



**CHARUSAT**  
CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY



## **Faculty of Technology and Engineering**

### **Department of Computer Science & Engineering**

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Date: 26/ 07 / 2023

#### **Practical List**

Academic Year	:	2023-24	Semester	:	7
Course code	:	CS474	Course name	:	IMAGE PROCESSING AND COMPUTER VISION

Sr. No.	Aim	Hrs.	CO
1.	Implement code to i. read an image, observe image as function along with its attributes, create a sample image and store it for grayscale images ii. read an image, observe image as function along with its attributes, split image in different color image planes, merge splitted image plane and observe effect on merged image by changing red, green and blue image plane values iii. convert color image to grayscale and HSV image and observe HSV values iv. create images of different shapes v. resize image with different types of interpolation	2	1,4
2.	Implement code to i. obtain negative of given images ii. perform contrast stretching on given images iii. perform thresholding on given images iv. perform Otsu's thresholding on given images v. perform log transformation on given images vi. perform gamma correction on given images	2	3,4
3.	Implement code to i. apply intensity slicing on given images ii. apply bit plane slicing on given images and observe information on different bit planes iii. calculate histograms on different contrast images. iv. apply normal histogram equalization and CLAHE histogram equalization on given images. v. apply histogram matching on given images	2	3,4
4.	Implement code to i. perform cross-correlation and convolution on images in spatial domain ii. apply smoothing spatial filters of different kernel sizes on images iii. apply sharpening spatial filters of different kernel sizes on images iv. apply non-linear spatial filters of different kernel sizes on images v. analyze noise removal with different smoothing spatial filters and non-linear filters vi. perform unsharp masking and high-boost filtering on different images	2	3,4

5.	<p>Implement code to</p> <ul style="list-style-type: none"> <li>i. convert images from space domain to frequency domain and observe their spectrum</li> <li>ii. observe aliasing in down-sampled images and apply anti-aliasing filter to reduce effect of aliasing</li> <li>iii. apply frequency domain low-pass filters of different types and cut-off frequencies on images and observe their effects</li> <li>iv. apply frequency domain high-pass filters of different types and cut-off frequencies on images and observe their effects</li> <li>v. add periodic noise on images in frequency domain, apply notch filters to remove noise and restore original image</li> </ul>	2	3,4
6.	<p>Implement code to detect</p> <ul style="list-style-type: none"> <li>i. edges in different images using laplacian operator</li> <li>ii. edges in different images using sobel operator</li> <li>iii. edges in different images using prewitt operator</li> <li>iv. edges in different images using canny operator</li> <li>v. lines in different images using Hough Transform</li> </ul>	2	2
7.	<p>Implement code to detect features using</p> <ul style="list-style-type: none"> <li>i. Harris corner detector</li> <li>ii. Shi-Tomasi corner detector</li> <li>iii. Scale Invariant Feature Transform (SIFT)</li> <li>iv. Speeded up Robust Feature (SURF)</li> <li>v. Oriented FAST and Rotated BRIEF (ORB)</li> </ul>	2	5
8.	<p>Implement a code to segment an image</p> <ul style="list-style-type: none"> <li>i. of mutually touching coins using distance transform along with watershed algorithms.</li> <li>ii. using the K-means algorithm.</li> <li>iii. using the Grabcut algorithm.</li> </ul>	2	2
9.	<ul style="list-style-type: none"> <li>i. Implement face detection and eye detection using HAAR cascade classifiers.</li> <li>ii. Implement face detection using Viola Jones method and Adaboost training algorithm.</li> <li>iii. Implement car detection and pedestrian detection using HAAR cascade classifiers.</li> </ul>	2	5
10.	<ul style="list-style-type: none"> <li>i. Implement code to perform feature extraction on given images of faces using Histogram of Gradients.</li> <li>ii. Implement code to apply Principal Component Analysis on extracted features in objective i.</li> <li>iii. Implement code to recognize faces using the SVMa classifier.</li> </ul>	2	5,6
11.	<ul style="list-style-type: none"> <li>i. Implement code to extract facial landmarks on given images.</li> <li>ii. Implement code to merge faces (face swaps) using extracted facial landmark features on given images.</li> <li>iii. Implement code to merge faces (face swaps) using extracted facial landmark features on live video.</li> </ul>	2	5,6

12	Implement Deep Learning concepts (using DIGITS/TensorFlow/Pytorch) i. Image Classification ii. Image Segmentation iii. Object Detection iv. Transfer Learning v. Face Recognition vi. Emotion Recognition	6	6
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Prepared by:	Harshul Yagnik	Date:	26/06/2023
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