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

Converting between different color spaces is a fundamental technique in image processing and computer vision. Color spaces represent how colors are encoded and perceived, and converting between them is essential for tasks like color correction, image enhancement, and feature extraction.Different color spaces are : RGB,Grayscale,CMYK,HSV,HSL.

The Fourier Transformation

The Fourier Transformation is a mathematical technique used in signal processing and image analysis to decompose a complex signal or image into its constituent frequencies. It enables the analysis of the frequency components present in a signal, helping to uncover patterns, identify noise, and perform transformations. The transformation involves converting a signal from the time or spatial domain to the frequency domain, where it can be manipulated or analyzed more effectively.

High pass filter

A high-pass filter is a signal processing tool used to emphasize higher-frequency components in a signal while attenuating or removing lower-frequency components. It achieves this by allowing frequencies above a certain cutoff point to pass through while attenuating those below the cutoff. High-pass filters are commonly used to enhance edges and details in images, reduce low-frequency noise, and emphasize changes or variations in signal intensity.

Low pass Filter

A low-pass filter is a signal processing technique that allows lower-frequency components to pass through while attenuating or removing higher-frequency components. It achieves this by using a cutoff frequency to determine which frequencies are allowed to pass and which are attenuated. Low-pass filters are widely used for smoothing and noise reduction, as they help eliminate high-frequency noise while preserving the overall shape and trends of the signal.

Conclusion:

Converting between different color spaces: Converting between color spaces enables versatile image manipulation by revealing perceptual qualities and adjusting for specific tasks.It enhances image analysis and manipulation by allowing for targeted adjustments based on perceptual qualities.

The Fourier Transformation: The Fourier Transformation offers insight into signal frequency components, crucial for understanding patterns and transformations.

High pass filter: High-pass filters are powerful tools for emphasizing finer details or reducing noise, enhancing image quality and revealing essential features.

Low pass Filter :low-pass filters aid in improving image quality. low-pass filters can be used to blur images, reduce noise, and perform image smoothing, ultimately enhancing the quality and clarity of the data.