



Android Smartphone Based Color Analysis Using The Colorimeter Application On The 2023 Polymedia Calendar

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ABSTRAK

Berkembangnya teknologi pada android menjadi sebuah smart phone yang dapat diakses dalam genggam. Begitupun dalam pengukuran warna suatu gambar dengan mudah dengan aplikasi colorimetri pada android telephone pintar. Dalam pengukuran colorimetri ini menggunakan studi kasus kalender Polimedia tahun 2023. Prinsip kerja kolorimeter adalah mengukur warna obyek melalui tiga komponen, yaitu sumber pencahayaan, filter cahaya dan detektor fotoelektrik. Setiap warna memiliki nilai tristimulus sendiri yang membedakannya dari warna lain. Kolorimeter memberikan pengukuran yang dapat dikorelasikan dengan persepsi mata-otak manusia dan memberikan nilai tristimulus (L, a, dan b) secara langsung. Penerapan metode colorimetri untuk mendeteksi warna dominan sebuah gambar, cukup cepat dalam pendeteksiannya. Terdiri dari warna Red, Green, dan Blue (RGB). Secara garis besar, terdapat 3 warna yang digunakan kalender Polimedia tahun 2023, yaitu scarlet violet (R:57; G: 41; B: 103), silver (R: 189 G: 192 B: 199), (R: 185 G: 188 B: 203), (R: 190 G: 197 B: 215), (R: 185 G: 191 B: 205), (R: 190 G: 198 B: 211), (R: 193 G: 197 B: 209), Light Steel Blue (R: 190 G: 197 B: 215), (R: 190 G: 197 B: 215), (R: 185 G: 190 B: 209), (R: 192 G: 199 B: 217), (R: 187 G: 194 B: 212), (R: 190 G: 195 B: 214). Secara keseluruhan, tampilan kalender Polimedia tahun 2023 harmonis dan

seimbang. Terjadi tumpang tindih antara elemen desain namun tidak memberikan gangguan yang berarti. Tipografi memiliki legibility yang tinggi.

ABSTRACT

The development of technology on Android has become a smart phone that can be accessed in the palm of your hand. Likewise in measuring the color of an image easily with the colorimetry application on an Android smartphone. In this colorimetric measurement using the Polimedia calendar case study for 2023. The working principle of the colorimeter is to measure the color of an object through three components, namely a light source, a light filter and a photoelectric detector. Each color has its own tristimulus value that distinguishes it from other colors. The colorimeter provides measurements that can be correlated with human eye-brain perception and provides real-time tristimulus (L, a, and b) values. The application of the colorimetry method to detect the dominant color of an image is quite fast in its detection. Consists of the colors Red, Green, and Blue (RGB). Broadly speaking, there are 3 colors used in the Polimedia calendar for 2023, namely scarlet violet (R: 57; G: 41; B: 103), silver (R: 189 G: 192 B: 199), (R: 185 G: 188 B: 203), (R: 190 G: 197 B: 215), (R: 185 G: 191 B: 205), (R: 190 G: 198 B: 211), (R: 193 G: 197 B: 209), Light Steel Blue (R: 190 G: 197 B: 215), (R: 190 G: 197 B: 215), (R: 185 G: 190 B: 209), (R: 192 G: 199 B: 217), (R: 187 G: 194 B: 212), (R: 190 G: 195 B: 214). Overall, the appearance of the 2023 Polimedia calendar is harmonious and balanced. There is overlap between design elements but does not provide significant interference. Typography has high legibility.

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1. INTRODUCTION

The development of science and technology in modern times, such as today, can be said to have developed very rapidly. Modern technology can be utilized by humans to help work or activities become easier and faster. An example of the use of technological developments, namely applications to make it easier for people to recognize various colors around them, these applications can also be used as media that can be used by people whose professions are directly related to color such as those in the fields of graphic design, designers, architects, and so on (Amrullah et al., 2022).

Android is an operating system embedded in gadgets, be it mobile phones, tabs, and now it has also penetrated into digital cameras and watches. For more practical needs, these tabs and smart phones can replace the role of a laptop (Junianto & Zuhdi, 2018).

Color was chosen as the object of analysis because color has an important and crucial role in a design. This is because color is the first thing the audience sees and is the easiest to remember. Color Basically, color is a wave of light. These waves are captured by the eye and translated by the brain as color. Color has an important role in a design. To study it, color is divided subjectively, based on its formation, combination, and function (Tansel et al., 2022).

Smartphone camera technology that is increasingly accurate and easy to operate has the potential to measure color. This study aims to evaluate the use of Android smartphone cameras in measuring color changes. The color values of L^* , a^* , and b^* from colorimetry are compared with the color values of R' , G' , and B' camera. Smartphone technology equipped with high-performance cameras and sensors has developed rapidly so that it has the potential to be an alternative to measuring color. With the support of the colorimeter application, measuring calendar color with the colorimeter application on a smartphone is more practical, cheap and fast. In previous studies, smartphone-based color analysis has been applied in the analysis of fluorine concentration in water, glutamate compounds in instant soup, peanut allergens in food, color grading in red wine merah (Kristanoko et al., 2021).

One technology that provides a solution to dealing with this problem is the colorimeter application available in smartphone features. The colorimeter application can be used for color analysis based on the colorimetric analysis method, the colorimeter application also utilizes a colored sample in determining the color content contained in it using the principle of measuring RGB (Red, Green, Blue) values. Based on the description above, researchers are interested in detecting Android-based colors with a colorimeter application implemented on an Android-based smartphone so that its use is easier and in real time.

2. METHOD

The method used is the colorimetry method where this method is used as a color parameter in the sample. The working principle of colorimetry is to measure the color of an object through three components, namely a lighting source, a light filter and a photoelectric detector. Each color has its own tristimulus value that distinguishes it from other colors. Colorimetry provides measurements that can be correlated with human eye-brain perception and provides tristimulus values (L, a, and b) directly.

3. RESULT AND DISCUSSION

Result

Needs Analysis

This color analysis requires some supporting equipment consisting of hardware and software. The hardware needed in designing this application is: Android Smartphone

The specifications of the Android smartphone are:

Device Name: Infinix Note 11

Android Version: 11

CPU: Helio G88

RAM: 6 GB + 3 GB FusiMem

ROM: 128 GB

XOS Version: XOS V10.0.0

Rear camera: 50 M Triple Camera

Front camera: 16 M

While the software needed in designing this application is:

Application : Colorimetry

Version : 1.6.6.6

Color Measurement

The first stage of the study was to determine the color value (R', G', or B') from the smartphone camera that gave the highest correlation to the measurement using a colorimeter. At this stage, the sample used was the 2023 Polimedia calendar. For this purpose, a special Android-based application was developed for this study so that the R', G', and B' values from the sample and reference could be directly obtained in the specified area.

The 2023 Polimedia calendar uses an additive system consisting of the colors Red, Green, and Blue (RGB). This is because it is generally displayed on light-based LED screen media. RGB capacity can affect color identity. The appearance of the colorimeter application in determining RGB values can be seen in the image:

a. Calendar Cover

R: 57 G: 41 B: 103

CIE L: 21.7 a: 23.9 b: -34.1

HEX: #392967

HUE: 255.5 Chroma: 41.62

ΔE : 46.94



Figure 1. Colorimeter Measurement Results On Calendar Cover

b. January Calendar

R: 189 G: 192 B: 199

CIE L: 77.7 a: 0.3 b: -3.9

HEX : #bdc0c7

HUE : 222 Chroma : 3.89

ΔE : 77.76



Figure 2. Colorimeter Measurement Results on the January Calendar

c. February Calendar

R: 185 G: 188 B: 203

CIE L: 76,4 a: 1,9 b: -7,9
HEX : b9bccb
HUE : 230 Chroma : 8,12
 ΔE : 4,49

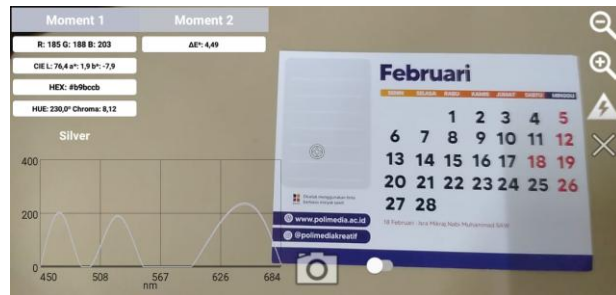


Figure 3. Colorimeter Measurement Results on the February Calendar

d. March Calendar

R: 190 G: 197 B: 215
CIE L: 79,5 a: 1,1 b: -9,8
HEX : bec5d7
HUE : 223,2 Chroma : 9,86
 ΔE : 3,67

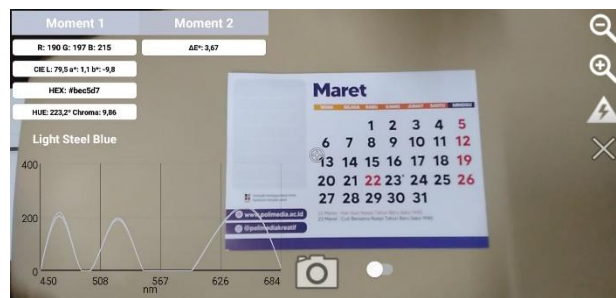


Figure 4. Colorimeter Measurement Results on the March Calendar

e. April Calendar

R: 190 G: 196 B: 212
CIE L: 79,1 a: 1,1 b: -8,7
HEX : bec4d4
HUE : 223,6 Chroma : 8,76
 ΔE : 79,63

