Shri Vile Parle Kelavani Mandal's
DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING
(Autonomous College Affiliated to the University of Mumbai)
NAAC Accredited with "A" Grade (CGPA : 3.18)

Department of Artificial Intelligence & Machine Learning
Academic Year 2023-2024

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Batch: A1

Experiment No. 2

Aim: Image Transformations

Objective: Develop a program to perform different Image Transformations

Theory:

Image Transformation involves the transformation of image data to retrieve information from the image or preprocess the image for further usage

OpenCV (Open Source Computer Vision Library) is an open-source computer vision and machine learning software library. OpenCV was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in commercial products. By using it, one can process images and videos to identify objects, faces, or even the handwriting of a human. When it is integrated with various libraries, such as NumPy, Python is capable of processing the OpenCV array structure for analysis.

Problem Definition

- Image Translation
- Reflection
- Rotation
- Scaling
- Cropping
- Shearing in x-axis
- Shearing in y-axis

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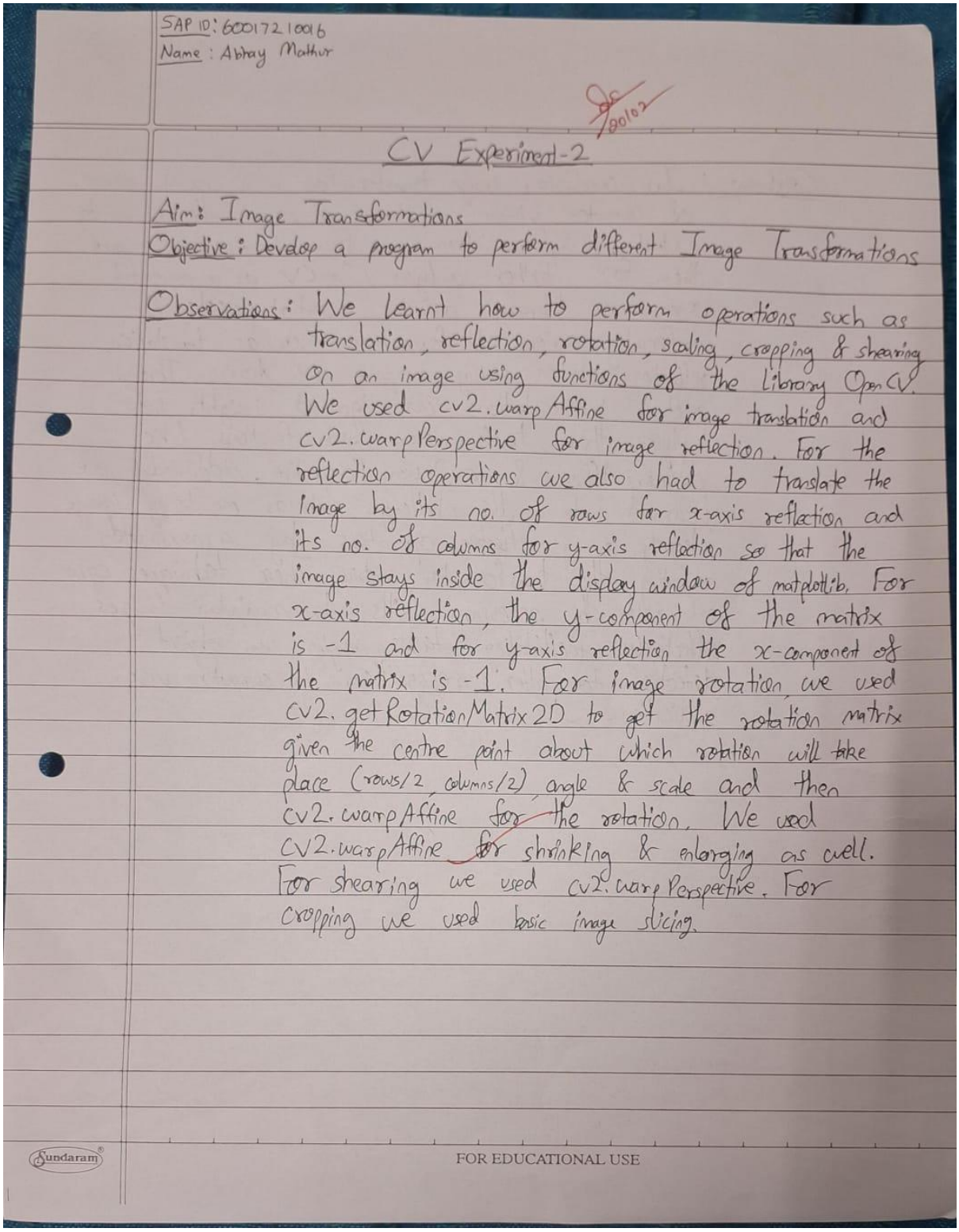
Observations:



