



**SUPERIOR
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Section: BSAI-4A

Subject: Programming for Artificial
Intelligence

Lab Task: 5

Task 5 : OpenCV Implementations

This file primarily deals with OpenCV image processing techniques.

1. Libraries Used

- **cv2** for OpenCV operations.
- **numpy** for numerical computations.
- **matplotlib.pyplot** for visualization.
- **PIL (Pillow)** for image handling.
- **os** for file operations.
- **time** for handling delays.

2. Loading and Displaying an Image

- `cv2.imread()`: Reads an image.
- `cv2.imshow()`: Displays the image.
- `cv2.waitKey(0), cv2.destroyAllWindows()`: Waits for input and closes the window.

3. Reading an Image from a Specific Path

- Reads and displays an image from a user-defined location.

4. Converting an Image to Grayscale

- `cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)`: Converts color image to grayscale.

5. Saving an Image to a Specific Directory

- `cv2.imwrite('savedImage.jpg', img)`: Saves the image.

6. Image Blending (Merging Two Images)

- `cv2.addWeighted(img1, 0.5, img2, 0.5, 0)`: Merges two images with equal weights.

7. Resizing an Image

- `cv2.resize(img, (width, height))`: Resizes the image.

8. Image Thresholding

- `cv2.threshold(img, 127, 255, cv2.THRESH_BINARY)`: Converts an image to binary format.

9. Detecting Edges Using Canny Edge Detector

- `cv2.Canny(img, 100, 200)`: Detects edges in an image.

10. Rotating an Image

- `cv2.getRotationMatrix2D(), cv2.warpAffine()`: Rotates the image.

11. Drawing Shapes on an Image

- `cv2.rectangle(img, pt1, pt2, color, thickness)`: Draws a rectangle.
- `cv2.circle(img, center, radius, color, thickness)`: Draws a circle.

12. Writing Text on an Image

- `cv2.putText(img, text, position, font, scale, color, thickness)`: Adds text.

13. Capturing Video from a Webcam

- `cv2.VideoCapture(0)`: Captures video.
- `cap.read(), cv2.imshow()`: Reads and displays frames.

14. Checking for User Input Before Closing

- `cv2.waitKey(1)`: Waits for keypress in a loop.