APPLICATION OF CAMERA PASSPORT PHOTO ONLINE IN STUDIO GEMBIRA BASED MOBILE ANDROID

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ABSTRACT

Passport photo is a small photograph taken from his head to his chest with his body erect state is often required as identification or identification information of a person. Passport photo used in the manufacture of formal documents such as passports, driving licenses, identity cards, school diploma, graduation photos and so forth.

The method of taking passport photo in this research is to use the existing camera on handheld devices based on the Android operating system, combined with back-sub algorithm and relies on accelerometer sensor for determining the position of the camera alignment. The case study conducted at a photo studio in the city of Bandung.

As for the features offered on the application made is their shuttle service and a chat between the customer and the photo studio Happy guard who was on duty. In this research will be demonstrated that the fusion methods and algorithms are not getting optimal results. This is because external factors are quite instrumental in producing images that should photograph.

Keywords: *Passport photo Cameras Online, Background subtraction, Accelerometer, Passport photo, Mobile.*

1. PRELIMINARY

Gembira Photo is a photo studio located in Jl.Inggit Granasih No. 42 Bandung. Excited Photo can be said as a photo studio that is still evolving and always puts the latest technology from year to year. Photo happily accept the creation of any type of photo like wedding photos, family pictures, photographs and others. Printout nice photograph studio makes happy many who come and also to hire a lot of schools to make a photograph.

The results of the online questionnaire distributed to 51 customers who make a photograph in Happy *Photo* yaitu sebanyak 92.2% pelanggan menyatakan pas foto merupakan hal yang sangat important for purposes of completeness of the data themselves. as much as 82.2% of customers stated in the making photograph still need to go to a photo studio. In addition, the distance to get to the photo studio considerable and require considerable time in the process of printing photos.

The existence of a mobile application on a variety of smartphones can be used to facilitate the users, especially the use of android. When taking photos in required perpendicular to the accelerometer sensor technology that is in smartphones assist in making the catch photos as well as assist in producing a photograph desired by the customer.

1.1 Imagery

If viewed from the mathematical point of view, the image is a function mnerus (continue) on intentitas light on two-dimensional field. The light source illuminates an object, the object reflecting back sebgai of the light beam. This light reflection is captured by optical devices, such as the human eye, a camera, scanner (scanner), and so forth, so that the shadow of the object called the image recorded [1].

The image is a representation of a real object in the form of two-dimensional or three-dimensional digital images into a form that is understandable by computers. The definition of other image is a two-dimensional color intensity function f (x, y) where x and y represent the coordinates of the location of a point and the value of the function which is the level of intensity of color or grayish level of the point.

1.2 Imager Photo

Photo image is an image generated by using the camera sensor. Example sitra image (in this case aerial photographs) can be seen in Figure 1 [2].



Figure 1 Sample Citra Photo [2]

To get a photo image or images as desired may not be done on images or photos printed. But with digital image is possible to do processing or image editing. Beberpa desktop publishing program besides have an image processing facility in itomatis, is also a customized image processing facilities, in particular for the operation of the filter-risasi. This operation can be done by using simple algorithms and techniques trasnformasi sederhanan image. Image transformation algorithms in particular in digital filtering to modify the value of digital pixel color display image based on color digital value judgment of the pixel in question and the neighbors (neighborhood).

1.3 Passport Photo

Photograph is a small photograph taken from his head to his chest with his body erect state is often required as identification or identification information someone [3].

The process of making photographs can not be separated from what needs to be considered in making photographs. In this case the requirement to make a photograph for the image quality to be sharp and focused, body position and their heads held parallel to the camera, to face between 25% - 50% of the photograph and the head is located in the middle horizontally (within the head kebats left more or less equal to the distance of the head to the right border). For standard background colors to create berwaran photograph red or blue, the size of the photograph there are many sizes of 2x3cm, 3x4cm, 4x6cm. For the type of paper used paper glossy photo paper.



Figure 2 Sample Photograph

1.4 Background subtraction process

Background to this discussion is the number of pixels the image is still and do not move in front of the camera. The simplest model of background assume that all background pixel brightness fluctuates freely, depending on the normal distribution. Background characteristics can be calculated by accumulating multiple number of photos that will find the number of pixel values [4]. Background subtraction has several stages before it can detect the object, the stages of this method are as follows:

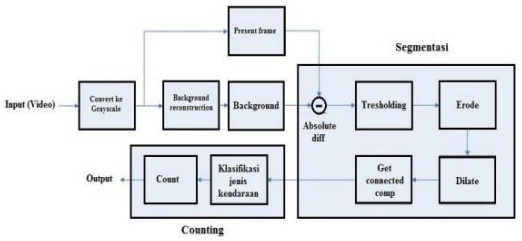


Figure 3 Sample Process Background subtraction [4]

1. *Convert Grayscale*

Grayscale image is an image that has only one channel on each pixel value, in other words the value of parts Red = Green = Blue. These values are used to indicate the level of intensity. Colors that have the color of black, grayish and white. Gray level here is gray with various levels of black to nearly white. [5]

The conversion of color images to grayscale form follow the rules as follows:

( ) ( ) ( ) ( )

Where :
Y = the degree of gray
R = Red channel pixel values
G = Green channel pixel values
B = the value of the pixel channel Blue
Examples of grayscale images are as follows:



Figure 4 Sample Image Conversion Results Grayscale [5]

2. *Absolute*

Absolute is a reduction stage every pixel values of the current image frame with each image pixel value of the background, to get a foreground object being detected. The process of reduction of absolute dilakukansecara image wherein each pixel differences of the two images will diperolehdan be positive. Because this technique will see the difference untuksetiap pixel in the image, so the image must have the same data type and size [5]. Absolute Dapa done using the following equation:

( ) | ( ) ( )| ( )

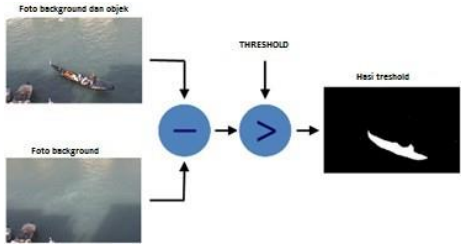
Where :
Z = absolute pixel value
B = the pixel values of the background picture and the objects
C = the value of the background pixel photo
(X, y) = coordinates of the pixel values of the matrix

3. Threshold

Threshold is a simple and effective technique for image segmentation. Thresholding process is often referred to binerisasi process. In some image processing applications, first performed on the image of gray level threshold to become a binary image (image having gray-level values of 0 or 255) [5]. To determine the threshold value of each image matrix values can use the following equation:

( ) { ( ) }
( ) { ( ) } ( )

Where :
g (x, y) = the value of the image matrix from which the threshold.
T = a threshold value (0-255)



Gambar 5 Ilustrasi *Background Subtraction* [5]

2. ISI RESEARCH

2.1 Analysis Shooting Photograph

In this study process analytical method of shooting photographs has several stages in the process of making photographs using a camera-based android headphones with background subtraction method by utilizing Accelometer. The following stages of the method of shooting photographs can be seen in Figure 6 as follows:

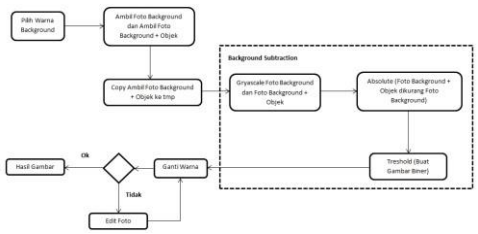


Figure 6 Analysis of Shooting Photograph

2.1 Background subtraction method

In this study the process of background subtraction methods have several stages in the process of making photographs using android based mobile phone camera with background subtraction method.
The following stages of background subtraction method as follows:
a. Convert Grayscale
b. Absolute Difference
c. threshold

