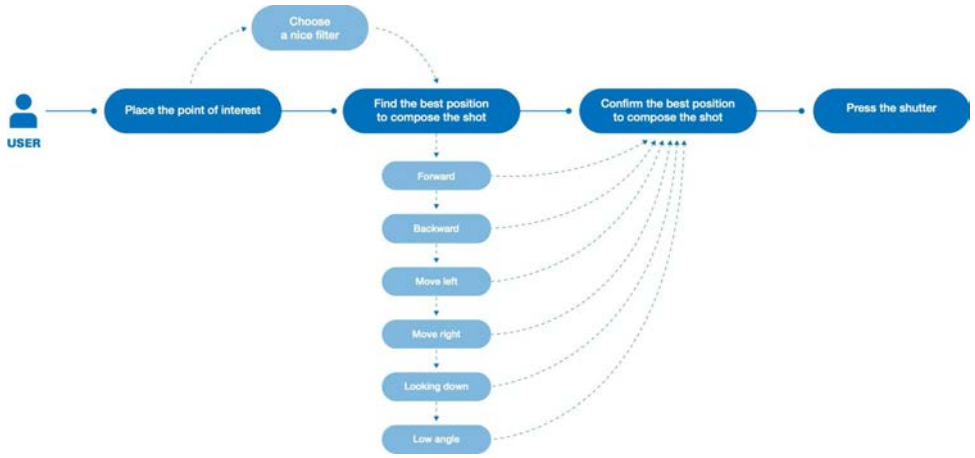

Figure 3: *Use case of Photography in Mobile Devices*

4.1.2 Composition Grids

It is important to note that all the rules conclude into three basic grids: golden ratio, the rule of the thirds, and symmetrical.[9] These are covering the compositions for most user needs. However, the same composition has different uses in different situations. The user research indicates that people like to take pictures of their family members; friends; pets; beautiful views during trips. In photography, those objects divided into three categories: portrait, food, and landscape. We designed it into portrait mode, food mode, and landscape mode, which is an inefficient way to give users a better understanding. To provide users with an enjoyable experience of the AR guidance process is the top mission. Shown in Figure 4, Figure 5 and Figure6, to put five basic used grids in each mode will show the basic rules of photography composition clearly. In Figure 4 shown the grids of the portrait mode, from left to right are Top Horizon Line, Fill the Frame, Rule of Thirds, Centred Composition& Symmetry and Golden Ratio. In Figure 5 shown the grids of the food mode, from left to right are The Bottom Line, Golden Triangles, Fill the Frame, Centred Composition& Symmetry and Golden Ratio. In Figure 6 shown the grids of the landscape mode, from left to right are The Bottom Line, Lending Lines, Rule of Thirds, Centred Composition& Symmetry and Golden Ratio.

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[9] Dunlop, Joshua. “Photography for Beginners: A Complete Guide (Updated 2019).” *ExpertPhotography*, expertphotography.com/a-beginners-guide-to-photography/. np

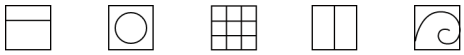

Figure 4: *Portrait Mode Grids*

Figure 5: *Food Mode Grids*

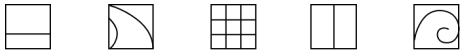

Figure 6: *Landscape Mode Grids*

4.1.3 Composition Analysis

In every education course, after-school practice is often the most critical part, and photography is a skill that needs to practice repeatedly to become proficient. In this project, composition analysis is a sub-function designed for users to review and learn after the shoot. After the AR composition guidance to guide the user in front-end shooting, the composition analysis function is necessary, which provided the user with the opportunity for advanced learning at a later date. This part included set the composition analysis function in which flow so as not to be intentional and can repeatedly deepen the user's impression is particularly important in this project.

4.1.4 Flowchart

The Flowchart illustrates the experience loop in this app. It indicates the flow of the user's interaction steps. The Flowchart consists in seven parts. The part in gold presents the functions on the main page. When the user turns on the AR mode, it will activate AR interactive guidance, which is the purple part; follow the guidance user will find the right shooting spot.[10] On the main page, users can switch between different grids and frames, and at the same time, users can choose their favorite filter to take photos. In analyzing functionality, we are going to look at two hierarchical menus. The first analysis menu is in the photo gallery. From the gallery, the user can review the brief introduction of all fifteen composition grids. The second analysis menu is included in the single photo browsing interface. The analysis function in this

[10] Zagrobelna, Monika. 2016. "What Is Composition, and Why Is It So Important in Drawing?"

level is used to analyze the composition techniques used in the photo currently being viewed.[11] Users can memorize composition rules easier and faster under the combing of multilayer composition knowledge.

