

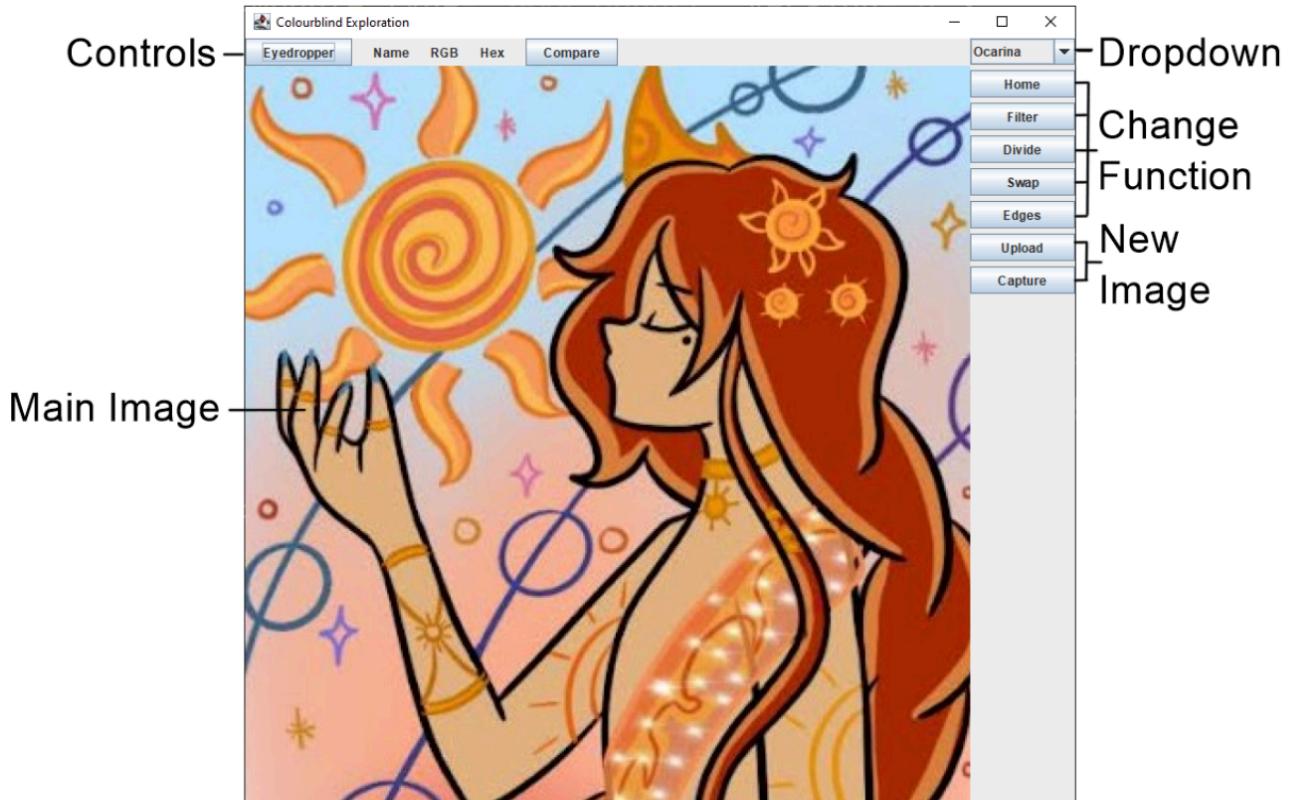
# An Exploration into Colour Blindness via Image Transformation

This desktop application is designed to grant colour blind individuals the opportunity to manipulate the colour and appearance of digital images to better view images they would have otherwise struggled to discern and make out fine details of due to their condition. In addition, they may investigate how their condition affects them and how their vision differs from that of a regular person.