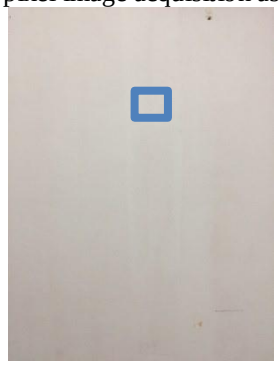
2.1.1 Convert Grayscale

After getting the image obtained from the photo camera mobile phone has a RGB format. At this stage, each photo will be converted to grayscale to be more easily processed at a later stage. Grayscale is the colors of pixels that would exist in a range of shades of black and white. To change the RGB to grayscale to do with the equation (1) as follows:

$$Y(y,x) = (0{,}229 * R) + (0{,}587 * G) + (0{,}114 * B)$$

Where :
Y = the degree of gray
R = Red channel pixel values
G = Green channel pixel values
B = the value of the pixel channel Blue

In the case of this background picture is assumed 5x5 pixel image acquisition as follows:



Gambar 7 Citra 5x5 Piksel Foto Background

Table 5x5 pixel value of the background image in Figure 7 are as follows:

Table 1 Value Pixel RGB Citra Background

Y/X	Format	1	2	3	4	5
	R	201	211	199	198	203
1	G	204	198	198	199	199
	B	198	202	212	203	203
	R	198	201	198	211	199
2	G	199	204	197	198	198
	B	203	198	202	202	212
	R	203	201	198	201	199
3	G	202	200	197	204	198
	B	198	199	202	198	212
	R	198	203	201	198	201
4	G	197	202	200	199	204
	B	202	198	199	203	198
	R	199	198	203	201	198
5	G	198	199	199	204	197
	B	212	203	203	198	202

To change to grayscale values can be calculated with the following equation:

Y(1,1) = (0,299*201)+(0,587*204)+(0,114*198) = 202,4 ~ 202
Y(1,2) = (0,299*211)+(0,587*198)+(0,114*202) = 202,3 ~ 202
Y(1,3) = (0,299*199)+(0,587*198)+(0,114*212) = 199,8 ~ 199
Y(1,4) = (0,299*198)+(0,587*199)+(0,114*203) = 199,1 ~ 199
Y(1,5) = (0,299*203)+(0,587*199)+(0,114*203) = 200,6 ~ 201

Value Y (y, x) will replace three RGB pixel value to 1 so as to pixel grayscale value at coordinates (0,1) with a value of R = 201, G = 204, B = 198 is replaced with the pixel value Y (1,1) namely 202. Similarly, for the value of the next pixel to the last pixel Y (5.5).

By the same calculation for each pixel in the matrix value it will generate a grayscale image matrix as follows:

202	202	199	199	201
199	202	198	202	200
202	200	198	202	200
198	202	203	199	202
200	199	201	202	198

Figure 8 Value Pixel Citra Background Results Grayscale

After calculating the conversion from RGB to grayscale, then the background image obtained grayscale results as follows:



Figure 9 Citra Background Grayscale Background Photos Results

In the next photo case similar to the case in the background photo taken at the same place is added to the object is assumed to capture the image of 5x5 pixels as follows:

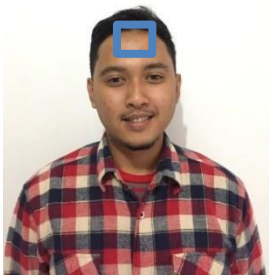


Figure 10 Citra 5x5 Pixel Photo Background and Objects

Table 5x5 pixel value of the background image in Figure 10 are as follows:Tabel 2 Nilai Background Citra pixels and RGB Object

