



S. B. JAIN INSTITUTE OF TECHNOLOGY, MANAGEMENT & RESEARCH, NAGPUR.

Practical No. 2

Aim: To understand the basic concepts of digital image processing and demonstrate the ability to read and write images using the OpenCV library in Python.

Name of Student: Shruti Pradeep Bagdi

Roll No.: CS22130

Semester/Year: VII/IV

Academic Session: 2025-2026

Date of Performance:

Date of Submission:

AIM: To understand the basic concepts of digital image processing and demonstrate the ability to read and write images using the OpenCV library in Python.

OBJECTIVE/EXPECTED LEARNING OUTCOME:

The objectives and expected learning outcome of this practical are:

- To grasp fundamental concepts of digital image processing.
- To become familiar with the OpenCV library and its capabilities for image manipulation.
- To demonstrate proficiency in reading and writing images using OpenCV in Python.
- To get knowledge about Digital Image Processing and its applications in real life

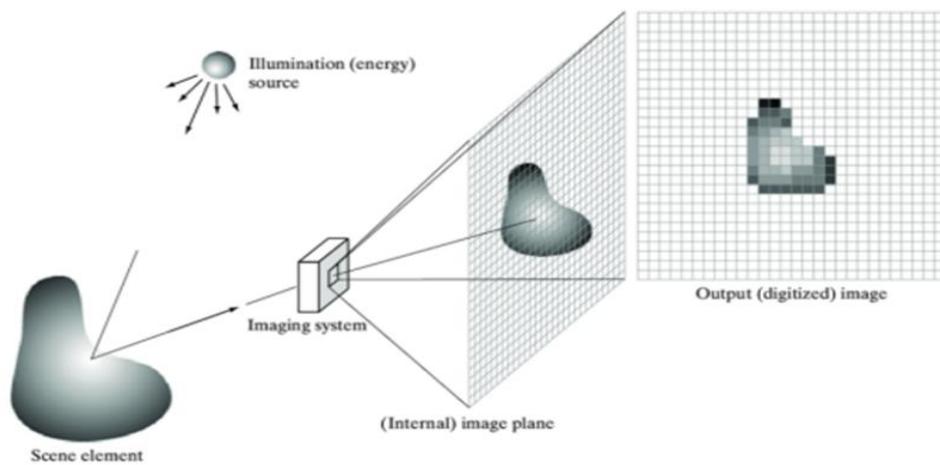
THEORY:

Digital Image Processing:

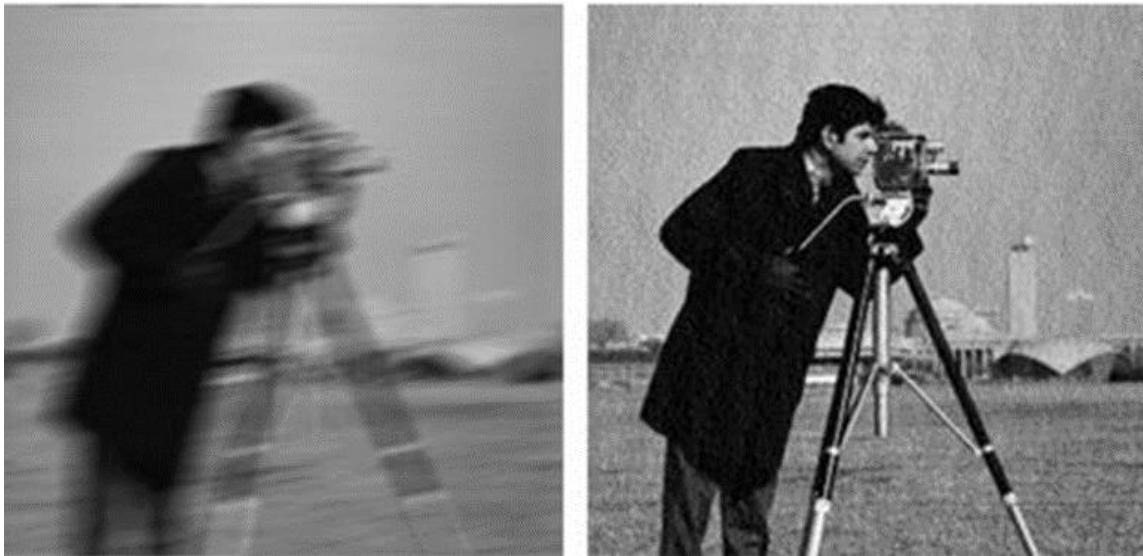
Digital Image Processing means processing digital images by means of a digital computer. We can also say that it is a use of computer algorithms, in order to get enhanced images to extract some useful information.

