Color Blind Test Using Ishihara Method for Mercu Buana University Prospective Students Selection

Sri Dianing Asri [1,*], Adhitya Dwiki Darmawan [1], Novianti Putri Wibowo [1], Dimas Riyanto Wibowo [1]

[1] Information System; Mercu Buana University; Jl. Raya Meruya Selatan, Kembangan, Jakarta, 11650, (021) 5840816; e-mail: dianing.asri@gmail.com; 41817210039@student.mercubuana.ac.id ; 41817210039@student.mercubuana.ac.id ; 41817210044@student.mercubuana.ac.id

* Corresponding author: e-mail: dianing.asri@gmail.com

Abstract

Mercu Buana University is a private university which consists of seven faculties. At the Faculty of Design and Creative Arts, Faculty of Communication Sciences and Faculty of Engineering, additional requirements are required for new student candidates, i.e. a color blindness free certificate. Color blindness is a vision disorder caused by the inability of the eye cone cells to perceive a certain spectrum of colors. There are many ways to test someone's color blindness, one of which is by using the Ishihara method. To obtain a color blindness free certificate, prospective students must visit a clinic or hospital, carry out the applicable color blind test procedure, then bring the results to campus. Based on these problems, the research was conducted with the aim of making a color blind test application that can issue a recommendation letter based on the test results of prospective new students. The system development method uses System Development Life Cycle. The results of the study were an android-based color blind test application that was able to detect color blindness using the Ishihara

method and issued a recommendation letter based on the test results of prospective new students in the on-time application.

Keywords: *android, color blindness test, Ishihara method, waterfall*

1. Introduction

As a private university that organizes the tridharma of the seat of learning, Mercu Buana University activites revolves around the education, research and the devotion towards the community. Being established on 1985 under the guidance of the Menara Bhakti Foundation. Mercu Buana University is part of the Higher Education Service Institution (LLDIKTI) Region III of the Ministry of Research, Technology and Higher Education (KEMRISTEKDIKTI) of the Republic of Indonesia (Mercubuana, 2021).

Mercu Buana University consists of six faculties, namely the Faculty of Engineering, the Faculty of Economics and Business, the Faculty of Communication Sciences, the Faculty of Computer Science, the Faculty of Psychology and the Faculty of Design and Creative Arts. The general requirements that are applied to the six faculties of Mercu Buana University require new student candidates to have a diploma and certificate of the results of the SMA / SMK / equivalent National Examination, KTP, a drug-free certificate issued by a clinic or hospital, as well as a signed tattoo-free certificate. by parents or guardians of prospective new students. Especially for registration at the Faculty of Design and Creative Arts, the Faculty of Communication Sciences and the Faculty of Engineering for the Design study program,

Based on the background of the problem, this study aims to make a color blind test application to help the process of admitting new students at Mercu Buana University. The benefit to be achieved is that the application can detect color blindness using the Ishihara method and issue a recommendation letter based on the test results of prospective new students in the application on-time.

In previous studies conducted by several researchers, color blindness itself is a visual disorder caused by the inability of the eye cone cells to capture a certain color spectrum (Kartika et al, 2014). Color blindness is usually passed

genetically from parent to child with a recessive X chromosome linked pattern (Neitz and Neitz, 2011)

Color blindness suffered by a person as a congenital disorder consists of three types, namely monochromation, chromation, and trichromation anomalies. Monochromation is total color blindness, where the patient cannot distinguish colors due to damage to the cone cells in the retina. Chromation is color blindness caused by the damage to one of the pigments in the cone cells so that the color is only two-dimensional. Chromated consists of protanopia (absence of red photoreceptors), deuteranopia (absence of green photoreceptors), and tritanopia (absence of blue photoreceptors).

