Module 4 – Fundamentals of Image Processing - Overview

The next module is about the “**Fundamentals of Image Processing.**” I explored essential concepts and techniques in this module. Image processing involves manipulating and analyzing images to extract meaningful information. The key topics include understanding digital images through pixels, color models like RGB and HSV, and various image formats such as JPEG, PNG, BMP, and TIFF. I also learned image enhancement techniques like histogram equalization, smoothing, and sharpening, as well as segmentation methods such as thresholding and edge detection. I also covered image restoration techniques like noise reduction and deblurring. The portfolio highlights the use of powerful libraries like OpenCV and Pillow for implementing these techniques, offering a comprehensive guide to improving image quality and preparing images for further analysis in applications ranging from medical imaging to facial recognition and object detection. Here are some key points I learned during this module.

* **Understanding Digital Images**: Concepts of pixels, color models (RGB and HSV), and image formats (JPEG, PNG, BMP, TIFF).
* **Image Enhancement Techniques**: Methods like histogram equalization, smoothing, and sharpening to improve image quality.
* **Segmentation Methods**: Techniques such as thresholding and edge detection for dividing images into meaningful parts.
* **Image Restoration Techniques**: Approaches like noise reduction and deblurring to restore image clarity.
* **Practical Implementation**: Using libraries like OpenCV and Pillow to apply these image processing techniques.
* **Applications**: Improving image quality for further analysis in fields like medical imaging, facial recognition, and object detection.