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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:

Color spaces are representations of colors in different ways, each serving a specific purpose. OpenCV allows us to convert between various color spaces, such as RGB, BGR, HSV, LAB, and more. Converting between color spaces is essential for tasks like color analysis, color correction, and object detection based on color information.

The Fourier Transformation:

The Fourier Transformation is a mathematical technique used in image processing to analyze the frequency components of an image. It decomposes an image into its constituent sinusoidal components, revealing patterns, textures, and other information. OpenCV provides functions like `cv2.dft()` to perform the Discrete

Fourier Transform (DFT) on images. Understanding the Fourier Transformation is crucial for applications like image filtering and feature extraction in the frequency domain.

High Pass Filter:

A high pass filter is an image processing technique that accentuates the high-frequency components in an image while suppressing the low-frequency ones. It is used for tasks like edge detection and enhancing fine details. OpenCV provides tools to create and apply high pass filters to images. Mastering high pass filtering is valuable for tasks requiring feature enhancement or edge detection.

Low Pass Filter:

Conversely, a low pass filter is an image processing technique that preserves the low-frequency components in an image while suppressing the high-frequency ones. It is useful for tasks like image smoothing, noise reduction, and blurring. OpenCV offers functions to create and apply low pass filters, which are fundamental for image preprocessing and noise reduction.

Conclusion:

In this experiment, we delved into essential image processing techniques using OpenCV3. We learned about converting between different color spaces, enabling us to work with color information in various representations. Additionally, we explored the Fourier Transformation, a powerful tool for analyzing image frequencies and patterns. We also covered high pass and low pass filters, which play crucial roles in enhancing features and reducing noise in images. These techniques are foundational for various image processing tasks, including image enhancement, feature extraction, and frequency-based analysis, and are valuable tools for computer vision applications.