Trichromation anomaly is color blindness that occurs due to damage to the retinal cone pigment cells in the sensitive part of the spectrum. Trichromation anomaly consists of protanomaly and deuteranomaly (difficult to distinguish between red and green colors) and tritanomaly (difficult to distinguish between blue and yellow)

2. Research Methods

2.1 Data Collection Methods

The techniques used for data collection in this study are a) *Literature review,* Literature study is carried out to find sources of books, articles, and internet literature related to the research topic, then study them as references to support research. b) *Observation,* Observations were made before data collection to observe the process of admitting new students at Mercu Buana University, so that system requirements can be estimated and application inputs and outputs can become clearer.

2.2 Data Analysis

Data were collected by conducting direct field observations of the color blind test process at the new student admissions of Mercu Buana University. A literature review was also carried out afterwards to obtain supporting data.

2.3 Research Framework

The following is a flow chart that is used as a reference in development.
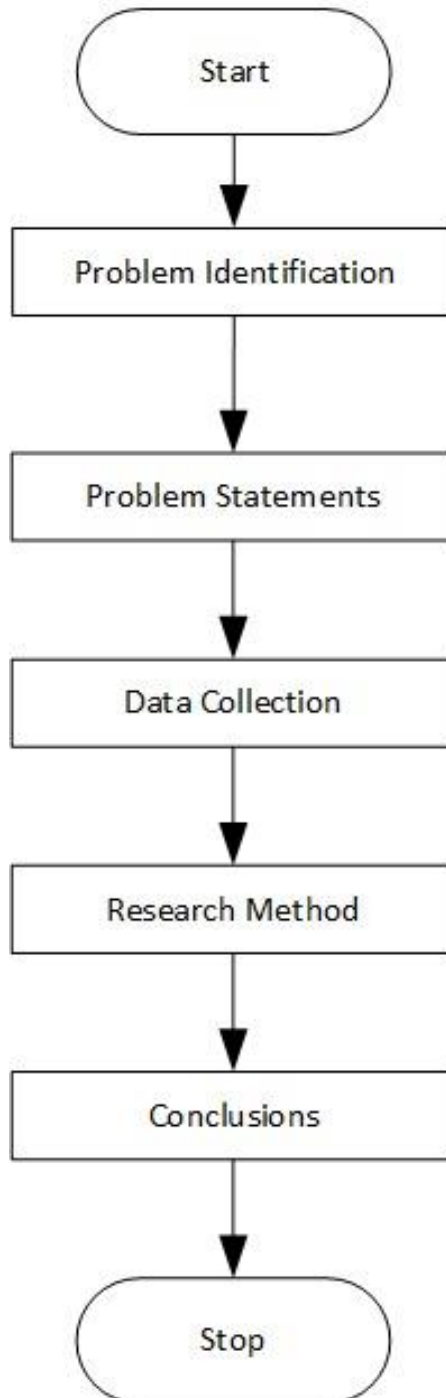
Source: Research Result (2021)

Figure 1. Research Flowchart

The problem identification stage is the first stage carried out by observing the circumstances around the researcher to find and identify existing problems.

In this study, the problem identification stage was carried out in the Mercu Buana University campus environment.

At problem identification, the problem is formulated based on the results of the identification of problems that have been done previously to find certain obstacles or parts that can be overcome or fixed. The researcher's problem formulation in this study refers to the process of admitting new students at Mercu Buana University.

In Data Collection stage is carried out to support the problem identification stage. Data collection in this study was carried out in two ways, namely by conducting literature studies of related literatures and by making direct field observations.

Problem Formulation is made based on the results of the problem formulation. At this stage, the problem formulation is created to give boundaries to the research according to the problems identified.

Research Objectives, at this stage, clearly defined research objectives so that researchers can determine and take appropriate steps to achieve research objectives.

Research Methods are needed to ensure the research process. Based on the formulation of problems and the formulation of existing problems, the research method used in this research is an action research method that aims to develop new skills or new approaches and be applied directly and examined the results.

Conclusions and Suggestions are drawn from the results of the research according research flow chart. The conclusions that exist will be studied to produce useful suggestions for developing research so that it can run more optimally.