# 1 - User Guide

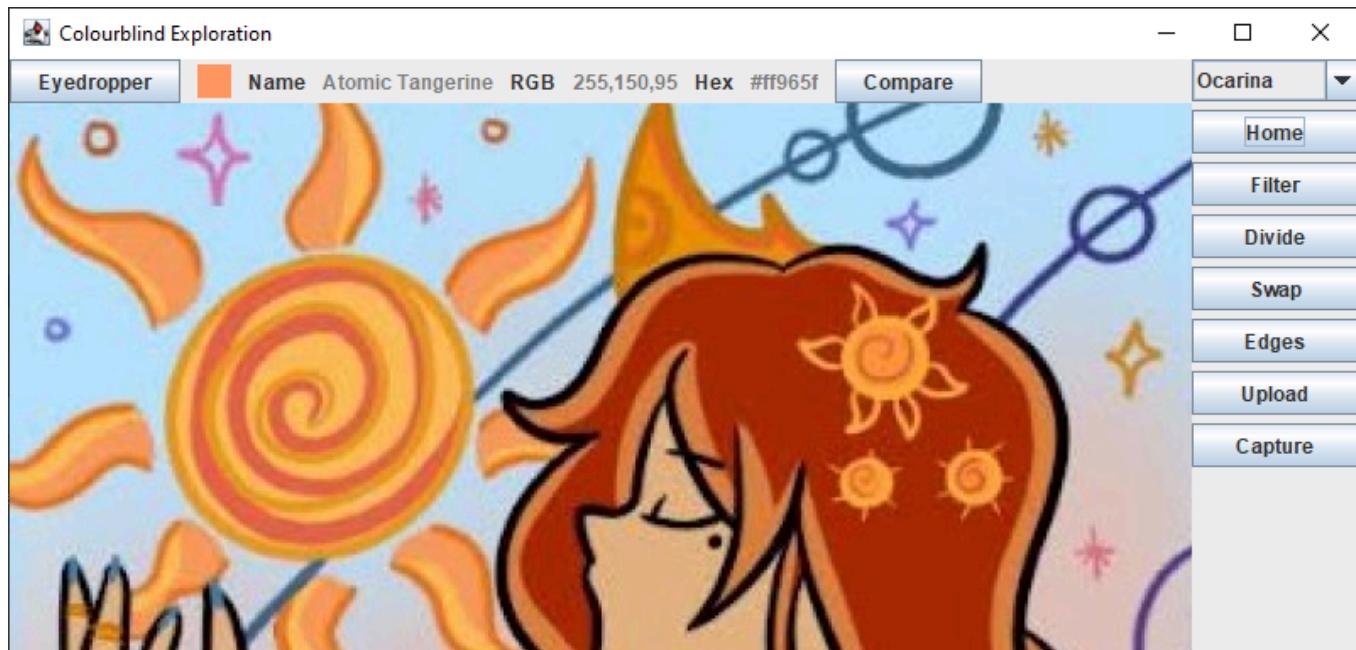
## 1.1 - Basic Layout

The user interface surrounds the central image to be processed. The Nav Bar to the right contains the main controls of the application. The Dropdown allows you to change the image to one from the pre-loaded set whilst upload and capture both add new images. The remaining 5 buttons are all to switch the current function. Each button changes the control panel (top) to provide access to the sliders, checkboxes and buttons required for the new function.

