International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 06 Issue: 04 | Apr 2019 www.irjet.net p-ISSN: 2395-0072

Design and Deployment of an Online Shopping Portal for the Color Blind People

Mr. Akshay Wankhade[1], Prof. Pramila M. Chawan[2]

[1]M.Tech Student, Dept of Computer Engineering and IT, VJTI College, Mumbai, Maharashtra, India
[2]Associate Professor, Dept of Computer Engineering and IT, VJTI College, Mumbai, Maharashtra, India

---

Abstract – *It is my attempt to make an online shopping portal for color blind persons to help them in discerning colors, and to provide assistance for an interactive shopping experience.*

The incentive behind this effort is to significantly reduce the difficulties faced by a color blind person while shopping online.To reduce said difficulties, we designed a color detection algorithm for an online shopping portal which is developed with help of PHP. Upon visiting the website, the user has a provision to take a color blindness test. The method of testing we have used is the famous ISHIHARA Test. The ISHIHARA Test will allow us to determine whether the user is a deutan, protan or tritan. This e-commerce website is not only limited to color blind persons, but also to persons with normal vision.

Key Words: e-commerce, color blindness, Ishihara test, server-database implementation.

1. INTRODUCTION

Online shopping is the place where transactions are carried out with the help of the Internet. E-commerce sites have an interactive graphical user interface so normal people can buy products easily. Here a problem arises for color blind persons. Color blindness is the lack of ability to distinguish between certain colors. Due to this color vision deficiency, 8% of men i.e. 1 out of 12 men are affected by this unfortunate condition. But in case of women, there is a different ratio: 0.5%i.e. 1 out of 200 women are affected with this color vision deficiency. Perhaps this problem can be mitigated. Color identification is the main aspect which is responsible for the recognition of items and the satisfaction of the user.

So here, we have designed an online fashion store, where we can view and purchase a wide variety of apparels and accessories. If an user likes the product from the website, he or she can add it to their shopping cart. After checkout the product will be delivered to the doorstep through logistics. When a color blind person tries to buy a product from this website, he or she finds difficulty while identifying the actual color of the product. To overcome this problem, we have introduced a module name 'EYE TEST' where anyone can go and determine their type of color deficiency with the help of the famous ISHIHARA Test.

The Ishihara test was initially designed by Dr. Shinobu Ishihara, a professor from the University of Tokyo, first published the test in 1917. The tests consist of several colored plates, each plate consisting of numerous colored dots; within the pattern a few dots compromise to make an identifiable number or figure. It is expected for a person with normal vision to be able to identify all figures or numbers in all the colored plates.

Another similar test is the REVERSE ISHIHARA TEST. In the REVERSE ISHIHARA TEST, the patterns within the dots which make identifiable numbers or figures is only distinguishable by only color blind persons.

As per the biological convention, the process in which retina absorbs electromagnetic radiation absorbs particular range of colors and transform them into a nervous electrical signal is called as visual perception and these electrical signals are transported to the brain through the optical nerves.

Color blindness is a hereditary disease which causes a person to unable to distinguish colors. The Ishihara test helps to diagnose dichromacy color deficiency effectively. It helps to identify 2 types of dichromacy:

- Protanomaly (weakness or deficit in the red)
- Deuteranomaly (weakness or deficit in the green)

1.1 LITERATURE REVIEW

Before beginning this endeavor, we studied a few works of different authors; to learn from them and to gain abstract inspiration.

In 1949, Color arrangement tests which is also referred to as "Farnsworth-Munsell 100 HueColor Vision Test" It is a test used for hue discrimination. Where we have aimed to arrange all the colors in color plates in correct order.

Pseudo-Isochromatic Test; in 1950, the first test introduced which is very reliable to find exact diagnosis of color vision deficiency whether the person is deutan, protan, or tritan. Also, pseudo-isochromatic tests have certain subtypes. Which are:

- Ishihara Test: It is the most famous and easy method to find dichrome color blindness with the help of dotted color plates. In such plates, a number is hidden with a slightly different shade of colored dots.