.

3. Results and Discussion

3.1 Analysis of the Ongoing Learning Process.

In the Running System Analysis in Figure 2, before prospective new students will take a color blind test, the user will be required to register online, then the user will be able to do a color blind test, if the user is declared to have

PIKSEL status is accredited by the Directorate General of Research Strengthening and Development No. 28/E/KPT/2019 with Indonesian Scientific Index (SINTA) journal-level of S5, starting from Volume 6 (1) 2018 to Volume 10 (1) 2022.

139

passed, the user sends proof of a certificate free of color blindness and complete other required documents.
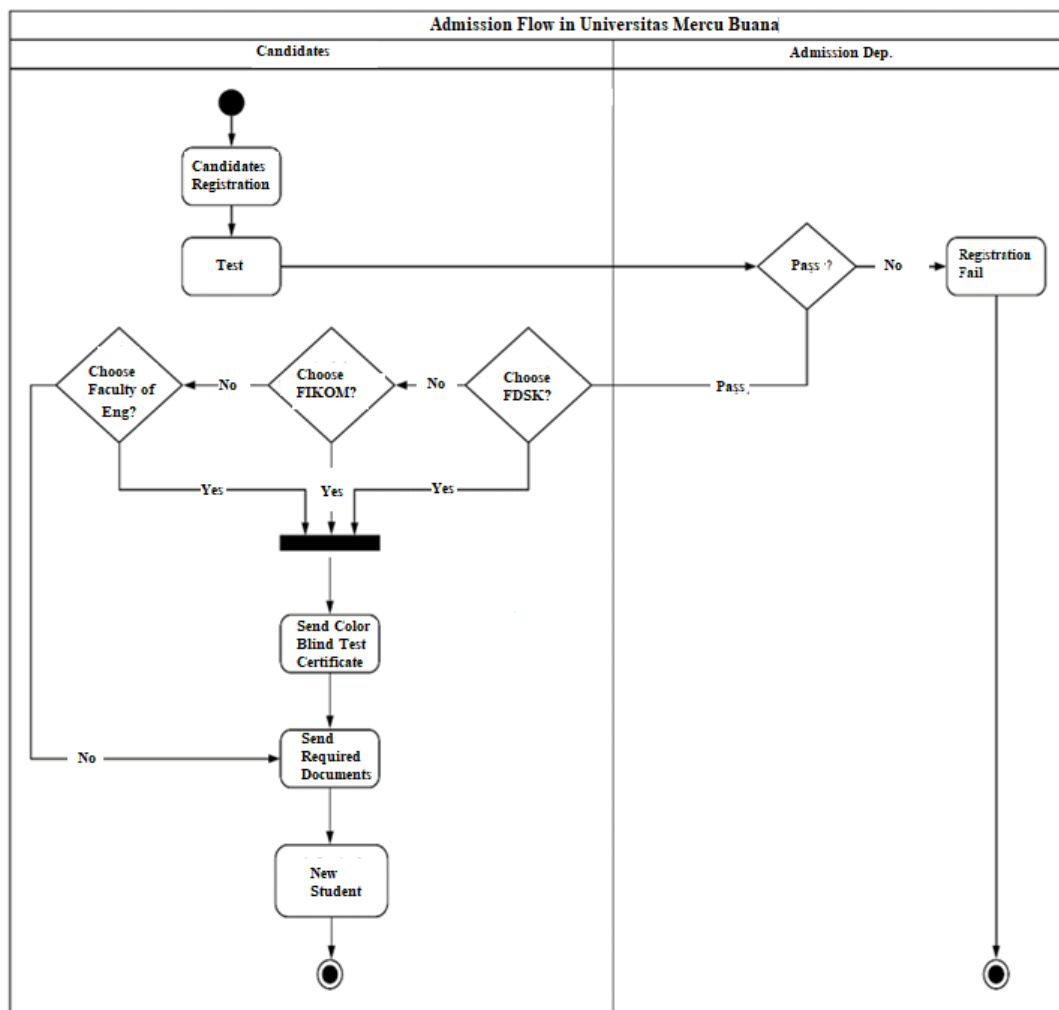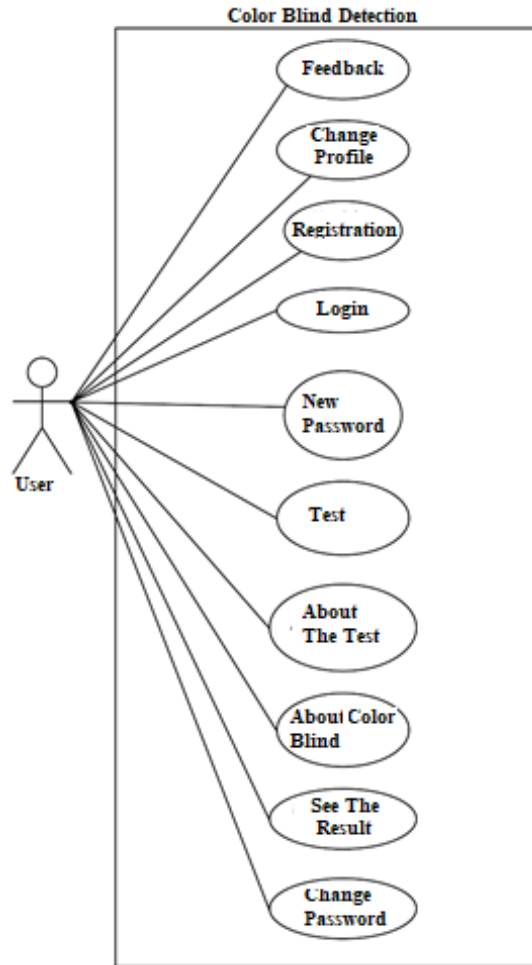

