Master 1 IMAGINE Projet Image

Brian Delvigne Vincent Schmitt Groupe 5.1

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1 Start of the graphic application

We have started configuring the graphics application. The application is not yet aesthetic, we are focusing on the functionalities. How to use the application: Once finished, you should be able to load an image from your directories, then apply the settings you want like different tint values, and finally click on the transformation you want to apply. It would show the image when you load it and the transformed image to the right of it when you apply a transformation. This would allow seeing the edit live to make changes accurately. At the moment we can load the base image but we cannot yet load the transformed one. If possible we would like to not have to save the new image to files every time we make changes, which is why we cannot use the same function that we use to display the base image because she needs a way. We need to find a way to display it from an OCTET*, otherwise we will write it to the files

2 Alternative Color Mapping

Until now we always mapped each hue of a pixel to the closest hue of the color scheme. But as it can be seen in Image 1, this leads to hard borders, where there is a border between two hues where in the image there is no border. This is especially strong in the sky of this image. To counter this problem we separated the color mapping from the color scheme. In the following we show two methods we implemented this week.

Figure 1: A photo transformed to a complimentary color scheme.

2.1 Hue offset

Apparently the problem is, that hues that lie close to each other get mapped to different hues. An easy way to manipulate the way colors get mapped is by adding an offset to each hue. In the color wheel this corresponds to turning the wheel by a certain degree. With this method one can try to manipulate the offset by hand, so that for example the whole sky gets mapped to the same hue. Images 2 and 3 show the image transformed with two different offsets. It can be seen that more pixels in the sky get mapped to the color yellow. But as can be seen in Image 3 the sky starts to get blue again in the bottom right before the top left has ever been yellow. This shows that the hues used in the sky use an interval of more than 180 degrees. So to fill the whole sky in one color, we need a nonlinear mapping function.

Figure 2: A photo transformed to a complimentary color scheme and an offset of 50.

Figure 3: A photo transformed to a complimentary color scheme and an offset of 100.

2.2 Histogram

The second method used a histogram and a clustering algorithm to find groups of the similar colors. At first a histogram of all the hues gets generated. Then the k-means algorithm tries to find clusters in this histogram. As k we select the number of colors in the color scheme. The algorithm also has to pay attention to the borders of the histogram, since the values wrap around at the borders, because the hue values are representing the color wheel. Each cluster is then assigned one color of the color scheme. So all the pixels in this cluster get colored in one the same hue.

The output of this function can be seen in image 4. It can be seen, that the sky is not colored in the same color, but the border is less noticable, because it lies directly on the border between the sky and the clouds.

An even better result can be seen when using this method on a triadic color scheme compared to the basic color mapping (Images 5 and 6). With the histogram method, the colors in the river are mapped a lot better.

The problem with this method is, that it does not consider the positioning of the pixels in the image and just assumes that similar colors are close to each other in the image. This is why this function does not generate a sky that is fully in one color.

Figure 4: A photo transformed to a complementary color scheme using the histogram method.

Figure 5: A photo transformed to a triadic color scheme using the basic method.

Figure 6: A photo transformed to a triadic color scheme using the histogram method.