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9/01/02

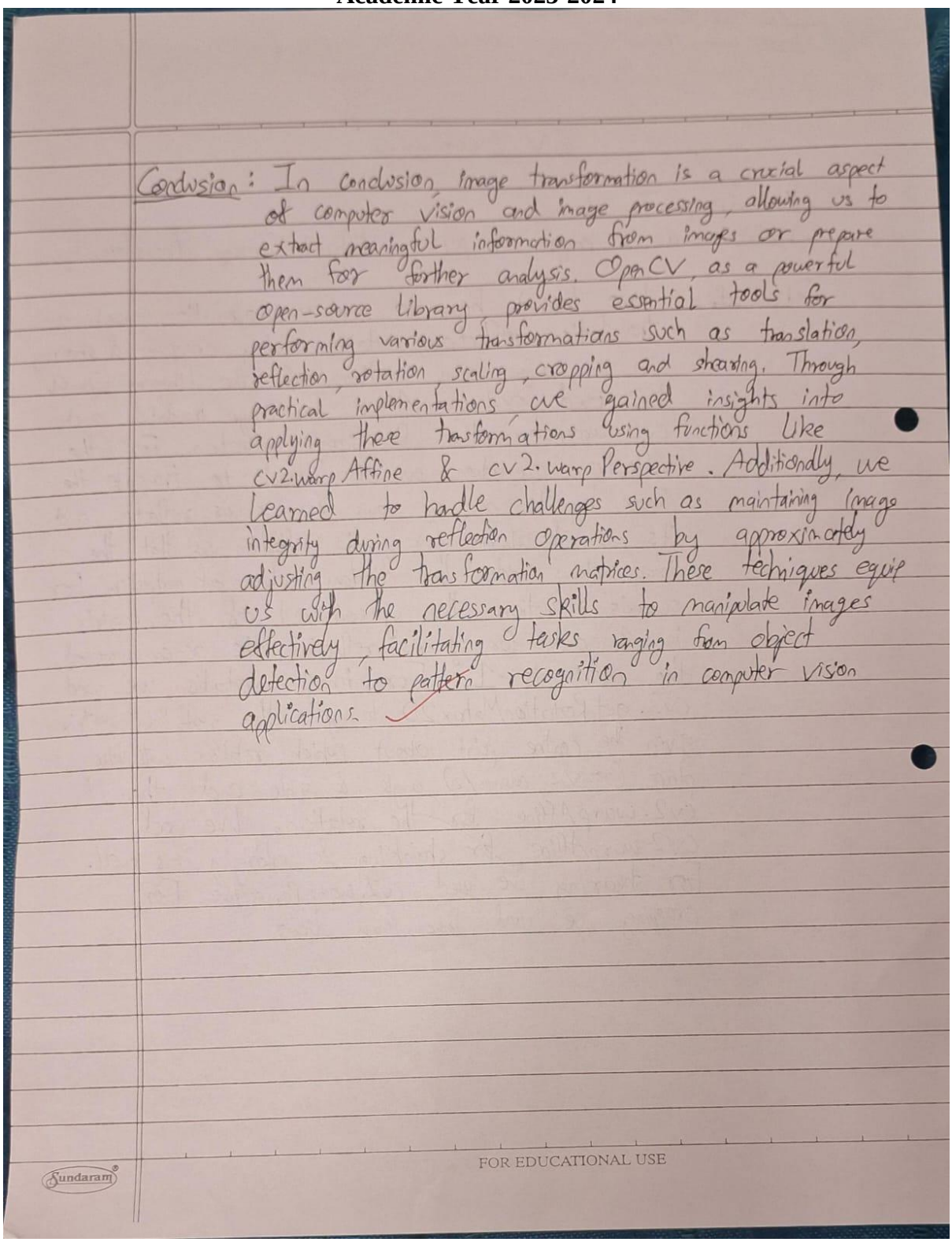
CV Experiment-2

Aim: Image Transformations
Objective: Develop a program to perform different Image Transformations

Observations: We learnt how to perform operations such as translation, reflection, rotation, scaling, cropping & shearing on an image using functions of the library OpenCV. We used cv2.warpAffine for image translation and cv2.warpPerspective for image reflection. For the reflection operations we also had to translate the image by its no. of rows for x-axis reflection and its no. of columns for y-axis reflection so that the image stays inside the display window of matplotlib. For x-axis reflection, the y-component of the matrix is -1 and for y-axis reflection the x-component of the matrix is -1. For image rotation, we used cv2.getRotationMatrix2D to get the rotation matrix given the centre point about which rotation will take place (rows/2, columns/2), angle & scale and then cv2.warpAffine for the rotation. We used cv2.warpAffine for shrinking & enlarging as well. For shearing we used cv2.warpPerspective. For cropping we used basic image slicing.

Sundaram

FOR EDUCATIONAL USE



Conclusion: In conclusion, image transformation is a crucial aspect of computer vision and image processing, allowing us to extract meaningful information from images or prepare them for further analysis. OpenCV, as a powerful open-source library, provides essential tools for performing various transformations such as translation, reflection, rotation, scaling, cropping and shearing. Through practical implementations, we gained insights into applying these transformations using functions like cv2.warpAffine & cv2.warpPerspective. Additionally, we learned to handle challenges such as maintaining image integrity during reflection operations by appropriately adjusting the transformation matrices. These techniques equip us with the necessary skills to manipulate images effectively, facilitating tasks ranging from object detection to pattern recognition in computer vision applications.

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In conclusion, image transformation is a crucial aspect of computer vision and image processing, allowing us to extract meaningful information from images or prepare them for further analysis. OpenCV, as a powerful open-source library, provides essential tools for performing various transformations such as translation, reflection, rotation, scaling, cropping and shearing. Through practical implementations, we gained insights into applying these transformations using functions like cv2.warpAffine and cv2.warpPerspective. Additionally, we learned to handle challenges such as maintaining image integrity during reflection operations by appropriately adjusting the transformation matrices. These techniques equip us with the necessary skills to manipulate images effectively, facilitating tasks ranging from object detection to pattern recognition in computer vision applications.

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