Semester Project

CS-470 Machine Learning

Due Date: **03 January 2024**

Task: You need to perform object classification on CIFAR-100 dataset available here.

- The training set contain 500 images while test set contains 100 images per class.
- Classification must be performed across 100 classes and not just the 20 superclasses.
- Allowed backbone models are ResNet, ResNext, EfficientNet and DenseNet. Use any of these architectures.
- You have to perform,
    - Training from scratch and check what the best test accuracy.
    - Using ImageNet pretrained weights as initialization and check the best test accuracy.
- The best performance on scratch training is around 67% on test set as reported in literature.
- The best performance with transfer learning (using ImageNet pretrained weights) is 96.08% on test set as reported in literature.
- Your task is to exceed these accuracies on test set using architecture modification,
    - You can use any further residual/slip connections.
    - You can use spatial and/or channel-wise attention mechanism.
    - You can use data pre-processing and feature extraction (using any dimensionality reduction approach).
    - You can use any post-processing on trained network embeddings.
    - Any other approach to support the deep architecture of your choice.

Mark Distribution: Total marks are 20 and base marks will be given as follows,

- Performance exceeding scratch training (67%) by 5% and exceeding transfer learning (96%) by 3% will be awarded 18 marks.
- Performance exceeding 2% and 1% respectively will get 13 marks.
- Performance exceeding 1% and 1% respectively will get 8 marks.

Deliverables: Project demonstration on live inference on test set on Google Colab or your personal hardware. Better presentation of results will add 2 marks. You can work in a group of 4 and viva will be taken individually (one-to-one) without the presence of other group members. Base marks will be reduced (down to 0) in case of failure to give satisfactory answers.