Experiment-1

Basics of OpenCV, Matplotlib, Numpy – Image Read and Display Operations

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Aim: To create a program in Python to read and display images and perform simple image manipulation operations.

Outcome: Understand different image libraries in Python.

Resources Used: Anaconda Python Environment, Google Collab ,Jupyter Notebook

Theory :

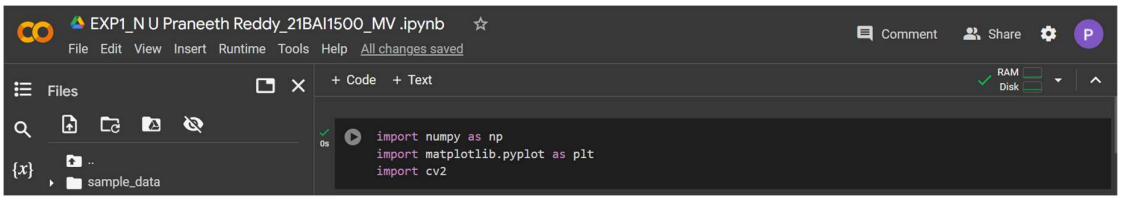
OpenCV stands as an open-source library designed for computer vision and machine learning applications. Its primary goal is to offer a unified foundation for computer vision projects and to facilitate the integration of machine perception into various commercial products.

On the other hand, NumPy serves as a Python library, enabling support for large, multi-dimensional arrays and matrices, accompanied by an extensive array of high-level mathematical functions for manipulating these arrays.

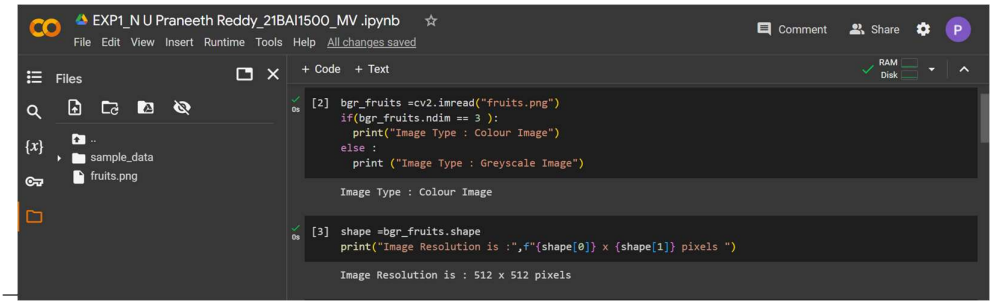
Additionally, Matplotlib functions as a Python plotting library, directly connected to the numerical mathematics capabilities of NumPy. It delivers an object-oriented API for seamlessly embedding plots within applications.

Procedure :

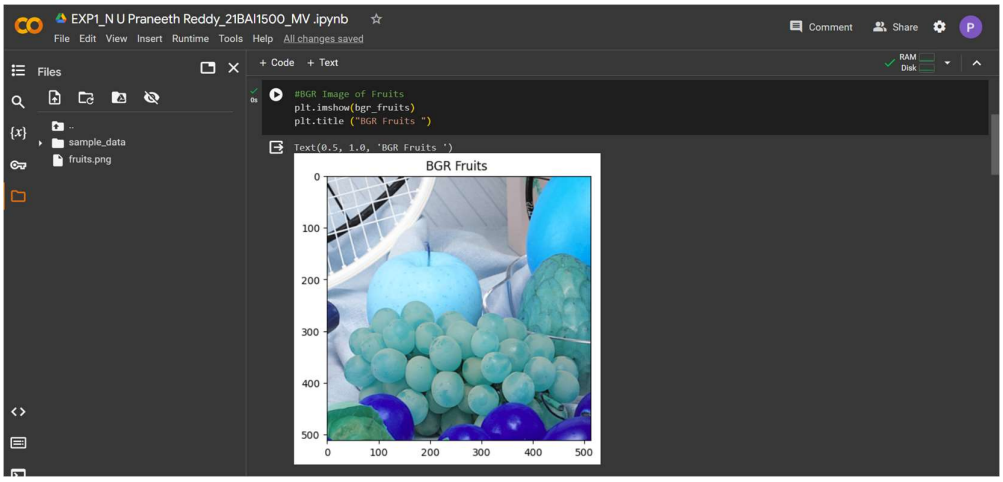
- Open Google Colab and create a new Jupyter Notebook.
- Import important libraries namely OpenCV, Numpy and Matplotlib.



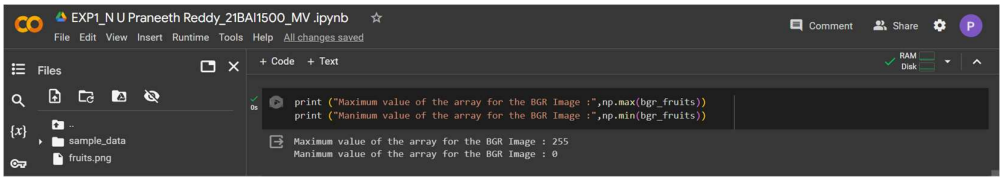
- Read the image and find its type and it's resolution in pixels.