- HRR Pseudo-Isochromatic Plates: It stands for Hardy-Rand-Rittler. It contains shapes in different shades of dots like Ishihara. But we find that it is quite difficult.

By comparing and evaluating both of these alternatives available to us, we decided to use Ishihara which is faster and better for the purpose of our e-commerce module.

In the technical perspective, we used XAMPP as a server where all back-end processes are taken care of, including the database. It proved to be fast and secure for implementing a large database.

2. IMPLEMENTATION

Design and coding our e-commerce website will be done through Adobe Dreamweaver Software, which provide all required libraries and simple API for making a website. I will built and designe the web pages and graphical user interface in PHP language, since it is a lightweight language, and works significantly faster in any given network. Also, the user interface made from PHP is 'responsive', that is to say, it can adjust it's scaling dynamically according to your screen resolution. Different effects can be applied to the website like, for instance: auto scrolling, image fading, image magnification when mouse over event is detected.

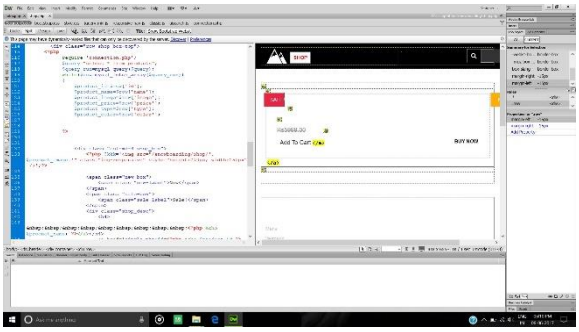

Figure -1: Dream Viewer user interface

Also, we have designed an eye test module which contains Ishihara test which gives diagnosis based on the result. The color plates to be used in the Ishihara test were pre-categorized depending on the different diagnosis possible. This simplifies the algorithm to determine the color deficiency type of the user.

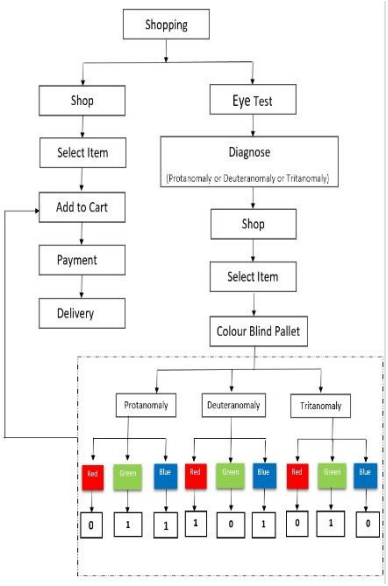

Fig -2: Flow of mobile shopping

Upon acquiring the diagnosis result, when we go for shopping and select any specific product, the website recognizes the colors in the product and conveys them with their enhanced color preview, which tried to enforce the wavelength of color, which is in reality not absorbed by the colorblind user's retina. For example, for a protan, the website enhances the preview color by increasing the red values of the hexadecimal color code. It also provides a diminished preview for normal color sighted users, to gain an idea of how it would look for a colorblind individual.

- 0 + G + B = Protan.
- R + 0 + B = Deutan
- 0 + G + 0 =Tritan (which is significantly rare)

2.1 RESULT

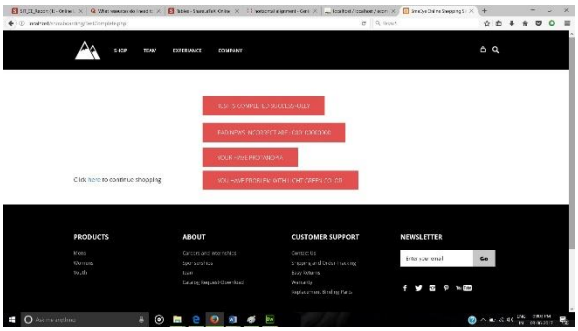

Fig -3: Result of Eye test module

Here we diagnosed the color blindness type with our Eye Test module by using ISHIHARA test.