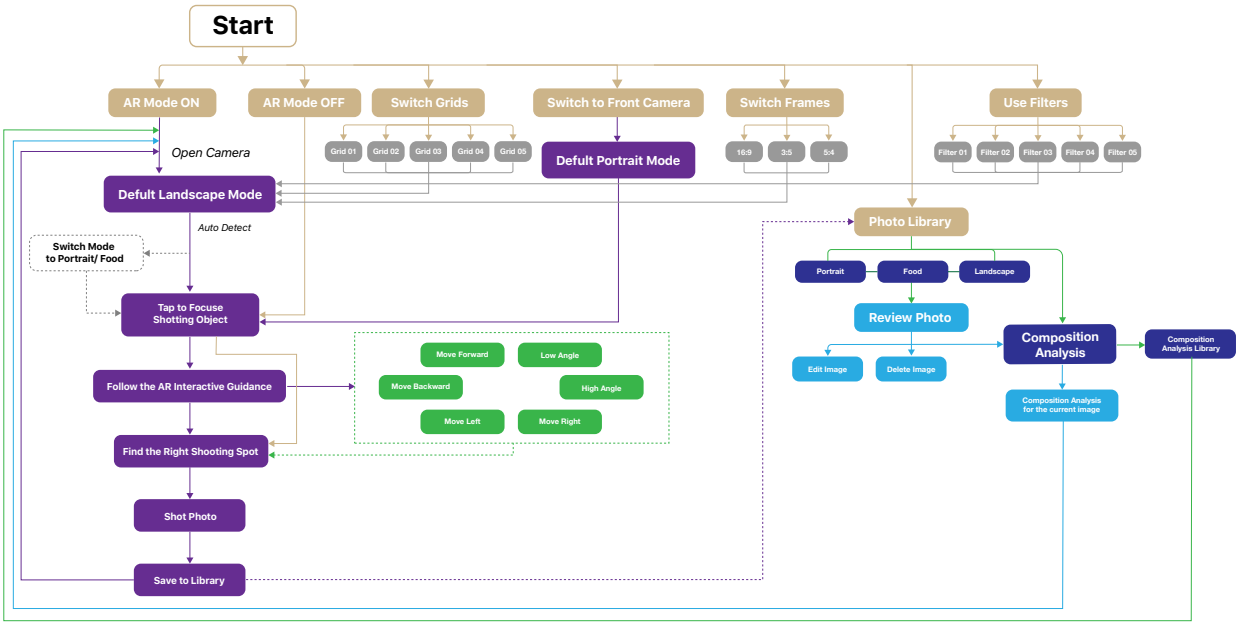

Figure 7: *Flowchart*

4.2 Main Page Interface Design

Part of the new and emerging technologies in photography is Augmented Reality AR. Designing the interface can bring users a refreshing experience, making it easier and faster for users to accept AR interaction grids from a visual and psychological level, and improve the user experience is very important. The interface design of the main page is divided into three parts. The center position of the interface is the frame, and the initial setting size is 3: 5. The main navigation bar is below the camera view and divided into two columns. The first column is the shooting modes: portrait, food, landscape. The second column is from left to right: basic settings, photo gallery, shooting button, camera switch key, AR mode switch key. The menu bar at the top of the interface is framed on the left and filters on the right. The prompt text will be displayed at the top of the shooting bar, so as not to affect the user's framing. During shooting, the user can switch the composition grid at any time by swiping the screen. The user switch

[11] Gorlin, Anton. 2018. "Photography Composition: The Definitive Guide - Landscape Photography | Real Estate Photography". *Landscape Photography*

composition will be temporarily displayed at the bottom of the shooting interface and will disappear when the user selects.