Y/X	Format	1	2	3	4	5
	R	206	126	155	23	124
1	G	199	187	123	56	176
	B	201	123	112	67	203
	R	152	23	72	138	214
2	G	123	76	39	187	164
	B	126	34	63	202	134
	R	164	201	167	176	167
3	G	98	178	134	165	198
	B	148	154	156	156	199
	R	176	113	210	76	178
4	G	132	126	200	93	164
	B	123	124	199	54	153
	R	124	87	127	167	167
5	G	134	104	167	99	178
	B	166	155	189	65	167

To change to grayscale values can be calculated with the following equation:

Y(1,1) = (0,299*206)+(0,587*199)+(0,114*201) = 201,3 ~ 201
Y(1,2) = (0,299*126)+(0,587*187)+(0,114*123) = 161,4 ~ 161
Y(1,3) = (0,299*155)+(0,587*123)+(0,114*112) = 131,3 ~ 131
Y(1,4) = (0,299*23)+(0,587*56)+(0,114*67) = 47,3 ~ 47
Y(1,5) = (0,299*124)+(0,587*176)+(0,114*203) = 163,5 ~ 164

Value Y (y, x) will replace three RGB pixel value to 1 so as to pixel grayscale value at coordinates (0,1) with a value of R = 206, G = 199, B = 201 is replaced with the pixel value Y (1,1) namely 201. Similarly, for the value of the next pixel to the last pixel Y (5.5).

By the same calculation for each pixel in the matrix value it will generate a grayscale image matrix as follows:

201	161	131	47	164
132	52	52	174	176
123	182	146	167	189
144	122	199	83	167
135	105	158	115	173

Figure 11 Value Pixel Citra Background and Objects Results Grayscale

After calculating the conversion from RGB to grayscale, then the background image obtained gray results as folloes :



Figure 12 Citra Background Results Background and Objects Photo Grayscale

2.1.2 Absolute Difference

Once the input data in the form of photos and photo background background objects from the phone through the process it will get the grayscale esktrasi backgound background image on the photo and background objects. Background grayscale image has gone through the process so that the resulting image is a grayscale image. Furthermore, abis process to detect objects or differences segnifikasi of the background image. This process will reduce the value matrix image background image background picture and background objects using absolute difference calculation.

Absolute difference calculation can be done with the equation (2) as follows:

( ) | ( ) ( )|

Where :
Z = absolute pixel value
B = the value of the background pixel photo
C = the value of the object pixel background photo
(Y, x) = coordinates of the pixel values of the matrix

The pixel values of the background picture (background image) the results of grayscale reused in the process. Background image pixel values are as follows:

202	201	199	199	201
199	202	198	202	200
202	200	198	202	200
198	202	203	199	202
200	199	201	202	198

Figure 13 Value Pixel Citra Photo Background Results Grayscale

While the pixel values of the background picture object (background image) grayscale is sebaagai following results:

201	161	131	47	164
132	52	52	174	176
123	182	146	167	189
144	122	199	83	167
135	105	158	115	173

Figure 14 Value Pixel Citra Photo Grayscale Background and Objects Results

Each niai background image pixel is calculated by the above equation in order to know the difference between absolute pixel values of the second image. The collection is an object that can be. The calculations are as follows:
Z(1,1) = |202 - 201| = 1
Z(1,2) = |201 - 161| = 40
Z(1,3) = |199 - 131| = 68
Z(1,4) = |199 - 47| = 152
Z(1,5) = |201 - 164| = 37
The calculation is performed on each pixel's value as follows:

|202-201|	|201-161|	|199-131|	|199-47|	|201-164|
|199-132|	|202-52|	|198-52|	|202-174|	|200-176|
|202-123|	|200-182|	|198-146|	|202-167|	|200-289|
|198-144|	|202-122|	|203-199|	|199-83|	|202-167|
|200-135|	|199-105|	|201-158|	|202-115|	|198-173|

Figure 15 Calculation of Absolute Value Difference

From these calculations obtained by the matrix results in a reduction or an absolute difference matrix as follows:

1	41	68	152	37
67	150	146	28	24
79	18	52	35	11
54	80	4	116	35
65	94	43	87	25

Figure 16 Value Absolute Difference Pixels Results

After background subtraction calculations, the results of background subtraction image obtained as follows:



Figure 17 Citra Results Absolute Difference

2.1.3 Threshold

After doing the absolute difference is then performed thershold. Thershold is a simple and effective technique for image segmentation. Theshold process is often referred to binerisasi process. In some image processing applications, first performed thershold the gray level image to be binary image (image having gray-level values of 0 or 255). An image thersholding process results can be presented in a histogram image / certain parts of the image so as to bimodal image, the histogram can be partitioned properly (object segmentation by background), and can be determined thershold its value.

The formula for determining the value thershold be obtained equation (3) as follows:

( ) { ( ) }
( ) { ( ) }

Where :
g (y, x) = matrix image of the threshold value.
f (y, x) = is the value that will be in the image matrix threshold.
T = a threshold value (0-255)

The threshold value depending on the requirement. In the image of the background subtraction will be done with the threshold value T = 30, so that the process of calculation is as follows:

1	41	68	152	37
67	150	146	28	24
79	18	52	35	11
54	80	4	116	35
65	94	43	87	25

Figure 18 Value Absolute Difference Pixels Results

For the matrix (1.1)
f (1,1) = 1
g (1,1) = {1 <30}
g (1,1) = 0
For the matrix (1.2)
f (1,2) = 41
g (1,2) = {41> 30}
g (1,2) = 1
For the matrix (1.3)
f (1.3) = 68
g (1,3) = {68> 30}
g (1,3) = 1
For the matrix (1.4)
f (1.4) = 152
g (1,4) = {152> 30}
g (1,4) = 1
For the matrix (1.5)
f (1,5) = 37
g (1,5) = {37> 30}
g (1,5) = 1

By the same calculation for each pixel value in a matrix with a value of T = 30, it will generate a matrix thershold sebgai following:

0	1	1	1	1
1	1	1	0	0
1	0	1	1	0
1	1	0	1	1
1	1	1	1	0

Figure 19 Value Pixel Citra Results Threshold

After the threshold value T = 30, then the results obtained thershold sebgai image below:

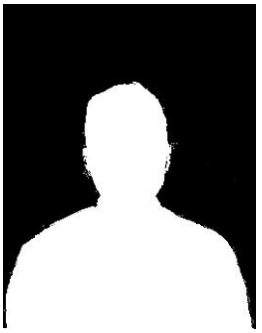


Figure 20Citra Background Results Threshold

2.1.4 Change Background Color

After conducting further thershold process changes color according to the desired color. if the pixel value is 0 (black or # 000000) then replace those pixels with a substitute color (red or blue), if the pixel value is 1 (white or FFFFFF) then replace those pixels with pixels on the coordinate bersesuaiaan with pixel values in tmp, it will be compressed image of the color change as follows:



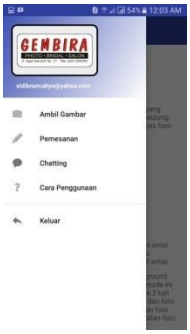
Figure 21 Citra Results Change Background Color

2.2 Implementation

Implementation of which interface implementation. Following implementation of the interface making processes photograph of development applications designed

- Form Menu

  Log in to the form to go into the settings menu photograph



- Form Talking Pictures

  From taking pictures for setting the photograph to be taken choose a background color and choosing the front or rear camera.



- Form The Firs Photo

  Form the first photo where the photo shoot for background



- Form The Second Photo

  Form the second photo where the photo shoot for photos of objects in a sma in the first photo.



- Form Editing Photo

  From photo editing to use if you want to edit photos that have been taken.



- Form The Images

  Form the images are the result of photographs that have been taken or that have been edited.



