**Color Detection using Computer Vision**

**Objective -** The primary objective of this project is to develop a computer vision system capable of detecting and identifying colors in real-time from digital images or video streams. This system can be applied in various fields such as robotics, object tracking, quality control in manufacturing, and assistive technologies for color-blind individuals.

**Methodology :**

1. **Image Acquisition**

* Capture input through a webcam or load static images.
* Convert the image to a suitable format (typically RGB or HSV).

**2) Preprocessing**

* Resize images if necessary.
* Apply noise reduction techniques (e.g., Gaussian blur).

**3) Color Space Conversion**

* Convert the image from RGB to HSV, as HSV is more effective for color segmentation due to better separation of chromatic content**.**

**4) Color Thresholding**

* Define HSV color ranges for each color to detect (e.g., red, blue, green, yellow).
* Apply cv2.inRange() (in OpenCV) to create masks for individual colors.

** 5) Mask Application and Contour Detection**

* Use the generated masks to extract color-specific regions.
* Apply contour detection to identify and localize colored objects in the image.

**6) Post-Processing and Output**

* Draw bounding boxes or labels around detected color areas.
* Display results via GUI or command line output.

**7) Evaluation (optional)**

* Assess accuracy by comparing detected colors with ground truth in a controlled dataset.

**Reference :**

* Bradski, G. (2000). *The OpenCV Library*. Dr. Dobb's Journal of Software Tools .
* Gonzalez, R. C., & Woods, R. E. (2018). *Digital Image Processing* (4th ed.). Pearson.
* Y. Boykov and M. Jolly, "Interactive graph cuts for optimal boundary & region segmentation of objects in ND images," in *Proceedings Eighth IEEE International Conference on Computer Vision*, 2001.

Group Member – E22CSEU0235 ( Rohan Singh )