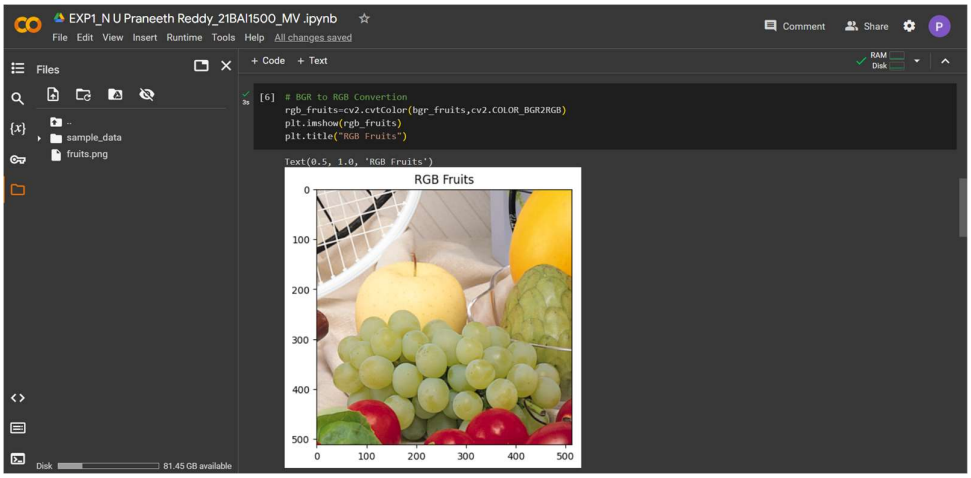
- Show the image in BGR (Blue-Green-Red).



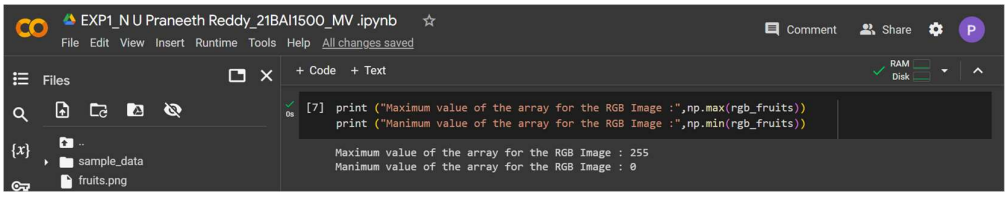
- Print the maximum and minimum values of the array for the BGR image of the Fruits



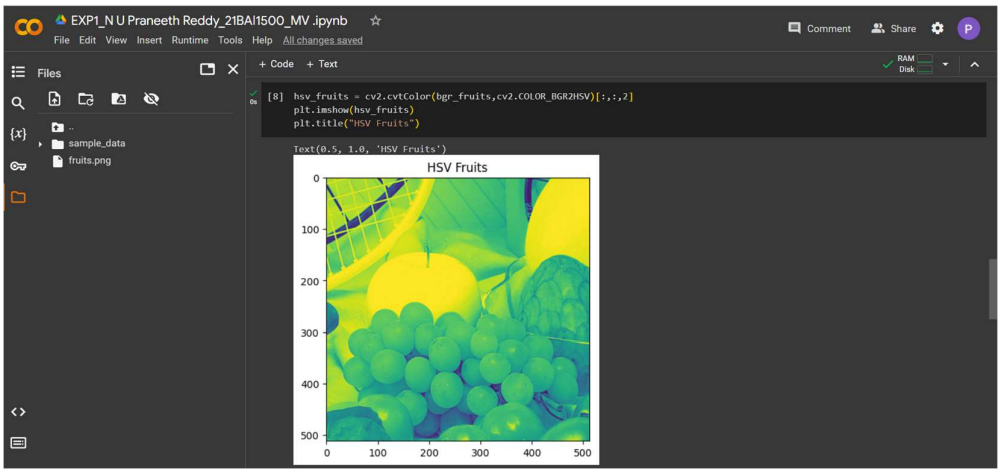
- Using the imread convert the image from BGR (Blue-Green-Red) to RGB (Red-Green-Blue).



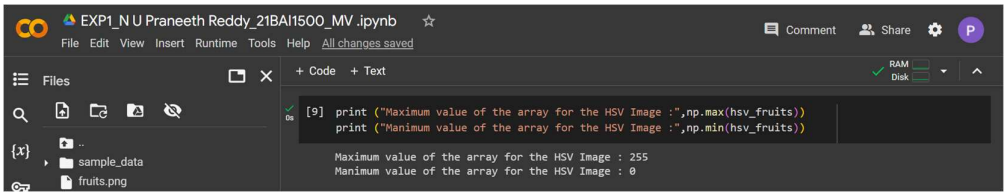
- Print the maximum and minimum values of the array for the RGB image of the Fruits.



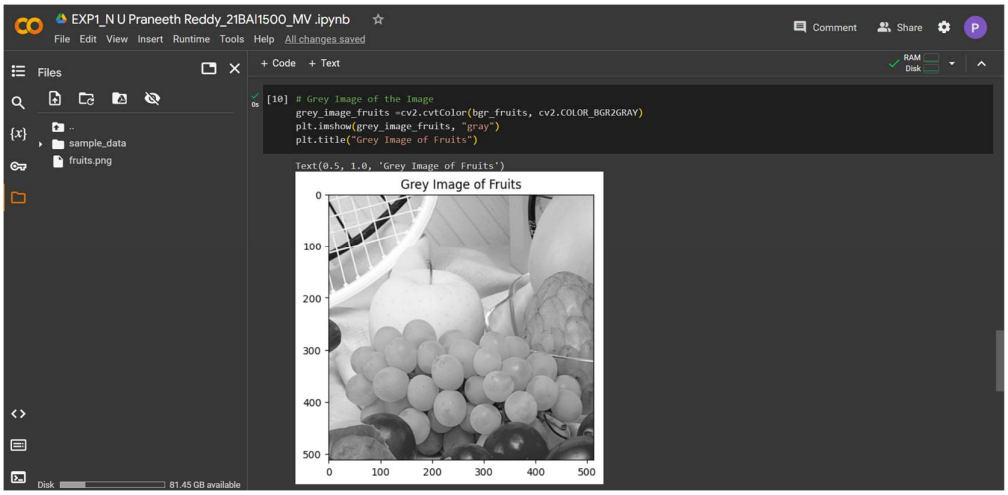
- Using the imread convert the image to the HSV version of it.



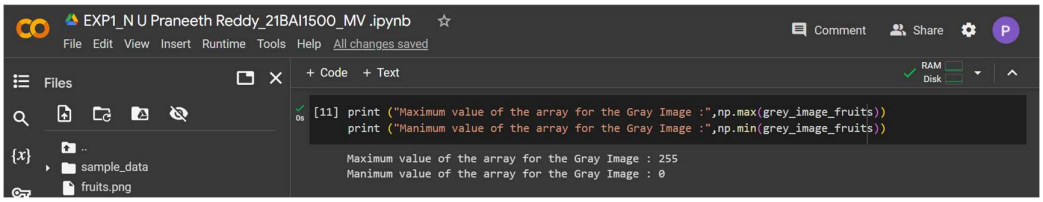
- Print the maximum and minimum values of the array for the HSV image of the Fruits.



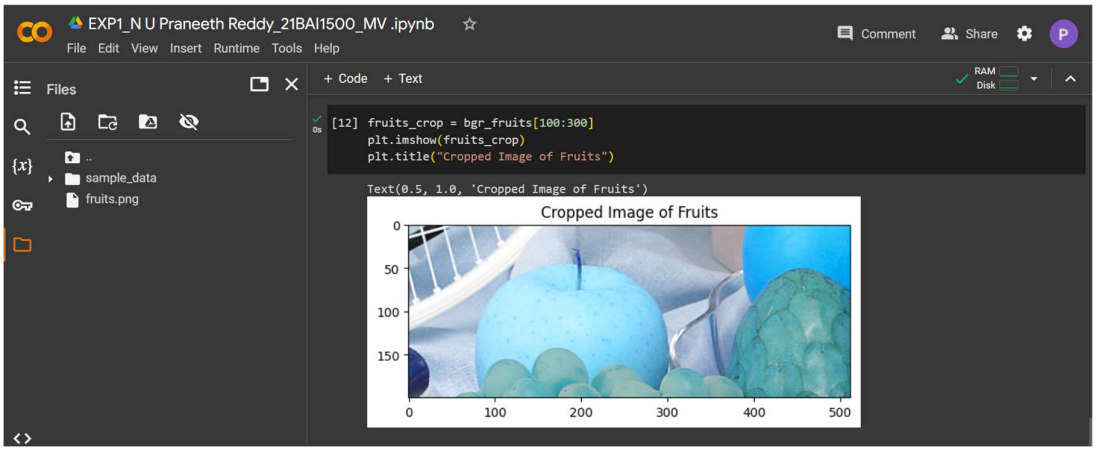
- Using the imread convert the image to the gray scale version of it.



- Print the maximum and minimum values of the array for the gray Fruits image.



- Print the cropped image of the Fruits with only apple displayed.



Results: The image has been converted to various forms and the maximum and minimum values of the arrays have been printed.

For BGR Image, the maximum value of the array is 255 and the minimum value is 0
For RGB Image, the maximum value of the array is 255 and the minimum value is 0
For the Blue Channel Image, the maximum value of the array is 255 and the minimum value is 0.
For the Gray Image, the maximum value of the image is 255 and the minimum value of the array is 0.
The min and Max doesn't value doesn't change for the fruits image as the values of pixel arrays can change based on the image's pixel encoding, such as in high dynamic range (HDR) or float32 images.

Conclusion: A Python program has been created to read, manipulate and display images using matplotlib, OpenCV and Numpy libraries.

Google Collab Link : https://colab.research.google.com/drive/1mHKddvMzuH3IdLGOWSj-fSir0Sm9zyIj?usp=sharing