IRIS Flower Classification

Problem Statement

Multi-class Classification is the task of classifying a set of given objects/images into multiple pre-determined categories. It is a common problem in computer vision and machine learning.

In this project you will build a multi-class classifier by applying conventional image processing technique and machine learning. The classifier will classify a set of IRIS flower images into four categories - 'crocus' 'daisy' 'pansy' 'sunflower'.

The original flower images and a set of mask images are provided for each image.

What are to be done?

i) Apply mask on the original image and suppress the background.
ii) Use conventional image processing techniques (e.g. color histogram) to extract features from the images.
iii) After feature extraction, convert the features into numeric vectors.
iv) Split the dataset into training and test set.
v) Design a machine learning classifier (e.g. Random Forest classifier) and train the model with on extracted features on the training set.
vi) Analyze the performance of the classifier on the test set.
vii) Precision/Recall/F-score measure can be used for objective performance evaluation.

Evaluation Parameters

Evaluation will be based on:

- Precision/Recall/F-score of the model.
- Given a New image and the mask, the model should be able to categorize it into one of the suitable categories ('crocus' 'daisy' 'pansy' 'sunflower').

Data Preparation

Dataset is provided in the following file: dataset.rar
Unzip this file. Make sure there is a folder named dataset.
Inside this folder there should be two subfolders named - ***images*** and ***masks***.
images should contain the original flower images.
masks should contain the binary masks of the original images.

Features can be extracted from the images after suppressing the background of the image with the corresponding mask and ten computing a color-histogram which is a numeric representation of the representative image itself. These numeric vectors can subsequently be fed to a machine learning classifier for training. The classifier will learn to classify various IRIS images into different categories based on the presence of some specific features (i.e. color histogram). Suitable training and test splitting are required for model training and validation.

Expected Outcome

- Students will learn to load and prepare images for building a multi-class classifier.
- How to perform feature extraction from image by applying conventional image processing approach like color-histogram.
- How to build a robust multi-class classifier for solving an image classification problem.
- Given a New image and the mask, the model should be able to categorize it into one of the suitable categories ('crocus' 'daisy' 'pansy' 'sunflower').