Figure 8: *Main Page Interface*

Providing users with a clean interface is one of the essential parts to ensure users focus on interaction guidance. The visual style for the interface is based on white shape. The visual style of menu items is in the first level of the menu, which is the icon of the portrait, food and landscape mode are filled black, when the shooting mode started, and the color of the symbol of the shooting mode will change from black to gold to remind the user.[12]

4.3 Photo Gallery Interface Design

When the user finishes shooting according to the AR instruction, they can view different photos taken by themselves in the album according to the shooting mode. When the user in the photo gallery page will show photos in the three shooting modes, and composition analysis icon on the menu bar will pop out for users to choose. This design is to provide users with a more convenient environment to review used composition. (Figure 9)

[12] Gorlin, Anton. 2018. "Photography Composition: The Definitive Guide - Landscape Photography | Real Estate Photography". *Landscape Photography*

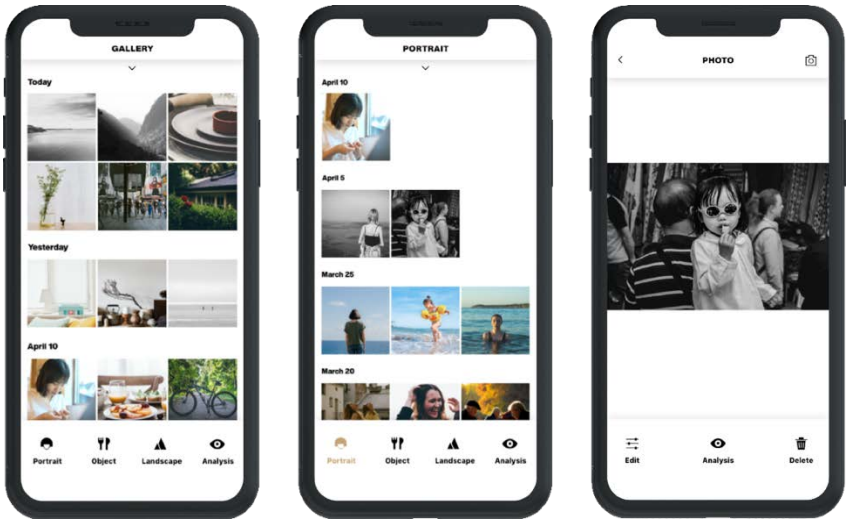

Figure 9: *Photo Gallery*

4.4 Composition Analysis Interface Design

The goal of the interface design in analyzing functionality is to help users memorize composition rules easier and faster. As shown in Figure 10 are the composition analyses of all grids shown in the single photo browsing interface. In this composition analysis screen shown in Figure 11: the clean layout of the name and selective analysis of this target image. User also can try a different shooting result by tap the icon of other grids.

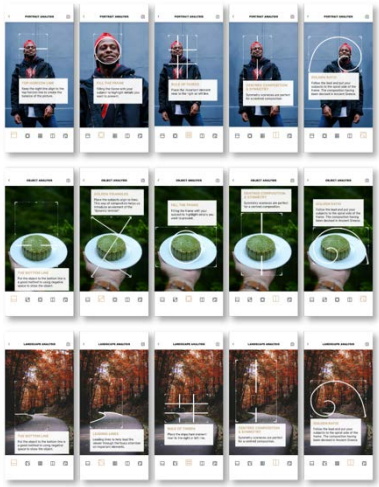

Figure 10: *Composition Analyses for All Grids*

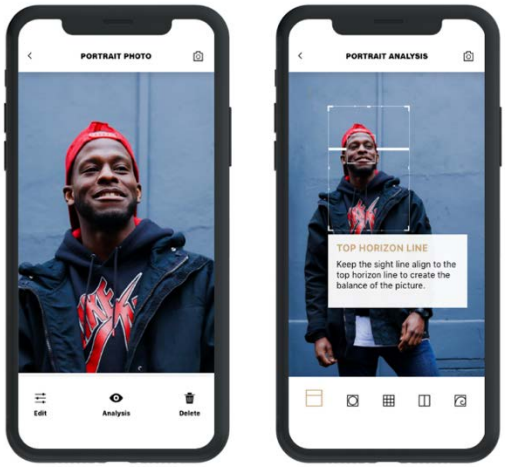

Figure 11: *Composition Analysis Shown in The Single Image Review*

4.5 AR Interactive Guidance Design

While responding to the process shown in the use case of photography in mobile devices (*Figure 3*), I designed the following AR interaction guidance to interact with users in the physical world. When the user is preparing to take a picture, the user can select a single target by tapping the object shown on the screen or touch the screen and move his finger to select multiple objects. The advantage of this design is that the system can calculate a more appropriate grid to provide to the user through a more specific target selection.[13] The yellow shape in *Figure 11* is a brief role for the reader to understand in case it will not show in the final prototype.

