

Laporan Penelitian



The Implementation of Augmented Reality Hairstyles at Beauty Salons Using the Viola-Jones Method (Case Study: Eka Salon)

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Abstract

Augmented reality is the technology that superimposes a computer-generated digital content on a user's view of the real world in a real time so users can experience the real virtual objects. The use of augmented reality has spread into various industries, for an example in the fashion industry. One of fashion industry type is hairstyle industry. Eka Salon is a beauty salon that provides beauty treatments for women's hair care. This salon has a problem that customer are not satisfied with the results of their new haircut because that doesnt match with their expectations. This can be seen from the results of observations at Eka Salon is resulted that 8 out of 15 interviewed customers were not satisfied with their new haircuts because it did not match the appearance in the catalog. In this research, an augmented reality hairstyles will be made that can visualize how the shape of the selected hairstyle by the customer without having to cut their hair first. The Viola-Jones method was chosen as the method used in this study because it has a high accuracy of 90% in face detection. The result of this research is that the Viola-Jones method can detect facial surfaces and generate a 3D hairstyle model distance to 100cm properly. The test of the acceptance level of this application is carried out by Eka Salon customers with an average percentage of 84.3%.

Keywords: Augmented reality; Viola-jones; Simulation; Hairstyles

I. INTRODUCTION

Augmented reality is becoming popular these days because of the use of augmented reality which is very interesting and easier for users to project virtual objects into the real world. Augmented reality is a multimedia technology where a two-dimensional or three-dimensional virtual object is combined into a three-dimensional real- world form then projects a virtual object in real-time. As time goes by, today's technology allows the development of applications in various fields including industrial fields [4]. Currently, the use of AR has spread to various industrial fields, for example the fashion industry. One of the applications of augmented reality in the fashion world can be applied to beauty salons.

Eka Salon is a beauty salon that provides beauty treatments for women's hair care. This beauty salon has many customers who visit every day to get beauty care services. This salon has a problem that customers are not satisfied with the results of their new haircut because that doesn't match with their expectations. This can be seen from the results of observations at Eka Salon is resulted that 8 out of 15 interviewed customers were not satisfied with their new haircuts because they did not match the appearance in the catalog. This salon will be a place to research cases that will be raised by the author.

In connection with the problems discussed earlier, Augmented reality technology can be implemented to help customers minimize the disappointment that occurs after cutting hair. Augmented reality will present a virtual hairstyle for women that will become the image of the customer before making changes to his hairstyle. With the existence of Augmented Reality Hairstyles, customers will be able to choose and see to match the results of the hairstyle change they want before their hair is changed and can choose a hairstyle that suits their face to minimize feelings of disappointment when changing their hairstyle. The application will describe the selected hairstyle using the face detection method.

Face detection or face tracking has experienced considerable development in the field of computer vision. Many methods and algorithms have been applied in making face detection. This is supported by the wider benefits that can be obtained from the development of face detection. Application of face detection usually uses a video camera and the user's face as the input media. One of the methods used in face detection is the Viola-Jones method. In the implementation of augmented reality hairstyles, the Viola- Jones method will be used for face detection.

In face detection, several methods can be used, namely the Eigenface, AdaBoost, Fisherface, Haar Cascade, and Viola-Jones methods. Based on a literature study conducted from 5 face detection methods, the Viola-Jones method has a high accuracy rate of 90% and has fast computation. The Viola-Jones method uses the Haar feature in the descriptor combined with the image integral and Adaboost to search for selected feature values then form the Cascade Classifier. The classifier that is formed will be used to detect faces in the image. This study also evaluates the level of system accuracy by modifying the parameter values in the Viola- Jones method. This research will explain about how Viola- Jones works and its application in a simple face detection system using OpenCV and SparkAR libraries. This implementation is made in the form of an Instagram filter so that customers can choose the desired hairstyle easily through their respective smartphones.

II. RESEARCH METHODOLOGY

The completed application contains an overview of the flow of the processes that will be carried out from the initial stage to the results. This is done so that the stages in conducting this research run in a structured manner, to maximize the control that will be carried out if an obstacle occurs.