2.3 Examination

Testing is done by several factors testing. The tests include:

A. Testing Black Box

Tests carried out on the results of the application design. The test results can be seen in the table:

- Customer Application Testing Results

Pengujian Aplikasi				
No	Komponen Yang Diuji	Detail Pengujian	Jenis Pengujian	Hasil Pengujian
1	Login	Verifikasi masuk Aplikasi	*Black Box*	Sesuai
2	Daftar	Verifikasi daftar Aplikasi	*Black Box*	Sesuai
3	Ambil Gambar	Melakukan pengolahan data ambil gambar	*Black Box*	Sesuai
4	Ambil foto Pertama dan kedua	Melakukan pengambilan foto pertama dan kedua	*Black Box*	Sesuai
5	Edit Pas foto	Melakukan edit pas foto	*Black Box*	Sesuai
6	Pemesanan	Melakukan data pemesanan pas foto	*Black Box*	
7	Chating	Melakukan chat	*Black Box*	Sesuai
8	Tips Pas Foto	Menampilkan tips cara pas foto	*Black Box*	

- Testing Results Admin Happy Photo

Pengujian Aplikasi				
No	Komponen Yang Diuji	Detail Pengujian	Jenis Pengujian	Hasil Pengujian
1	Login	Verifikasi masuk Web	*Black Box*	Sesuai
2	Melihat Pemesanan	Melihat data pemesanan masuk	*Black Box*	Sesuai
3	Chating	Melakukan chat	*Black Box*	Sesuai
4	Pengaturan Akun	Melakukan pengaturan akun admin	*Black Box*	Sesuai

B. Beta Testing

Beta testing is testing conducted objectively where tested directly into the field which the agency concerned about customer satisfaction with the content of the points that the fulfillment of the original purpose of the development of online applications and camera photograph photograph camera app to see online in Happy Studio. Beta testing is done through two techniques of data collection, namely through interviews and questionnaires.

Beta testing through interviews conducted for the admin page on a web subsystem happy pictures, due to the limited number of users to the web admin Happy Happy Photo Studio Photo.

Beta testing through questionnaires done by creating a questionnaire about customer satisfaction with the content of user requirements freindly points were subsequently distributed to most customers by taking a sample of 30 people. From the results of the questionnaire will be calculated to be able to conclude the assessment of the implementation of the new system. Beta testing is done by testing directly to customers who would load the photograph in the study.

- Beta Testing Results Questionnaire

NO	Tujuan	Soal	Pertanyaan	SS	Σ	S	Σ	RR	Σ	KS	Σ	TS	Σ	Σtotal	Rata - Rata Item	Rata - Rata Total
1	Menyediakan sebuah media aplikasi kamera pas foto online yang dapat digunakan sebagai alternatif pelanggan dalam melakukan pengambilan pas foto.	1	Apakah anda setuju aplikasi kamera pas foto online ini memberikan kemudahan dalam melakukan pengambilan foto?	10	50	19	76	1	3	0	0	0	0	129	4, 3	4,05
2	Menyediakan sebuah media aplikasi kamera pas foto online yang dapat digunakan sebagai alternatif pelanggan dalam melakukan pengambilan pas foto.	4	Apakah anda setuju hasil pas foto pada aplikasi kamera pas foto online ini sangat sesuai dengan standar di studio?	1	5	14	56	14	42	1	2	0	0	105	3,5	4,05
3	Menyediakan sebuah media aplikasi kamera pas foto online yang dapat digunakan sebagai alternatif pelanggan dalam melakukan pengambilan pas foto.	6	Apakah anda setuju antarmuka dalam aplikasi kamera pas foto online ini mudah dipelajari?	11	55	19	76	0	0	0	0	0	0	131	4,36	4,05
	melakukan pengambilan pas foto.															
4	Membangun aplikasi kamera pas foto online yang dapat digunakan pelanggan dalam melakukan transaksi pembuatan pas foto.	2	Apakah anda setuju aplikasi kamera pas foto online ini memberikan kemudahan ketika ingin memesan pas foto?	12	60	18	72	0	0	0	0	0	0	132	4,4	4,33
5	Membangun aplikasi kamera pas foto online yang dapat digunakan pelanggan dalam melakukan transaksi pembuatan pas foto.	5	Apakah anda setuju aplikasi kamera pas foto online ini memberikan kemudahan dalam melakukan pengambilan dan pembayar pas foto?	8	40	22	88	0	0	0	0	0	0	128	4,26	4,33
6	Membangun aplikasi kamera pas foto online yang dapat digunakan pelanggan dalam menyampaikan keluhan.	3	Apakah anda setuju fitur chating pada aplikasi kamera pas foto online ini memberikan kemudahan dalam menyampaikan komunikasi kepada admin di Studio Gembira Photo?	8	40	18	72	4	12	0	0	0	0	124	4,13	4,13