Source: Research Result (2021)

Figure 2. Analysis of the ongoing learning process

3.2 System Requirements Analysis

At this stage, system developers need communication that aims to understand the software expected by users and the limitations of the software. This information can usually be obtained through interviews, discussions or in-person surveys.

3.3 UML design

Use case diagrams contained in the Making of a Color Blind Test Application for new student admissions using the Android-based Ishihara Method as Figure 3.
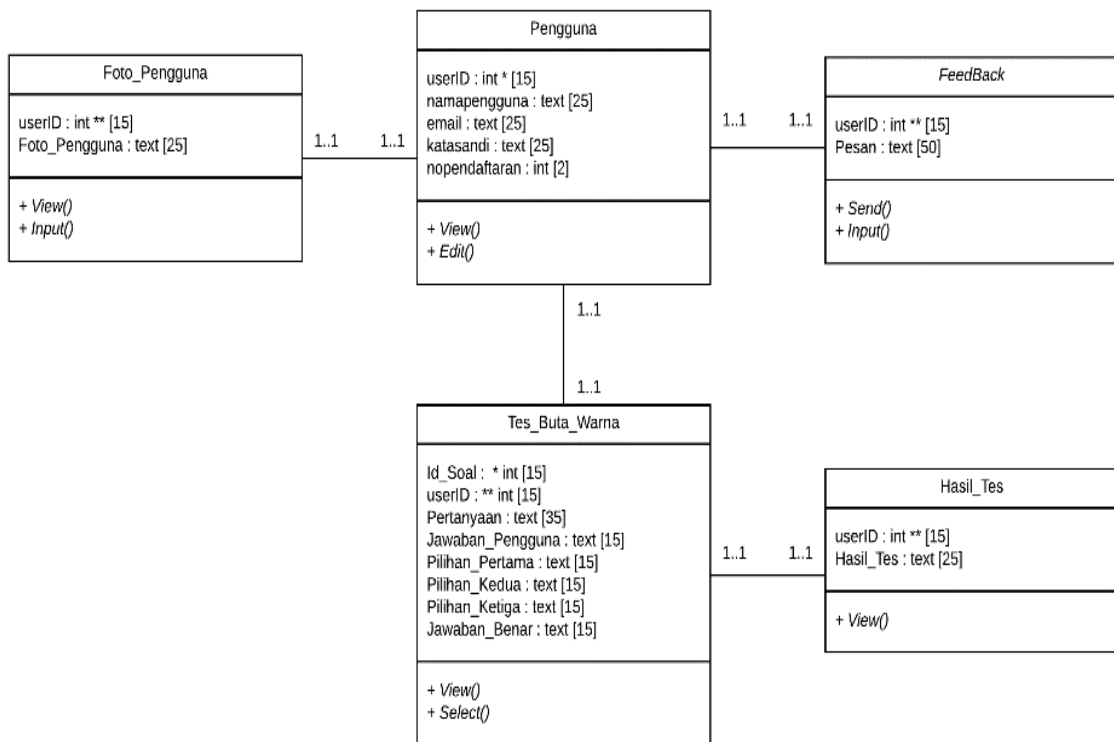
Source: Research Result (2021)

