Marks : 15

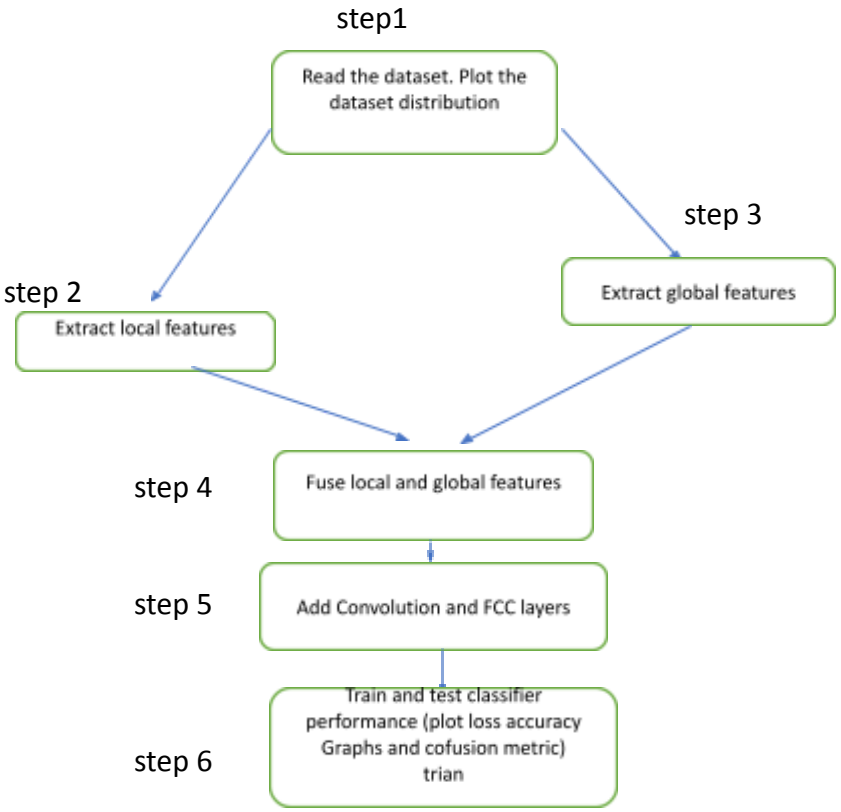
Instructions: Attempt one of the two questions you choose and upload the pdf / HTML file with all the required outputs.

1) Create a pdf document describing your approach and upload it along with notebook (pdf / html)
2) For any queries write to : chinesh.doshi@wilp.bits-pilani.ac.in ,

Q1) Image classification :

Create a word document describing the approach and the features in detail. It should include what are the local features and global features used along with the reason. Reduce the number of classes in the dataset to 10.

Use the following dataset :
https://www.kaggle.com/datasets/gpiosenka/sports-classification



Rubrics:
Step1 - 2 Marks
Step2 - 2 Marks
Step3 - 2 Marks
Step4 - 1 Marks
Step5 - 2 Marks
Step6 - 4 Marks (2+1+1=training,testing, graph and confusion metric plotting)

Documentation - 2 Marks

Q2) Object Detection

Dataset : https://www.kaggle.com/datasets/mbkinaci/fruit-images-for-object-detection

1. **Data Preparation: 2 Mark**
    - Download a dataset for object detection tasks
    - Preprocess the dataset:
        - Split the dataset into training, validation, and test sets.
        - Prepare annotations for object bounding boxes.
2. **Build Model: 4 Marks**
    - Choose a pre-trained object detection model (e.g., SSD, Faster R-CNN, YOLO).
    - Load the pre-trained model weights.
    - Modify the model architecture if necessary (e.g., for transfer learning).
    - Set up the model for training.
3. **Training: 3 Marks**
    - Define training parameters such as batch size, learning rate, and number of epochs.
    - Train the object detection model using the training dataset.
    - Monitor the training process and visualize training metrics (e.g., loss, accuracy).
4. **Evaluation: 2 Marks**
    - Evaluate the trained model using the validation dataset.
    - Calculate performance metrics such as precision, recall, and mean Average Precision (mAP).
5. **Inference: 2 Marks**
    - Use the trained model to perform object detection on new images.
    - Visualize the detected objects and bounding boxes on test images.
6. **Conclusion and Future Work: 2 Marks**
    - Summarize the key findings and results of the object detection pipeline.
    - Discuss potential improvements or future work to enhance the performance of the model.
    - Reflect on the challenges encountered during the implementation and possible solutions.

Do not upload the zip files. If you are using some source code, it is fine to call or run the file using notebook but make sure to run the commands using ! mark from notebook as explained in the tutorial session.

Just make sure to get all the desired output visible in the notebook that you are submitting.