Image processing is the process of transforming an image into a digital form and performing certain operations to get some useful information from it. The image processing system usually treats all images as 2D signals when applying certain predetermined signal processing methods. An image is defined as a two-dimensional function, $F(x,y)$, where x and y are spatial coordinates, and the amplitude of F at any pair of coordinates (x,y) is called the intensity of that image at that point. When x, y , and amplitude values of F are finite, we call it a digital image. In other words, an image can be defined by a two-dimensional array specifically arranged in rows and columns.

1. Image acquisition: This involves capturing an image using a digital camera or scanner, or importing an existing image into a computer. It could be as simple as being given an image which is in digital form

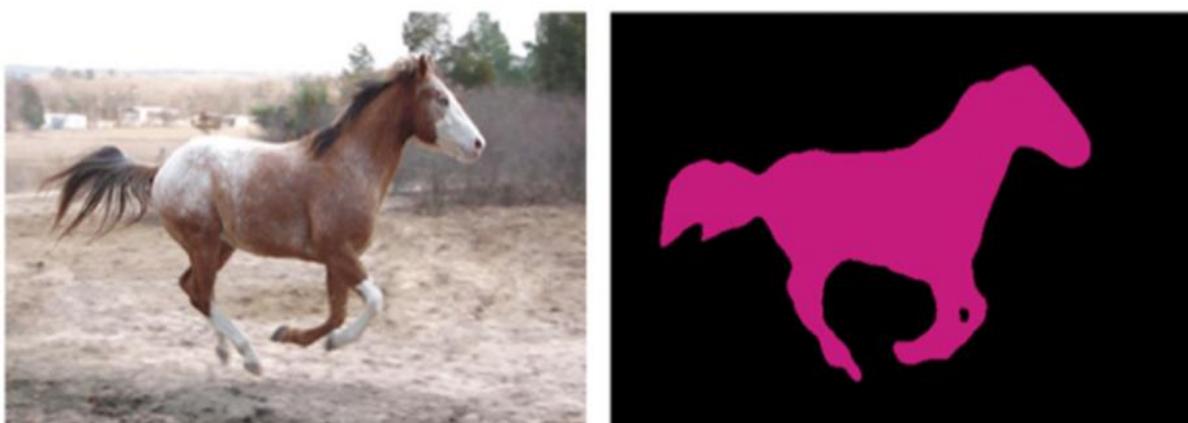


2.Image enhancement: This involves improving the visual quality of an image, such as increasing contrast, reducing noise, and removing artefacts. It is amongst the simplest and most appealing in areas of Image Processing it is also used to extract some hidden details from an image and is subjective.



3.Image restoration: This involves removing degradation from an image, such as blurring, noise, and distortion. It also deals with appealing of an image but it is objective(Restoration is based on mathematical or probabilistic model or image degradation).

4.Image segmentation: This involves dividing an image into regions or segments, each of which corresponds to a specific object or feature in the image. It includes partitioning an image into its constituent parts or objects. Autonomous segmentation is the most difficult task in Image Processing.

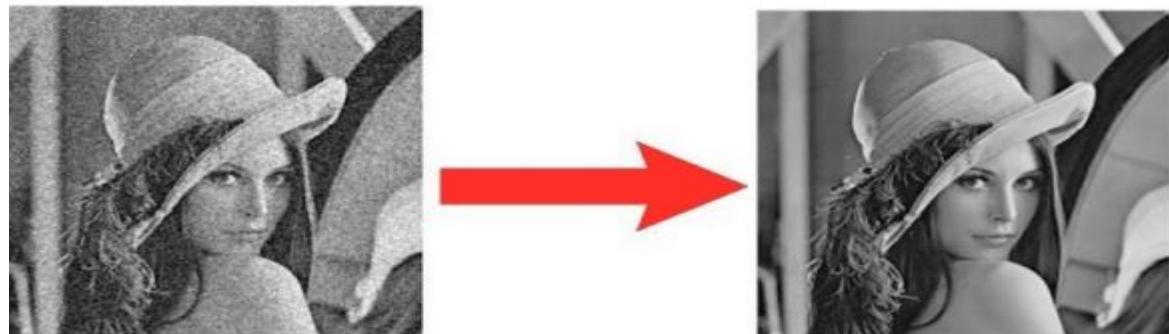




5. Image Compression : Image compression is a process applied to a graphics file to minimise its size in bytes without degrading image quality below an acceptable threshold. By reducing the file size, more images can be stored in a given amount of disk or memory space. The image also requires less bandwidth when being transmitted over the internet or downloaded from a webpage, reducing network congestion and speeding up content delivery.