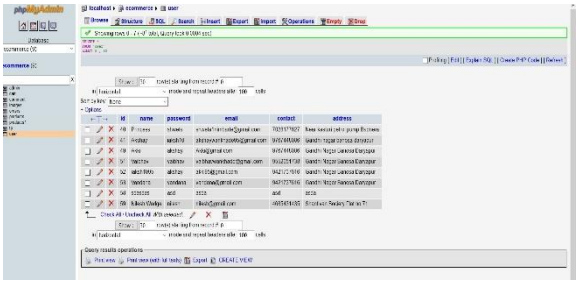

Fig -3: My SQL Database

Fig -3: Diagnosed Color Palette

3. FUTURE SCOPE

Our future scope involves expanding the operation and quality to accommodate a larger customer base. It would mean scaling the database and also upgrading the respective servers. Another feature to explore would be a smart personal assistant; it would identity patterns in the user's interests using machine learning and artificial intelligence. This would be a cornerstone is smart suggestion to the user; suggestions of style and apparels.

Another future objective intent is to expand to the smart-phone platform. We have plans to expand the e-commerce portal into the Android and iOS platforms. Data sharing and interoperability between these platforms is required to have sync between the carts the user wishes to maintain across the various devices at his disposal, but within his account. This data-interchange can be implemented using JSON.

The color enhancement feature for color blind users must not be limited to e-commerce, but rather must expand to other applications as well; to bring confidence to the color blind, and bring to them what they could not reach before.

3. CONCLUSION

This paper introduces a new way of shopping experience for a color blind person. So they can go and check whether they have one of the mentioned conditions, with the help of the Ishihara test. After the testing is done, while shopping, they are provided with a color palette of diminished colors and enhanced colors as per their diagnosed condition. Thus, here, we have improvised and modified the shopping experience and reduce the trials faced by color blind individuals. Also we use a flat and responsive graphical user interface for this web application which requires a lot less time and data to load over the Internet. Furthermore, this website is highly interactive and responsive as to even dynamically scale itself to the user's screen resolution. By adding such aforementioned extra features in our e-commerce website, we try to overcome the flaws of any generic online fashion store regarding color blind persons.

REFERENCES

[1] Bhagya R Navada, Santhosh K, Prajwal S, Harikishan B Shetty, "An Image Processing Technique for Color Detection and Distinguish Patterns with Similar Color: An aid for Color Blind People," Proceedings of International Conference on Circuits, Communication, Control and Computing (I4C 2014).

[2] Orazio Gambino1, Ester Minafo, Roberto Pirrone & Edoardo Ardizzone, "A Tunable Digital Ishihara Plate for Pre-School Aged Children," Proceedings of International Conference on Circuits, Communication, Control and Computing (I4C 2014).

[3] About the XAMPP project, https://www.apachefriends.org/about.html

[4] Hideaki Orii, Hideaki Kawano, Hiroshi Maeda and Takaharu Kouda,, "Color Conversion Algorithm for Color Blindness using Self-Organizing Map," 978-1-4799-5955-6/14©2014 IEEE.

[5] S Poret, R D Dony, S Gregori, "Image Processing for Colour Blindness Correction," 978-1-4244-3878-5/09©2009 IEEE.

[6] Ingeborg Schmidt, "Effect of Illumination in Testing Color Vision with Pseudo-Isochromatic Plates," Journal of the optical society of America volume 42,number 12 December 1952.

[7] Rodney d. steinmetz, m.d., and Thomas p. kearns , m.d., "H-R-R PSEUDO-ISOCHROMATIC PLATES*," Section of Ophthalmology, Mayo Clinic, and the Mayo Foundation. The Mayo Foundation is a part of the Graduate School of the University of Minnesota.

[8] http://www.eyequant.com/blog/2013/07/02/108-million-web-users-are-color-blind-how-do-they-see-your-website.

BIOGRAPHIES

Mr. Akshay A. Wankhade
Mtech Student, Dept. Of Computer Engineering and IT,VJTI College, Mumbai, Maharashtra, India

Prof. Pramila M. Chawan
Associate Prof, Dept. Of Computer Engineering and IT,VJTI College, Mumbai, Maharashtra, India