- Beta Testing Results Interview

1. Menurut pendapat anda dengan adanya subsistem web di studio Gembira Photo akan membuat kegitan pengelolaan data pelanggan dalam membuat pas foto menjadi mudah?

   Jawaban :

   Sangat membantu, dengan adanya subsistem web ini saya lebih mudah untuk pengelolaan data pelanggan yang akan membuat pas foto yang biyasanya pelanggan mengantri dalam membuat pas foto dan untuk penyimpanan data pelangan sangat mudah dikarnakan sudah terkomputerisasi.

   Berdasarkan hasil wawancara diatas dapat disimpulkan bahwa subsistem web sangat membantu di studio Gembira Photo dalam pengolahan data dan pelayanan pelanggan dalam pembuatan pas foto.

2. Menurut pendapat anda dengan adanya chating pada subsistem web di studio Gembira Photo dalam kegiatan pelayanan keluhan pelanggan lebih mudah?

   Jawaban :

   Ya dengan adanya chat di subsistem web di studio Gembira Photo ini sangat mempermudah kami dalam pelayanan keluhan pelanggan. Selain menjadi lebh praktis karena tidak lagi menggunakan telepon dan lebih mudah kami memproses keluhan apa yang di sampaikan oleh pelanggan.

   Berdasarkan hasil wawancara diatas dapat disimpulkan bahwa subsistem web sangat membantu di studio Gembira Photo dalam menanggapi keluhan pelanggan dalam pembuatan pas foto.

3. Menurut pendapat anda apakah fungsionalitas dari halaman subsistem web di studio Gembira Photo ini mudah dipahami dan digunakan?

   Jawaban :

   Ya, tidak ada masalah seluruh fitur dan fungsi di susbsistem web Gembira Photo ini dapat dengan mudah daya pelajari dan saya pahami.

Berdasarkan hasil wawancara diatas dapat disimpulkan bahwa subsistem web ini dapat dengan mudah dipelajari dan digunakan.

3. COVER

3.1 Conclusions

After doing the analysis, design, implementation and testing of the application, it can be concluded that:

1. Application is capable of taking pictures for the purposes photograph using the camera android based mobile phone functionality with the existing business in the joy of photo studio.

2. The removal process a background image or background, using background Substraction but there are still a lot of noise. Noise can be improved from the user to the application or after booking opeh employees Gembira Studio Photo.

3. After conducting several experiments and in accordance with the interview, the application can megirimkan customer data ranging from data completeness of the data to the location of the booking and can send messages through a chat feature contained in the application to the web contained in Gembira Studio Photo.

3.2 Suggestion

Based on the results of research on Camera Applications Development Photograph Studio Happy Online Android-Based Mobile proposed a few suggestions:

1. Required further development of the use of background subtraction methods through the incorporation of other algorithms including edge detection algorithm.

2. Required additional features in terms of editing photographs, photographs sehinggan results can be edited in accordance with the wishes of the customer.

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