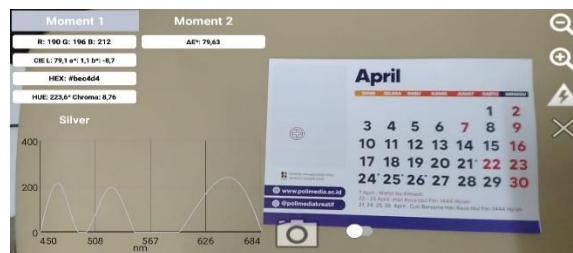


Figure 5. Colorimeter Measurement Results on the April Calendar

f. May Calendar

R: 190 G: 197 B: 215
CIE L: 79,5 a: 1,1 b:-9,8
HEX : bec5d7
HUE : 223,2 Chroma : 9,86
 ΔE : 80,10

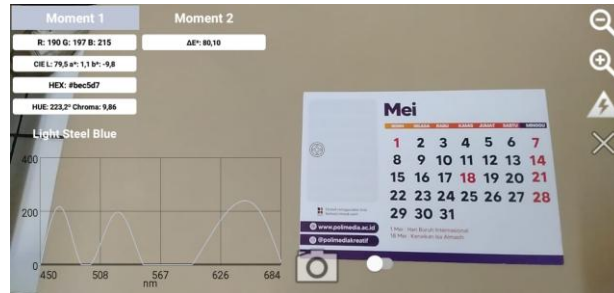


Figure 6. Colorimeter Measurement Results on the May Calendar

g. June Calendar

R: 185 G: 190 B: 209
CIE L: 77,1 a: 2 b:-10,1
HEX : b9bed1
HUE : 227,5 Chroma: 10,32
 ΔE : 2,54

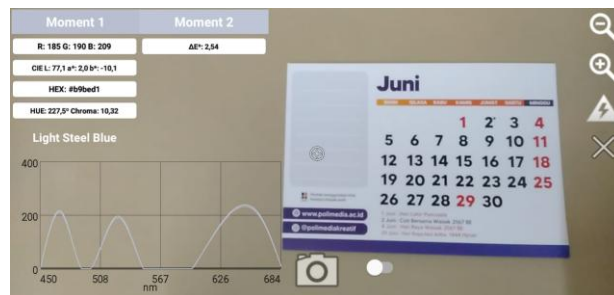


Figure 7. Colorimeter Measurement Results on the June Calendar

h. July Calendar

R: 185 G: 191 B: 205
CIE L: 77,3 a: 0,7 b: -7,7
HEX : b9bfcd
HUE : 222 Chroma : 7,77
 ΔE : 0,93

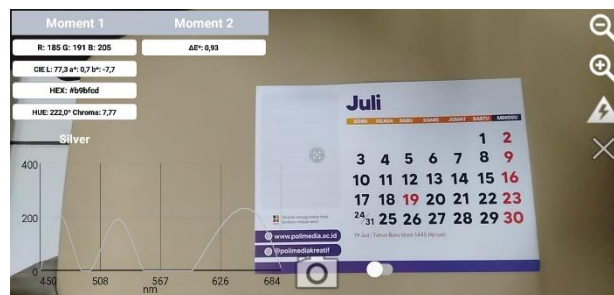


Figure 8. Colorimeter Measurement Results on the July Calendar

i. August Calendar

R: 190 G: 198 B: 211
CIE L: 79,6 a: -0,2 b: -7,4
HEX : #bec6d3
HUE : 217,1 Chroma : 7,43
 ΔE : 1,87

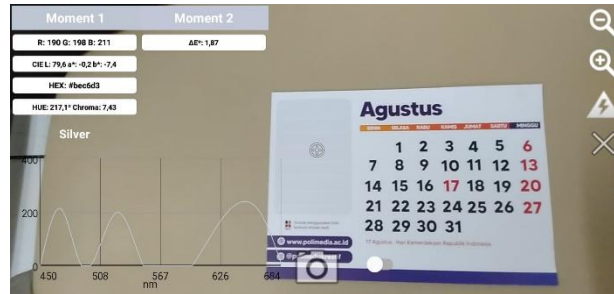


Figure 9. Colorimeter Measurement Results on the August Calendar

j. September Calendar

R: 193 G: 197 B: 209
CIE L: 79,5 a: 0,9 b: -6,5
HEX : #c1c5d1
HUE : 225 Chroma : 6,53
 ΔE : 4,51

