



## Lab. Assignment #2

**Instructor:** Dr. Ha Viet Uyen Synh.

**Software:** Python, NumPy & OpenCV

### 1. Transformation

Load an image. Make a transformation matrix to

- Rotate the image  $45^\circ$  around the center point.
- Scale the image  $\frac{1}{2}$  about x-axis
- Reflect the image about y-axis

### 2. Sharpness

To sharpen an image, we can define a function such as

$$f_{sharp} = f(x, y) + k * g(x, y)$$

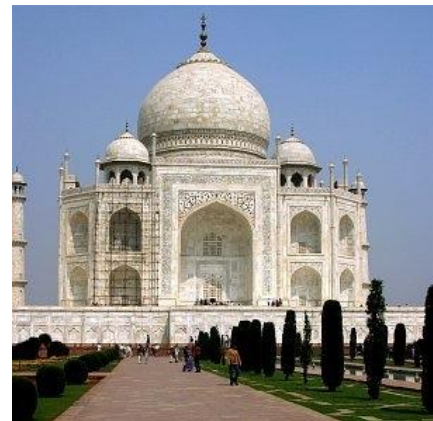
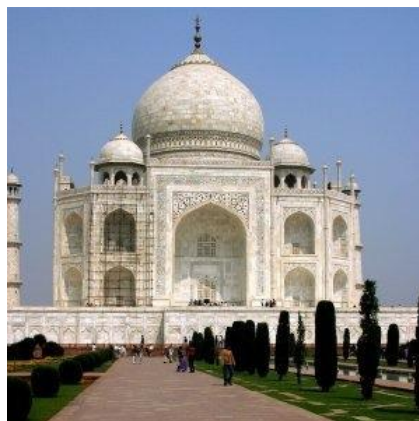
where  $k$  is a scaling constant. Reasonable values for  $k$  vary between 0.2 and 0.7, with the larger values providing increasing amounts of sharpening.

$$g(x, y) = f(x, y) - f_{smooth}(x, y)$$

where  $f_{smooth}(x, y)$  is a smoothed version of  $f(x, y)$  (Use the Gaussian Filter to smooth the image).

Build a program to implement the  $f_{sharp}(x, y)$ .

Example:

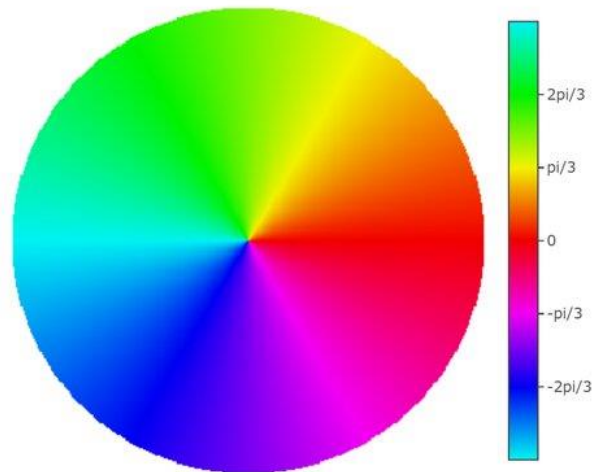


### 3. HSV color space

Build an HSV colormap in 2 forms such as the following image

Given an RGB image, show the H-channel of the image based on the colormap.

HSV colormap



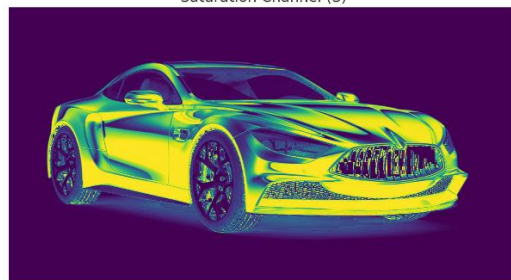
You can use the function `cv.cvtColor()` in the OpenCV library. (`cv.COLOR_BGR2HSV` flag)



Hue Channel (H)



Saturation Channel (S)



Value Channel (V)

