ATDL Lab Assignment1: Model Comparison on Fetal Head Abnormalities Dataset

Problem Statement

The objective of this assignment is to analyze and compare the performance of state-of-the-art deep learning models for the classification of fetal head abnormalities using the dataset available on Kaggle: Fetal Head Abnormalities Dataset. Specifically, you are required to:

1. Implement the **ResNet50** model
2. Implement the **MobileNet v3-small** model.
3. Explore the models for objectives (a) and (b) using Zero shot learning and (c) using Few Shot learning on the **Fetal Head Abnormalities Dataset**. using the following objectives:
   (a) Using traditional augmentation techniques such as Rotation, Horizontal Flip and Crop.
   (b) Using Advanced augmentation techniques of Mixup and CutMix.
   (c) Use Few Shot learning to train the models .
4. Evaluate the performance of all three models using metrics such as:
   - Confusion Matrix
   - Accuracy
   - Precision
   - Recall
   - F1-Score
5. Provide a detailed comparison and analysis of the results obtained from the two models.

Dataset Details

The dataset is available at Fetal Head Abnormalities Dataset. The dataset consists of images of fetal head ultrasounds categorized into different classes of abnormalities. You are required to preprocess the data appropriately before training.

Submission Requirements

(a) Submit the source code and instructions for running the code.

(b) Provide a report (in PDF format) detailing:

- The implementation process.
- The training setup, including hyperparameters.
- The results obtained from each model.
- A comparative analysis of the three models based on the evaluation metrics.

(c) Include visualizations such as the confusion matrix and plots of the metrics.

Note

Please bring your Laptop fully charged for the lab session