A. Identification of problems

The problem discussed in this study is that there is often

disappointment faced by a person after changing their hairstyle because it does not match the desired expectations. With this research, it will be discussed how to implement augmented reality using the viola-jones method into a hairstyle application. The aim is to present an idea of how the hairstyle will look after cutting without having to change hairstyles directly.

B. Data Collection

1. Input

At this input stage, there are several steps, namely

the user opens the application via a smartphone then the application will then the user selects the desired hairstyle.

2. Process

At the process stage, there are several stages, namely;

a. Start: The first stage of Start, namely the system starts running.

b. Face input stage: At this stage, the user will face the face to the smartphone camera.

c. AR implementation stage: The user selects the

desired hairstyle.

d. Method implementation stage: After the hair model is selected the 3D model will be right on the detected face

e. Capture stage: After selecting the desired hairstyle, the user can take the results of applying this virtual hairstyle.

f. The program end-stage indicates the program is complete.

3. Output

The results that will be generated from this application are in the form of an augmented reality hairstyles application. To make it easier for salon users and owners to use AR hairstyle, it will be inputted into the Instagram story feature found on the Eka Salon Instagram account so that customers can try it on their smartphone without having to install other applications.

D. Implementation of Augmented Reality

In this study, the making of a 3D Hairstyle model was made totaling 9 medium and short hairstyles. This hairstyle is taken from interviews with salon owners picking up the types of haircuts that are often chosen by customers. The types of hairstyle that will be displayed on the augmented reality hairstyle of Eka Salon. The types of hair in the image above include bob haircuts, layer hair, mullet haircuts, and volume haircuts that are made for medium and short haircuts. The process of making this 3D model using a blender application can be seen in Figure 3.

Figure 3. The process of making a 3D model of a hairstyle.

The hairstyles made are 9 medium and short hairstyles. This hairstyle is taken from interviews with salon owners picking up the types of haircuts that are often chosen by customers. The types of hairstyle that will be displayed on the augmented reality hairstyle of Eka Salon. The following Study Literature Collecting data and studying theories related to the Viola-jones method by referring to articles, books and data from the internet.

Field Study In this stage, observations are made to identify problems that exist at Salon Eka. Observations are made by visiting directly to the location Collecting data related to the salon and materials such as what types of hairstyles will be displayed in the augmented reality hairstyles application.

C. System planning

The system design stage consists of input, process, and output using the viola-jones method.

III. RESULTS AND DISCUSSION

A. Results and Discussion of Applications

The results and discussion here discuss the viola-jones method used in the application and several displays of hairstyles objects.

1. Face detection test based on light intensity

This test is carried out to prove that when the user performs a simulation, whether the user's face is detected by the system in different light conditions.

a) Dark lighting, carried out in a room with minimal lighting intensity of 5-watt lamps (closed room). The face test results are detected 100%.

b) Medium lighting, done in a medium lighting room with a light intensity of 15 watts of light (closed room). The face test results are detected 100%.

c) Bright lighting, done in a bright lighting room with a light intensity of 20 watts of light (open space). The face test results are detected 100%.

Face detection test based on distance

The parameter that is also very influential in the face detection section this time is the distance between the user and the camera used. However, in this test, it is only carried out on users whose detection is right in the face area which is perpendicular and the height is parallel to the webcam's height.

a) A distance of 30 cm, the test results are detected by the percentage 100% success.

b) 60 cm distance, the test results are detected faces with a success percentage of 100%.

c) Distance of 100 cm, the test results are detected with a success percentage of 100%.

Face detection test based facial movement speed This test is conducted to test the frame per second (fps) sensitivity of the webcam in capturing and detecting the movement of a moving face. This movement detection test is carried out by changing the facial movement from one position to another.

IV. CONCLUSION

Based on the result of this study, the augmented reality system can function properly during testing parameters of distance, light, motion, and position. The Viola-Jones method is successful in detecting faces that are inputted from the camera. The 3d model is not implemented perfectly on the user's neck. The results of testing customer opinions about the implementation of 3D hairstyle models in augmented reality produce an average percentage of 84.3% Thus, it can be said that the application was well received by salon customers because it has exceeded the expected figure, which is 80%.

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