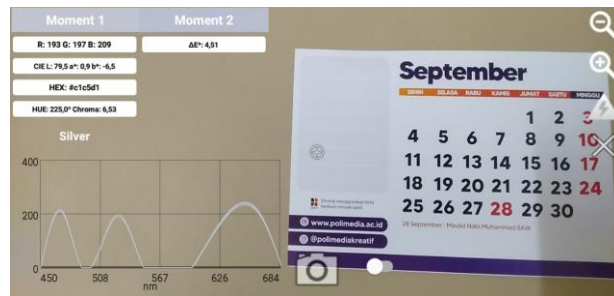


Figure 10. Colorimeter Measurement Results on the September Calendar

k. October Calendar

R: 192 G: 199 B: 217
CIE L: 80,2 a: 1,1 b: -9,8
HEX : #c0c7d9
HUE : 223,2 Chroma : 9,84
 ΔE : 2,13



Figure 11. Colorimeter Measurement Results on the October Calendar

I. November Calendar

R: 187 G: 194 B: 212
CIE L: 78,4 a: 1,2 b: -9,8
HEX : #bbc2d4
HUE : 223,2 Chroma : 9,89
 ΔE : 1,81



Figure 12. Colorimeter Measurement Results on the November Calendar

m. December Calendar

R: 190 G: 195 B: 214
CIE L: 78,9 a: 2 b: -10,1
HEX : #bec3d6
HUE : 227,5 Chroma : 10,27
 ΔE : 1,04



Figure 13. Colorimeter Measurement Results on the December Calendar

Discussion

The purpose of grouping using $L^*a^*b^*$ color space segmentation is to identify color content digitally. The CIELAB color space expresses color as three numeric values, L^* for light level and a^* and b^* for green-red and blue-yellow components. The identity of a color is determined by the wavelength of light, the wavelength of color that can still be captured by the human eye ranges from 380-780 nanometers. There are 12 types of colors produced in the color wheel, namely red, yellow, green, cyan, blue, magenta, with all intermediate colors (the last is the color between magenta and red). The partitioning process is carried out by converting and transforming the image color space from RGB to XYZ. Furthermore, the results of the RGB color values are used as values to calculate the values of L , a^* and b^* (Sinaga, 2019).

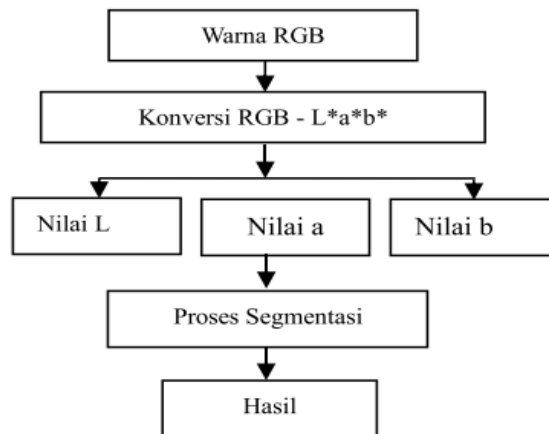


Figure 14. Color Segmentation
(source : Sinaga, 2019)

The application of the colorimetry method to detect the dominant color of an image is quite fast in its detection. Consisting of Red, Green, and Blue (RGB). In general, there are 3 colors used in the 2023 Polimedia calendar, namely scarlet violet (R: 57; G: 41; B: 103), silver (R: 189 G: 192 B: 199), (R: 185 G: 188 B: 203), (R: 190 G: 197 B: 215), (R: 185 G: 191 B: 205), (R: 190 G: 198 B: 211), (R: 193 G: 197 B: 209), Light Steel Blue (R: 190 G: 197 B: 215), (R: 190 G: 197 B: 215), (R: 185 G: 190 B: 209), (R: 192 G: 199 B: 217), (R: 187 G: 194 B: 212), (R: 190 G: 195 B: 214). Overall, the appearance of the Polimedia 2023 calendar is harmonious and balanced. There is overlap between design elements but it does not cause significant interference. Typography has high legibility.

4. CONCLUSION

The application of the colorimetry method to detect the dominant color of an image is quite fast in its detection. Consisting of Red, Green, and Blue (RGB). Broadly speaking, there are 3 colors used in the 2023 Polimedia calendar, namely scarlet violet, silver and light steel blue. Overall, the appearance of the 2023 Polimedia calendar is harmonious and balanced. There is an overlap between design elements but does not cause significant interference. Typography has high legibility. Based on the research that has been done, in the future color analysis can be explored from various aspects not only calendars, not only in terms of color but also wavelength. This is so that the analysis is more detailed, in-depth, and comprehensive. For further researchers, researchers can further develop this research from a different perspective. Researchers can use surveys to consumers such as the environment of Polimedia employees and students themselves.

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