Figure 3. Usecase Diagram

The use case diagram in Figure 3 above, illustrates the functional requirements of a color blind test application. The actor in the color blind test application is the user. The use case described consists of conducting feedback, that is, users can send suggestions and criticism of the assessment of the color blind test application to us as the maker of the color blind test application. Changing the Profile Image, that is, the user can attach and change the user's profile image. Registering New Users, namely users registering first in order to get an account to be able to enter the main menu of the color blind test application. Login, namely the account that was previously created is used to enter the color blind test application. Reset Password, that is, if the user forgets the password, the user can forget the password on the login page, so that he can create a new password which will be sent via email as the address registered to the user account.

Performing the test, namely the user doing a color blind test, which is a test that will be carried out in 3 stages to get more accurate results, each stage of the test will produce several color blind test results. See About the Color Blindness Detection Application, that is, users can view information from the color blindness test application. Seeing about color blindness, the user can view information about color blindness, starting from the definition, symptoms, types, causes, prevention and treatment of color blindness. Seeing the Color Blindness Test Results, i.e. the user can see the result from doing the previous color blind test. Change Password, that is, the user can update or replace the password with a new one.
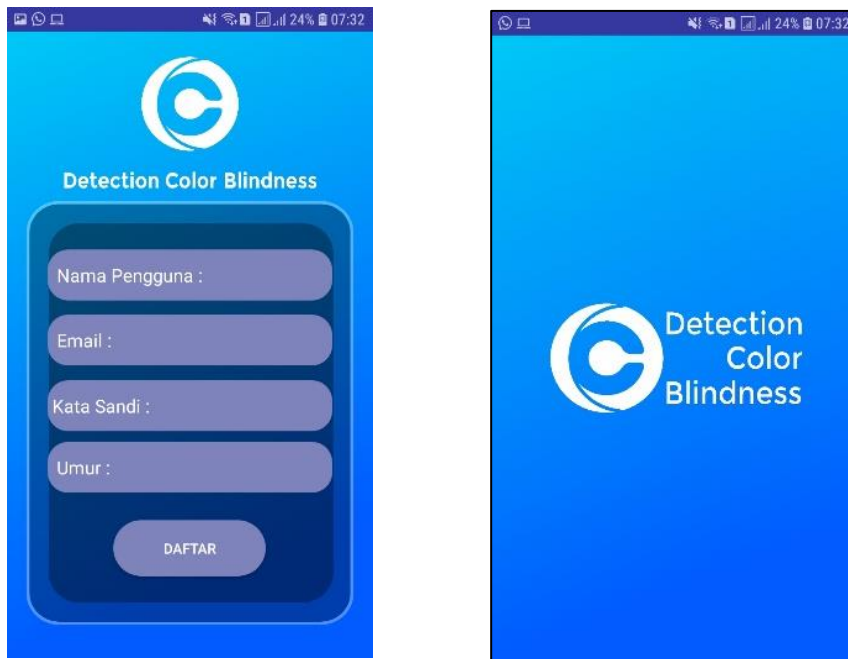