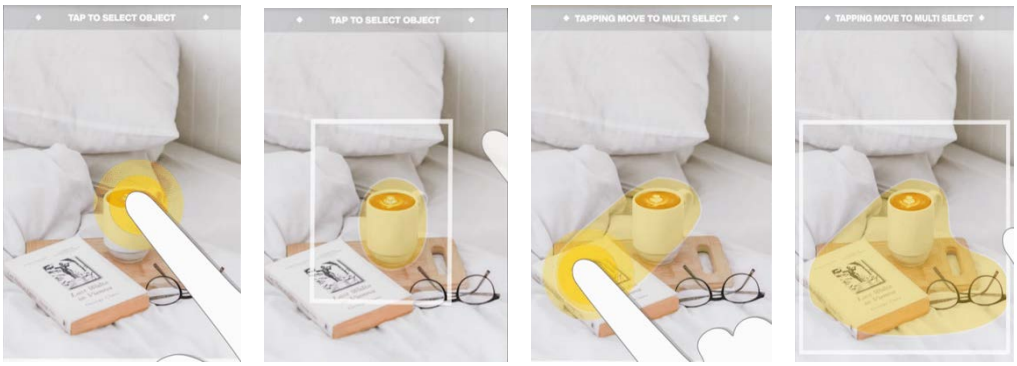

Figure 11: *Select Single Object and Multiple Object*

After locking the shooting target, the system automatically displays an appropriate grid on the screen. The composition grid will stay directly and displayed in front of the selected subject on the mobile phone screen. At this point, the user will see some texts at the top of the screen. It is recommended that the user moves the phone and position back and forth to the location of the composition frame. Once the user is too close to the shooting object, a reminder text will be set off, and a flashing frame will appear to remind the user to move further away. (*Figure 12)*

[13] Zagrobelna, Monika. 2016. “What Is Composition, and Why Is It So Important in Drawing?”

Figure 12: *Flashing Frame with Reminder Text*

Being able to switch different grids in the shooting process is a flexible way for the user to select the composition grid they prefer to use. Just tapping the screen and swipe, users can change the shooting grids at any time. The AR grids will show on a good shooting position based on the object and environment.

Figure 13: *Switch the Grids in Shooting Process*

When the user follows the guidance and reaches the correct position, the color of the grid will change from white to gold to show that they can press the shutter to shoot (*Figure14*). After the user finishes shooting, the photo will be saved to the photo gallery.

Figure 14: *Follow the Guidance to Find the Best Spot to Shoot*

5.0 Final Results

The final design of The MCAM link (Website and Video):

http://liuyunke.com/project/mcam

Figure 15: More content of this AR Interaction prototype on this website.

6.0 Evaluation & Discussion

This project explored how to guide users to learn the nonrepresentational composition concepts through visible AR interactions. My design goal was to give users a better understanding of composition in the process. The answers were in the usability tests.

I have made a total of three iterations of this project. In the first version, the design of instructions was to guide the user to pose. The excessive interaction instructions prompted the user to be very confused during the simulation process and to complete the process very difficult. Because the user needs to change the shape to fit in the composition every time actively, it is not suitable for the quick capturing to maintain the status quo.

