



Experiment No. 2
To Perform Image Processing with OpenCV3
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## **Aim: To Processing Image with OpenCV3**

**Objective:** To Conversion between different color spaces, The Fourier Transformation, high pass filter, Low pass filter

### **Theory:**

#### **Converting between different color spaces**

OpenCV implements literally hundreds of formulas that pertain to the conversion of color models. Some color models are commonly used by input devices such as cameras, while other models are commonly used for output devices such as televisions, computer displays, and printers. In between input and output, when we apply computer vision techniques to images, we will typically work with three kinds of color models: grayscale, blue-green-red (BGR), and hue-saturation-value (HSV)

#### **The Fourier Transformation**

OpenCV implements a number of algorithms that enable us to process images and make sense of the data contained in them, and these are also reimplemented in NumPy to make our life even easier. NumPy has a fast Fourier transform (FFT) package, which contains the `fft2` method. This method allows us to compute a discrete Fourier transform (DFT) of the image



## **High pass filter**

An HPF is a filter that examines a region of an image and boosts the intensity of certain pixels based on the difference in the intensity of the surrounding pixels.

A kernel is a set of weights that are applied to a region in a source image to generate a single pixel in the destination image. For example, if we call an OpenCV function with a parameter to specify a kernel size or ksize of 7, this implies that 49 ( $7 \times 7$ ) source pixels are considered when generating each destination pixel. We can think of a kernel as a piece of frosted glass moving over the source image and letting a diffused blend of the source's light pass through. The preceding kernel gives us the average difference in intensity between the central pixel and all its immediate horizontal neighbors. If a pixel stands out from the surrounding pixels, the resulting value will be high. This type of kernel represents a so-called high-boost filter, which is a type of HPF, and it is particularly effective in edge detection

## **Low pass Filter**

A LPF will smoothen the pixel if the difference from surrounding pixels is lower than a certain threshold. This is used in denoising and blurring. For example, one of the most popular blurring/smoothening filters, the Gaussian blur, is a low-pass filter that attenuates the intensity of high-frequency signals.



### **Conclusion:**

Image processing allows us to transform and manipulate thousands of images at a time and extract useful insights from them, OpenCV is a great tool for image processing and performing such computer vision tasks through which the concept of converting images between different color models, importance of frequencies and the Fourier transform in image processing, applying high pass filters and low pass filters was implemented