Source: Research Result (2021)

Figure 4. Usecase Diagram

The class diagram in the image above describes the database relationships that exist in the application, and explains how the relationships between tables, there are 5 relationship tables consisting of user tables, table results_tes. tes_buta_warna table, form_pengguna table, and table Feedback.

3.4 Testing and Evaluation

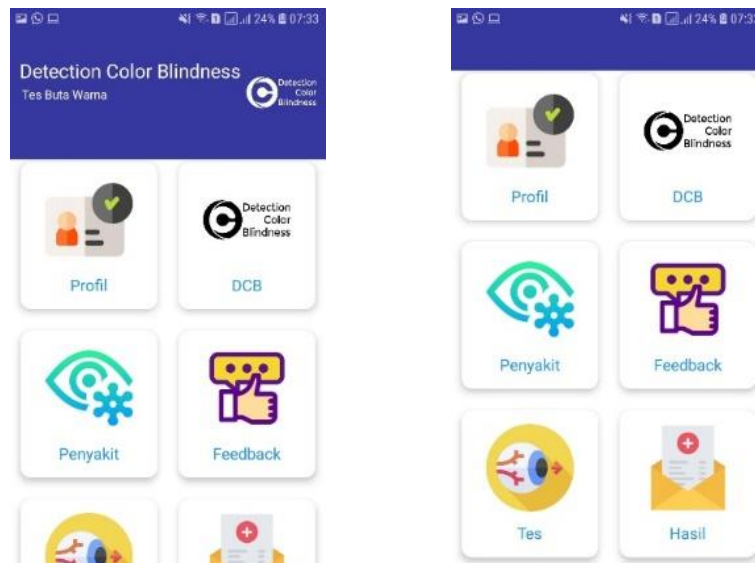Source: Research Result (2021)

Figure 5. List

Before a user has an account to access and use the application, the user should register online, including data input (name, email, password, and new student admission number).

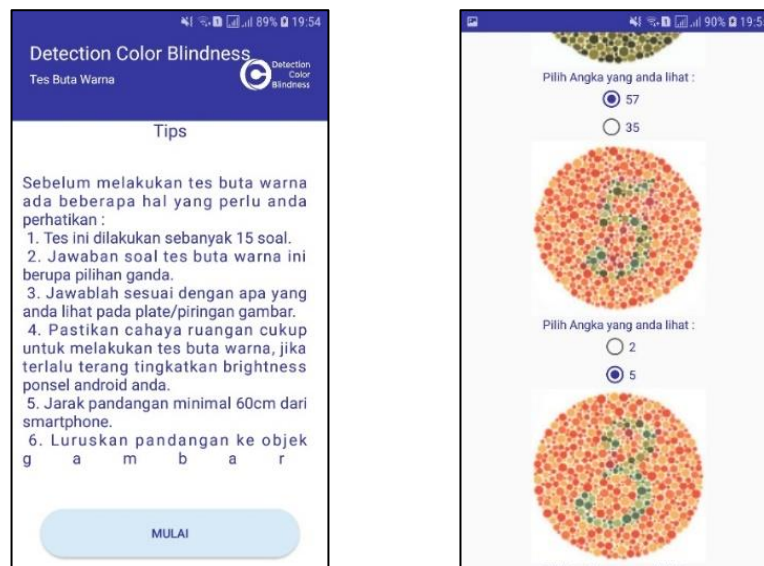Source: Research Result (2021)

Figure 6. Login

After registration, prospective students are required to login to access the main page

Figure 7. Main view

After you login, prospective new students will access the main menu on the Color Blindness Detection application, the initial menu display.