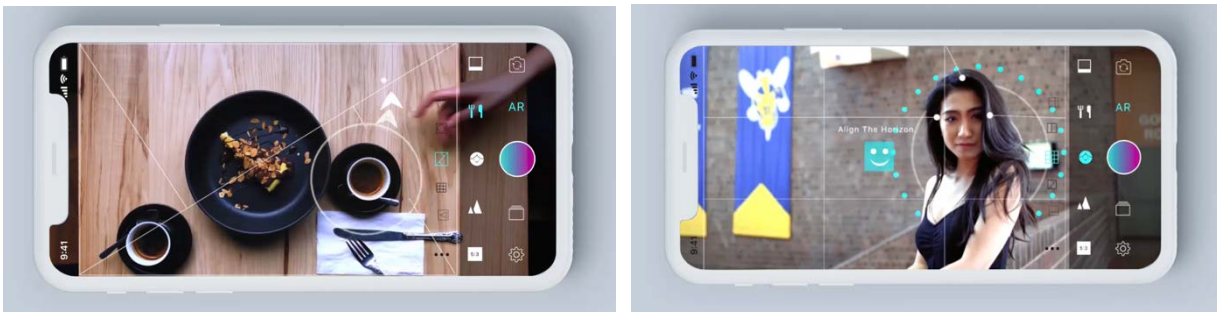

Figure 15: The First Version of MCAM

In the second edition, the most critical part of the design is to guide the user to find the most suitable angle and position in the original state. It is easier for users to understand direct and simple movement instructions in use, just like the behavior of moving a mobile phone to find an angle when taking a picture. With the current AR composition, the grid is displayed directly in a reasonable position, and users can quickly match the AR composition grid without feeling cumbersome and frustrated. However, because the color of the top navigation bar is gold, the instruction text is white on a grey background, some users will not see the text instructions when they start to use it, and they are confused about the gold of the top navigation bar.

In the third edition, the color of the top navigation bar changed from gold to white, which improved the speed for users to extract valid information. In composition analysis, the text color of composition name changed from black to gold, and all of the designs related to the AR composition designed with gold.

Connecting the critical information with the same color was to reduce users' cognitive burden. In this case study, users did quickly find the information they needed in subsequent tests.

Figure 16: Color Change of the Second and the Third Edition

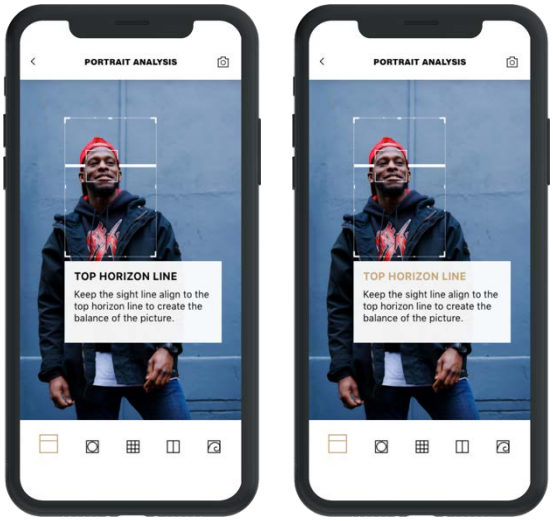

Figure 17: Composition Name Color Change of the Second and the Third Edition

7.0 Conclusions

The prototype provides a new channel for users to learn photography composition through artificial intelligence and interaction with AR. The AR Photography Composition Education Prototype is an interactive project exploring the AR interaction design to improve the sense of photography education. The entire user process includes a complete photography process exercise and repeated theoretical learning to deepen the impression. Users use this software to understand and use photography composition more intuitively. The higher the user's participation in the use process, the more it can help users repeatedly understand and practice the methods and techniques of composition.

It is hard to shoot creative and innovative photographs. I hoped that it would inspire users' interest in photography, combine various composition methods, and shoot their favorite works. In the subsequent improvement, the software can also add more complex compositions for users to choose from, and the interactive communication community can inspire more users to explore photography compositions. Since composition is a sophisticated knowledge, following my design can only make the reader understand some basic knowledge of compositions. In terms of composition grids guidance, there are many more directions worth to explore. For example, design the AR modeling to allow users to practice still-life photography on a table or floor or build character models to provide users with opportunities to learn character photography. Further, strengthen users' commercial photography skills. It can also design as a level-breaking game; in each time, users increase their proficiency, users can unlock a new composition mode or composition angle.

The design of the AR and VR fields has become necessary in the Internet industry. With the 5G network environment, virtual reality has entered people's lives. More Internet products that improve the quality of people's lives will improve their living experience. Currently this project is just a conceptual design that explores an interactive possibility of AR in the learning field. Due to the technical limitation, AR interaction can only be limited to some simple actions. However, with the maturity of AR technology, I believe more AR interaction apps will appear in the future, people can conduct practical exercises anytime and anywhere, and AR interaction methods will become more convenient and useful.

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