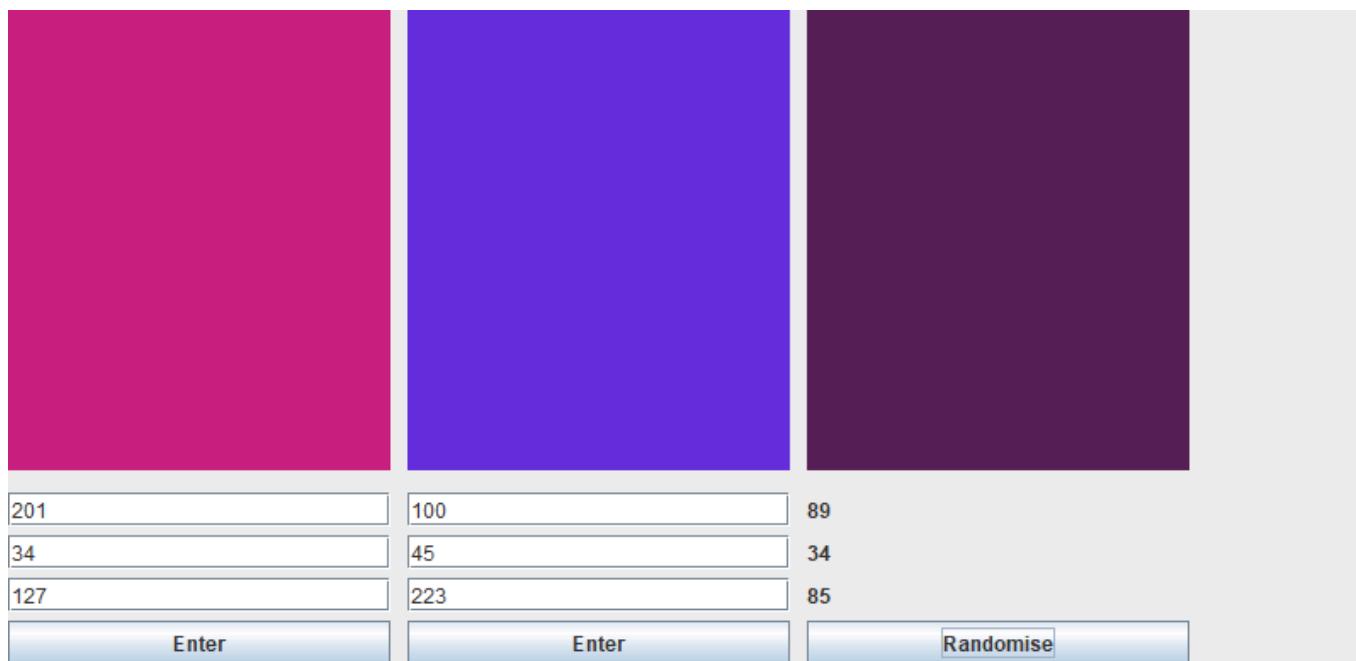


## 1.2 - Home

The homepage serves as the frontpage of the application. Here you can view unaltered images and use the eyedropper tool to select colours from that image. Learning their name, RGB and Hex value.



From the home page the compare page can be accessed. Two colours can be input into the left and middle column, once complete the Randomise button generates a new colour in the right column with the same colour difference between right and middle as middle and left.



## 1.3 - Colour Filter

The filter function serves to isolate specific colours from an image and return what remains in greyscale. By performing this transformation it may aid a colour blind person to visualise which parts of an image contain chosen colours and to what degree.



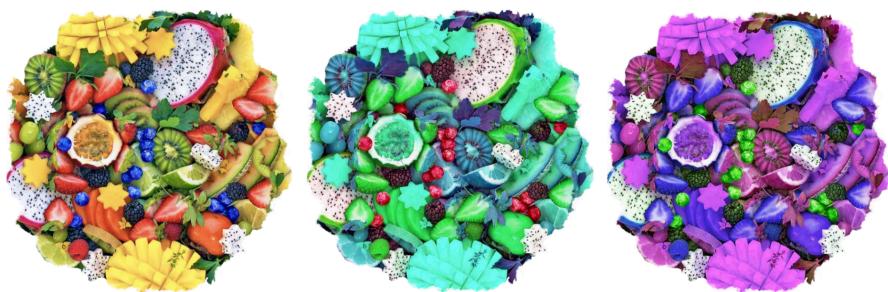
## 1.4 - Hue Division

The divide filter's purpose is to reduce the total amount of colours in an image by rounding them to an approximation (i.e. making blue's more blue or very light colours more white). This should separate colours which once appeared similar but appear on very different ends of the colour spectrum.



## 1.5 - Colour Swap

The swap filter works on a simple premise to swap colour channels (e.g. RGB → BRG). The theory being that if a person suffering from tritanopia struggles to differentiate colours in blue hues. By swapping them to red hues the individual will be able to perceive changes in colour they would have otherwise been unable to.



## 1.6 - Edge Detection

The edge detector is designed to superimpose artificial borders upon an image separating two adjacent “pseudo similar”\* colours.



\* “Pseudo Similar” refers to two colours which appear near identical to a colour blind individual but are in reality very different.