Figure 8. Color blindness test questions

Figure 8 explains the activity before the test. Users are expected to read tips on doing color blind test questions, then click start to start working on the color blind test questions.
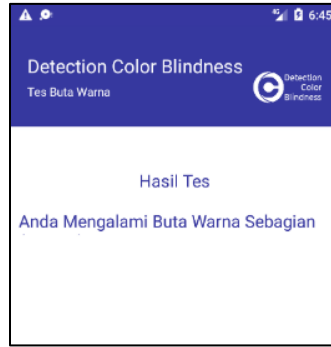
Source: Research Result (2021)

Figure 9. Test Results

After performing a color blind test, the results are automatically saved and can be viewed on the test results page.

4. Conclusion

The business process for admitting new students at Mercu Buana University, especially prospective new students who will apply to the Faculty of Design and Creative Arts, the Faculty of Communication Sciences and the Faculty of Engineering must conduct a color blindness test. This study intends to design an Android-based color blind test application using the Ishihara method which later can be used as another alternative to simplify the color blind test procedure by using the Detection Color Blindnes application for prospective new students who will apply to the Faculty of Design and Creative Arts, the Faculty of Communication Sciences and The Faculty of Engineering is conducted on-site and the results can come out on-time.

Author Contributions

Sri Dianing Asri proposes the topic; Sri Dianing Asri, Adhitya Dwiki Darmawan, Novianti Putri Wibowo, Dimas Riyanto Wibowo conceived models and designed the experiments; Adhitya Dwiki Darmawan, Novianti Putri Wibowo, Dimas Riyanto Wibowo the design, coding and testing; Adhitya Dwiki Darmawan, Novianti Putri Wibowo, Dimas Riyanto Wibowo analysed the result.

Conflicts of Interest

The authors declare no conflict of interest.

References

A. Octaviano and A. Umbari. (2017). Application of the Ishihara Method to Detect Early Color Blindness Android based. *Pamulang University Journal of Informatics*, vol. 2, no. 1, p. 42. Available: 10.32493 / informatika.v2i1.1516.

Darmono. (2012). Genetic Toxicology: Effects, Causes and Consequences of Gangguan Descendants. Jakarta: University of Indonesia Press. pp. 127-130.

J. Neitz and M. Neitz. (2011). The Genetics of Normal and Defective Color Vision, *Vision Research*, vol. 51, no. 7, pp. 633-651. Available: 10.1016 / j.visres.2010.12.002.

Kartika, Kuntjoro. K, Yenni, and Halim. Y. (2014). Pathophysiology and Diagnosis of Color Blindness. *Mirror of the World Medicine-215.* vol. 41, no. 4, pp. 268-271.

LL Hakim and Supatman. (2017). Expert System for Color Blind Detection Using Neural Network Methods. Journal Multimedia & Artifical Intelligence, vol. I, pp. 27-35.

Mercubuana. (2020). About UMB | Mercu Buana University Jakarta. Mercubuana.ac.id.[Online].Available:

https://www.mercubuana.ac.id/id/profile. [Accessed: 25- May- 2020].

N. Hamid and A. Kusworo. (2015). Determining The Level Of Color Blinding With The Fuzzy Color Segmentation Method and Rule-Based Forward Chaining In Ishihara Image. *Youngster Physics Journal*, vol. 4, no. 2, pp. 212-213.

R. Dhika, E. Ernawati and D. Andreswari. (2014). Blind Color Test Application with Method Ishihara On Android Smartphone. *Pseudocode*, vol. 1, no. 1, pp. 51-59. Available:10.33369 / pseudocode.1.1.51-59.

R. Sahara and I. Ranggadara. (2018. Design and Implementation of Treasury Application Based on Mobile in Student Organization Mercu Buana University. International Journal of Computer Science and Mobile Computing, vol. 7, no. 2, pp. 1-8.