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Mobile solution for color blindness - An application of image processing

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Color blindness is a deficiency of color vision which mostly appear as a genetic problem. Due to presence of color blindness, human eye becomes unable to differentiate colors from other colors. People who suffer from the color blindness fully or partially have trouble in differentiating certain colors, but the severity of the color deficiency is varying. Sometimes damage of an eye or disorder of eye and brain are also cause to color blindness. The people suffers from color blindness wear suitable spectacles to overcome the deficiency. There are some scientific studies currently going on to address this problem. They can be classified as computer aided solutions and non-computer aided solutions. On the non-computer aided side, there is just one technique used: colored filters. These filters come in different forms such as Lenses, Glasses, etc. In the Computer aided side, there are different tools available such as Ishihara Test, Farnsworth Lantern Test. In the modern world, people always carry many smart solutions with their mobile phones in their hands and many services available to them with a single touch. For example, weather information, train time table, alerts about important meetings etc. By following a design science research methodology, this research is to study the techniques for color blindness and, implement an algorithm to detect the color ranges using Convolution matrix. The main artifacts are algorithm and mobile application. The results are twofold. On one hand, the proposed solution is very useful for those who don't like to wear spectacles or if they forget to bring the spectacles every time. On the other hand, there are some people who are still not aware about their color blindness. For them, the mobile application can be used to identify their color blindness. Images are captured using the camera of the mobile phone and they are matched with the RGB range for colorblindness. Basically image processing techniques are used to implement the solution. The Convolution Matrix class is used to sharpening the image when mapping. This mobile application has facilities to check the different colorblindness and also a test for colorblindness. The proposed solution is validated with a sample of 25 users.

Keywords: Color blindness, Convolution matrix, image processing