6. Image Recognition : Image recognition is the process of identifying an object or a feature in an image or video. It is used in many applications like defect detection, medical imaging, and security surveillance

7. Image Noising and Denoising: Image denoising plays an important role in modern image processing systems. Image denoising is to remove noise from a noisy image, so as to restore the true image.



Algorithm:

Write a program to read and write the image using imread, imshow ,imwrite function of opencv library to store image in computer.

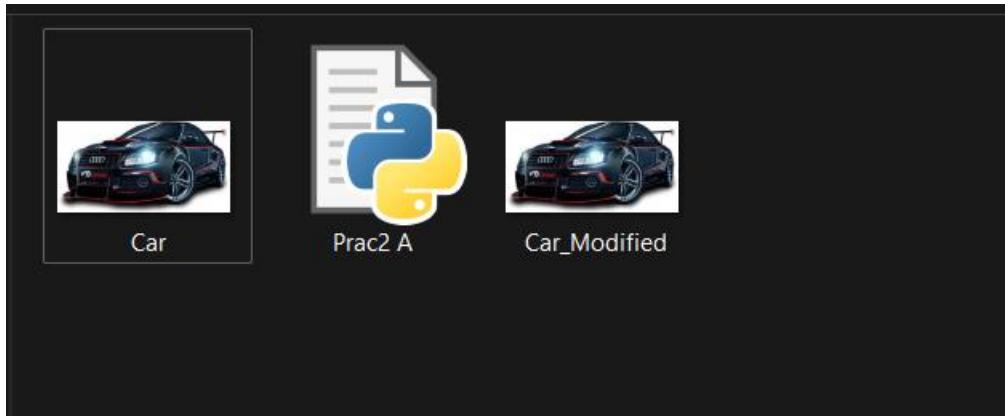
PROGRAM CODE:

Write a program to read and resize the image and store it using imwrite function.

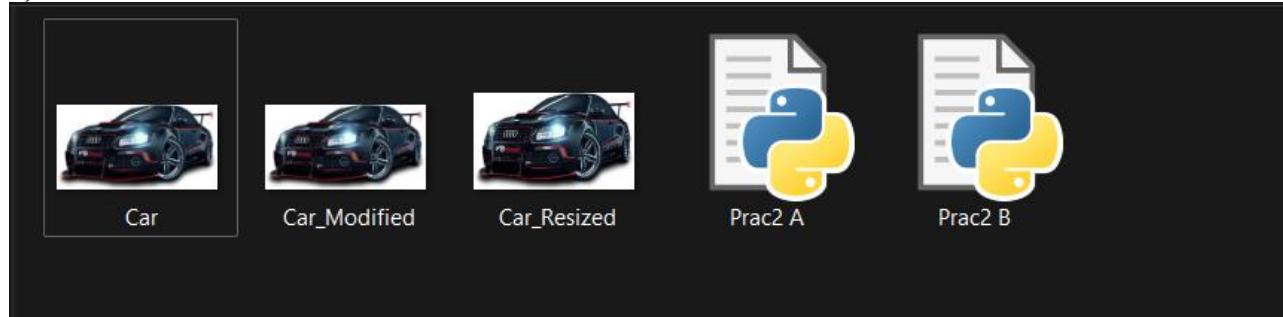
PROGRAM CODE:

INPUT & OUTPUT:

1)



2)



CONCLUSION:

This practical exercise introduces the fundamental concepts of digital image processing and demonstrates the basic functionality of reading and writing images using the OpenCV library in Python. By completing this exercise, participants gain a foundational understanding of image processing techniques and familiarity with using OpenCV for image manipulation tasks.

DISCUSSION QUESTIONS:

- 1) What is a digital image?
- 2) What do you know about computer vision libraries?
- 3) What is OpenCV and how can you use the algorithms in it?
- 4) Why is digital image processing used?
- 5) Explain resize () function of OpenCV library?
- 6) Explain imwrite() function of OpenCV library.?

REFERENCES:

- Computer Vision: Algorithms and Applications, Richard Szeliski, 2010, Springer.
- Computer Vision - A modern Approach, D. Forsyth, J. Ponce, 2nd Edition 2011, Pearson India.
- OpenCV Computer Vision with Python, Joseph Howse, 2013, Packt Publishing.
- Dictionary of Computer Vision and Image Processing, R. B. Fisher, T. P. Breckon, K. Dawson-Howe, A. Fitzgibbon, C. Robertson, E. Trucco, C. K. I. Williams, 2nd Edition, 2014, Wiley.
- <https://www.geeksforgeeks.org/digital-image-processing-basics/>
- <https://www.javatpoint.com/digital-image-processing-tutorial>
- <https://www.simplilearn.com/image-processing-article>
- <https://www.mygreatlearning.com/blog/digital-image-processing-explained/>