

## Final Project – Colorization Using Optimization

Site: <https://www.cs.huji.ac.il/w~yweiss/Colorization/>

### The Goal

The goal of this project is to create a program that utilizes colorization via optimization. This is done from the premise of, “neighboring pixels in space-time that have similar intensities should have similar colors.”. This is implemented using a few functions that get neighboring pixels, calculate the weights needed, and colorize the pixels to get our output.

### The Functions

- `Idx_from_coord`
- `Adjacent_coords`
- `Transform_images`
- `Calculate_weights`
- `Populate`
- `Color_image`

The function, `Idx_from_coord`, is simple and just converts the coordinates given via parameters to the proper index using `m_dim`.

The function, `adjacent_coords`, find the proper adjacent coordinates to a point from the parameters inside of the dimensions.

The function, `transform_images`, converts the gray scale and scribble image given to the proper color space so that the rest of the program can work properly.

The function `calculate_weights`, calculates the weight for the given parameters and returns the normalized weights.

The function, `populate`, populates the matrix given as a parameter which is used later in the `color_images` function.

Finally the `color_image` function, is what will actually color the images given initially. After using the `transform_images` function so that we can properly start, we initialize the needed matrices and vectors, calls the `populate` function so that they aren't empty, and solve for the color channels, and combine them with the grayscale image to create the result of the colorized image.

The biggest issue I had while going about this was actually starting off since the directions weren't as simple as say a PA. But after some research and looking overs some other articles I ended up getting some headway and figuring out the rest piece by piece.

## Results

Images from the site



Tyler Roosth  
CSCE 448  
4/12/2023

The following are my own images



Tyler Roosth  
CSCE 448  
4/12/2023



This one ended up a little strange, but still worked out.

