Task-B: Robust Face Recognition using ResNet-50

Objective

Develop a face recognition system that performs well under degraded visual conditions (blur, fog, rain, low light).

Core Approach

- Model: Fine-tuned ResNet-50 (pretrained on ImageNet).

- Enhancements: Modified classification head with BatchNorm and Dropout.

- Loss Function: CrossEntropy with label smoothing (0.1) for better generalization.

Training Techniques

- Augmentation: Heavy use of ColorJitter, Blur, Rotation to simulate distortions.

- Class Imbalance: Tackled using WeightedRandomSampler.

- Optimizer: AdamW with learning rate 0.0005.

- Scheduler: StepLR (step=5, gamma=0.7) for dynamic learning rates.

Data Pipeline

- Images resized to 224x224, normalized.

- Augmentations applied only during training.

- DataLoader used for efficient batch handling.

Evaluation

- Assessed via accuracy, precision, recall, F1-score.

- Best model saved based on validation accuracy.