Roadmap

Week 1 — Absolute Foundations

Goal: Learn how images, video streams, and colors work in OpenCV, and confidently perform basic image manipulation.

Day 1: Understanding the basics

- Be able to capture video from a camera

- Understand what a frame is

- Know how pixels and arrays represent images

- Display frames in color and in grayscale

Day 2: Understanding Video Streams in OpenCV

- Understand how frames are read from a camera

- Know what ret and frame mean

- Understand how OpenCV creates live video using frames

- Clearly know why while True is mandatory

Day 3: Controlling Playback & Exiting Video

- Understand how keyboard input is captured in OpenCV

- Know what cv2.waitKey() does and what it returns

- Understand ASCII values and why keys are represented as numbers

- Understand bitwise AND (&) and why 0xFF is used

- Implement a keyboard-controlled exit from a video loop

Day 4: Images as NumPy Arrays

- Understand images as NumPy arrays in OpenCV

- Read and display images using OpenCV

- Understand image shape, channels, and pixel values

- Differentiate between grayscale and color images

Day 5: Drawing on Images with OpenCV

- Draw **lines, rectangles, circles, and text** on images

- Control **color, thickness, and position** of drawings

- Modify an image array directly

Day 6: Image Resizing, Cropping, and Copying

- Resize images using OpenCV

- Crop images using array slicing

- Copy and modify image regions

- Understand how image dimensions change after resizing and cropping

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Day 7: Image Color Spaces

- Understand what a color space is

- Know the difference between BGR, Grayscale, and HSV

- Convert images between color spaces using OpenCV

- Understand when and why different color spaces are used

◇ **Week 2**

Day 8: Color Detection using HSV

- Detect a specific color in an image

- Use HSV ranges to isolate colors

- Create and apply masks

- Understand how color-based segmentation works

Day 9: Trackbars for real-time HSV tuning

- Create trackbars in OpenCV

- Adjust HSV values in real time

- Tune color detection interactively

- Understand how real-time parameter control works

Day 10: Color Detection in Live Video

- Capture live video from a webcam

- Apply HSV-based color detection on video frames

- Combine trackbars + video feed

- Perform real-time color segmentation

Day 11: Noise Removal & Morphological Operations

- Understand what **noise** is in images and masks

- Clean binary masks using **morphological operations**

- Use **erosion, dilation, opening, and closing**

- Improve color detection results

Day 12: Contour Detection

- Understand what contours are

- Detect contours from a binary image

- Filter contours by area

- Draw bounding boxes around detected objects

Day 13: Object Tracking Basics

- Track a colored object across video frames

- Use contours to find object position

- Identify the **largest object** of a given color

- Draw tracking visuals (center point, path)

Day 14: Hand / Gesture Detection (Color + Contours)

- Detect a **hand region** using color segmentation

- Use contours to isolate the hand

- Draw bounding boxes around the hand

- Understand the base of gesture recognition systems

◇ Week 3

Day 15:

Day 16:

Day 17:

Day 18:

Day 19:

Day 20:

Day 21:

◇ Week 4

Day 22:

Day 23:

Day 24:

Day 25:

Day 26:

Day 27:

Day 28:

Day 29:

Day 30: