# Experiment-10

## Texture Analysis based on GLCM

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**Aim:** To perform GLCM (Gray Level Co-Occurrence Matrix on a mountain image, with the Mountain as the foreground and the sky behind It as the background.

**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.

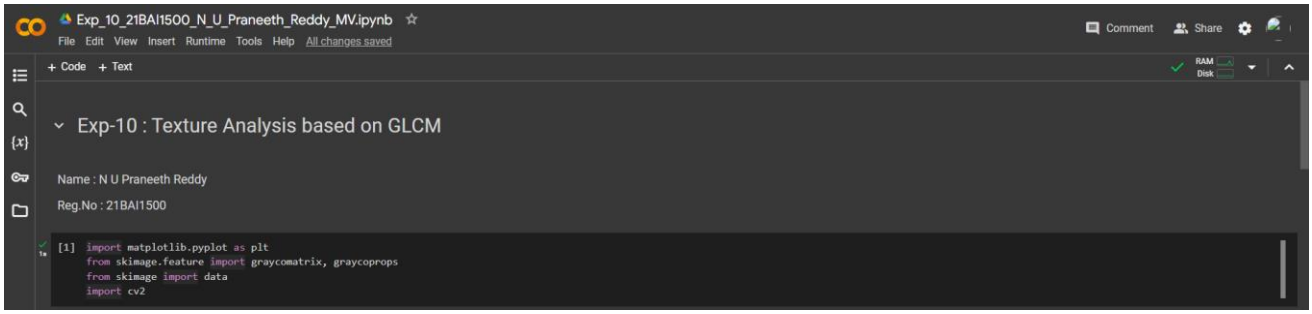
Additionally, Matplotlib functions as a Python plotting library, directly connected to the numerical mathematics capabilities of NumPy. It delivers an object-oriented API for seamlessly embedding plots within applications.

## Tasks:

1) Obtain Region of Interest (ROI) of the given image namely few points for the foreground and few points on the background.
2) Compute the GLCM for the selected ROIs and display the min and max value of the selected ROIs
3) Provide a scatter plot considering the features contrast and Correlation and provide your inference

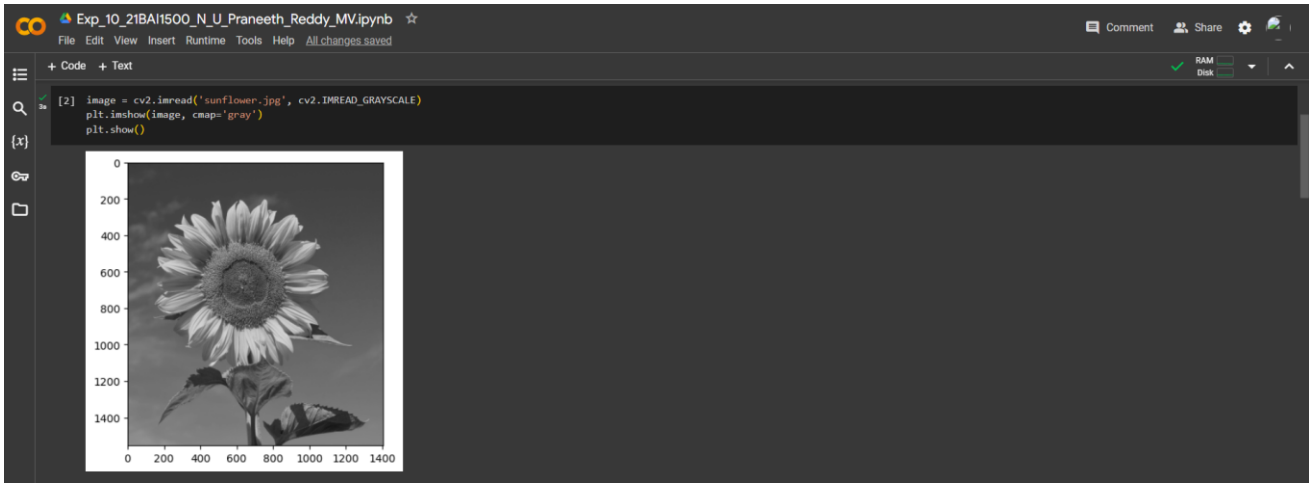
## Procedure :

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

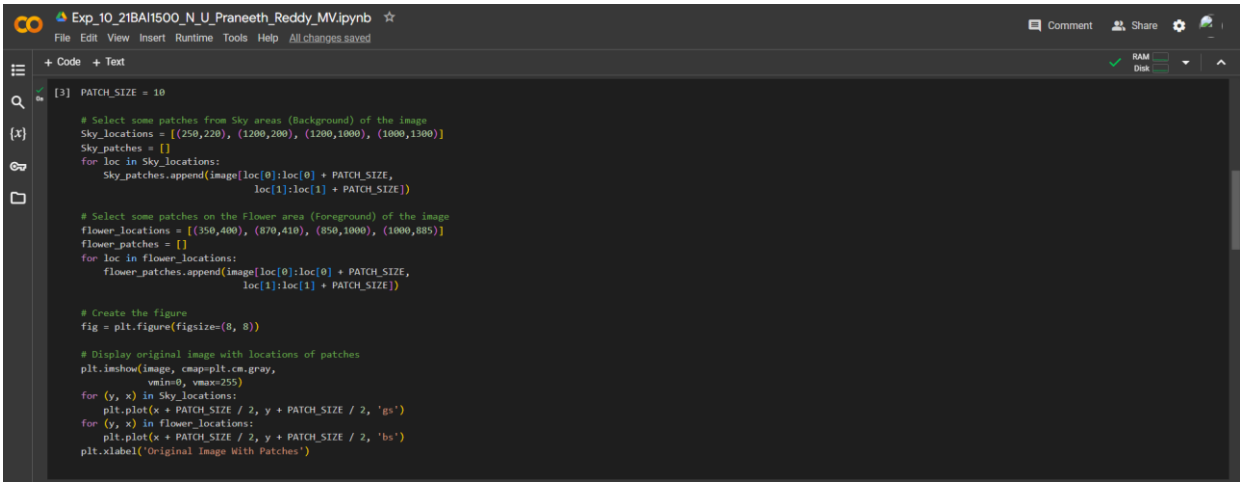


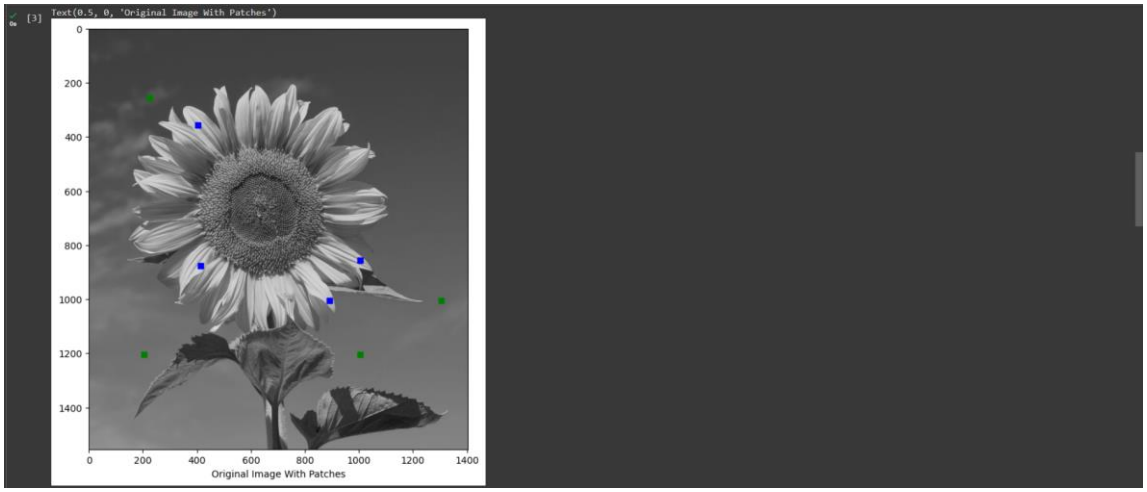

**Task 1:** Obtain Region of Interest (ROI) of the given image namely few points for the foreground and few points on the background.

- Read the image in grayscale and observe it for points in the foreground and background.

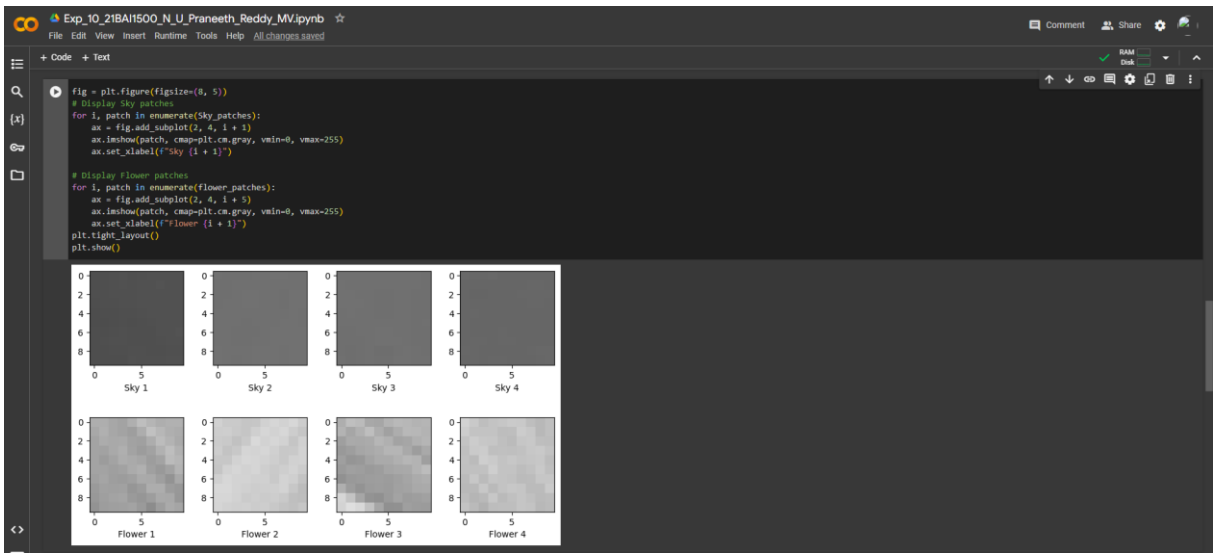



- Selects patches from the sky (background) and flower (foreground) areas of the grayscale image, then visualizes these patches on the original image and separately.

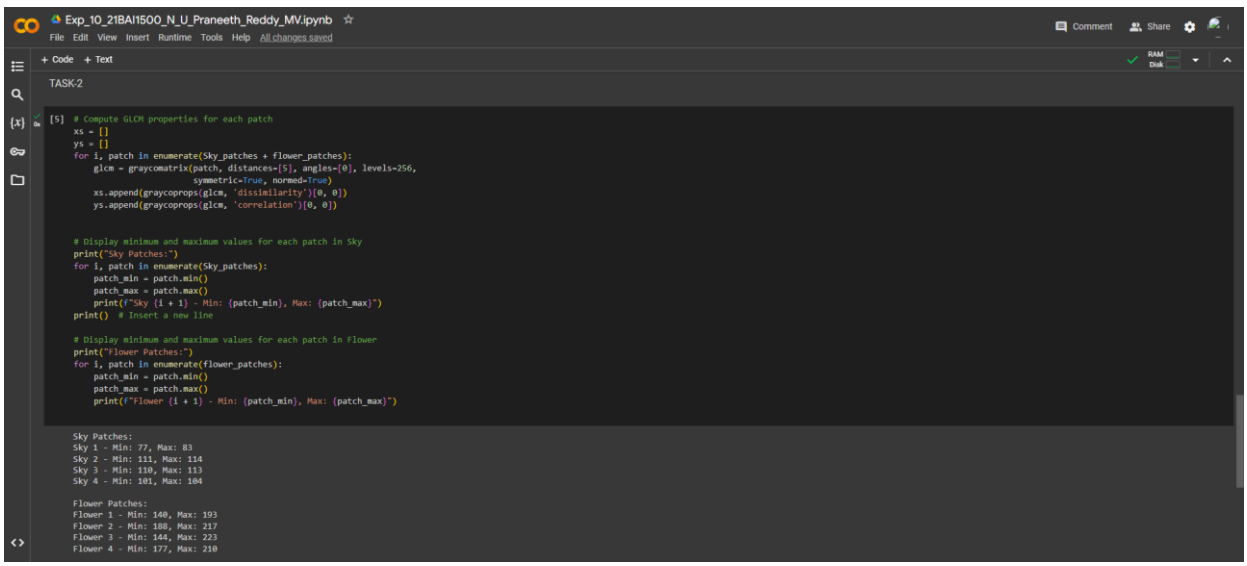




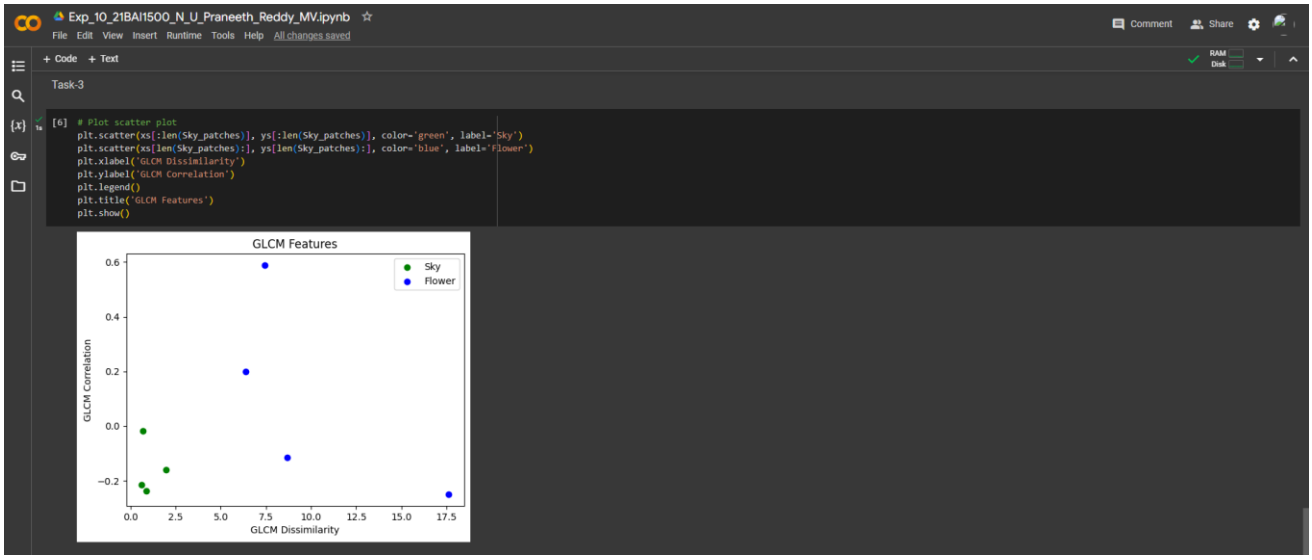

- Display sky and flower patches from the selected regions of interest (ROI)




**Task-2:** Computes GLCM properties (dissimilarity and correlation) for each patch and prints the minimum and maximum pixel values for both sky and flower patches.



**Task-3:** Plots a scatter plot showing the relationship between GLCM dissimilarity and correlation for the patches, with sky patches in green and flower patches in blue.




**Inference:** The scatter plot reveals sky patches with low contrast and weak correlation, indicating uniform texture. In contrast, flower patches exhibit higher contrast and a mix of positive and negative correlations, suggesting varied and intricate textures. GLCM features effectively differentiate texture characteristics, aiding in image analysis and classification tasks.

**Results:** The given tasks have been done using programs in Python using OpenCV, Skimage and Matplotlib libraries.

**Conclusion:** Python program have been created to Obtain Regions of Interest (a few points in the background - sky and a few points in the foreground - Flower) for the Flower image, GLCM for the selected ROI's has been computed, the min and the max values of the selected ROI's have been displayed and a scatter plot of features contrast vs correlation has been generated

Google Collab Link :
https://colab.research.google.com/drive/1fRMI6FcKMLbRcZNgUkF1zp-ojudUardh?usp=sharing