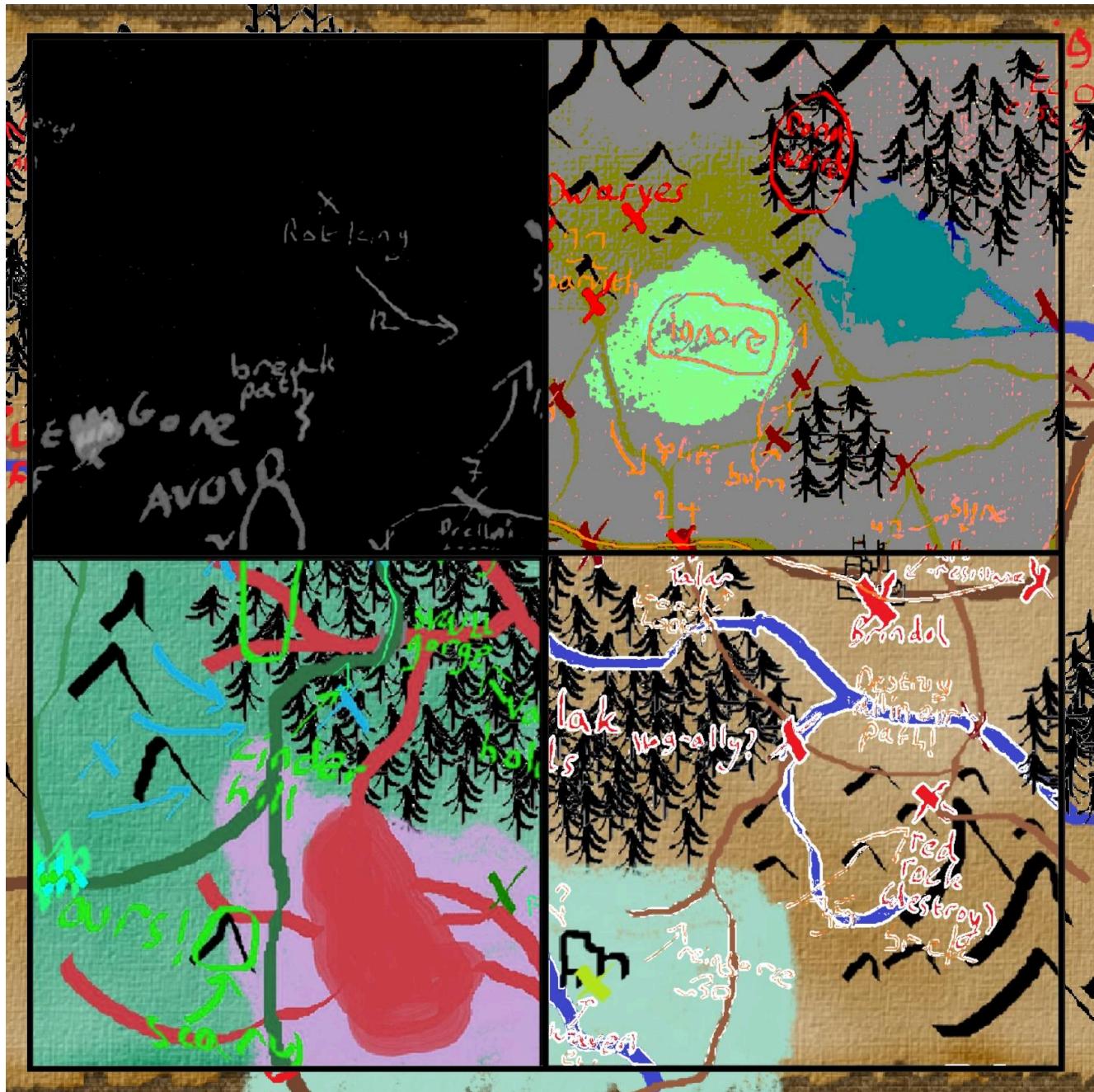
## 2 - Example

Each function in turn was applied to this image of a fantasy map to attempt to make the text easier to discern for a colour blind individual who is likely to struggle to differentiate the red/orange text from the brown background and black forests.

### 2.1 - Original Image



## 2.2 - Results



Top left = Colour Filter Top right = Hue Division  
Bottom left = Colour Swap Bottom right = Edge Detection.

## 3 - References

References for the externally sourced images found within src/files

1. **Colours** - Madalena. (2019). The Basic Principles of Web Design: The Colour Theory. Available at:  
<https://forum.freecodecamp.org/t/the-basic-principles-of-web-design-the-colour-theory/324464>  
(Accessed: 10/2/2024)
2. **Los Muertos, Pencils, Parrots** - Giedrė Vaičiulaitytė. (2017). *You'll Be Amazed How People With Color Blindness See The World (57 Pics)*. Available at:  
<https://www.boredpanda.com/different-types-color-blindness-photos/> (Accessed: 5/2/2024)
3. **Fruit** - Dee Dine. (2021). *How to eat the rainbow*. Available at:  
<https://greensmoothiegourmet.com/how-to-eat-the-rainbow/> (Accessed: 6/3/2024)
4. **Ishihara-color-blindness-test** - Webeyeclinic. (2018). *Color Blind Test*. Available at:  
<https://www.webeyeclinic.com/color-blind/color-blind-test> (Accessed 18/2/2024)