

EfficientNet-based Gender Classification

ComSys Hackathon 5 - Task A

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1. Objective

To classify gender (Male/Female) from face images using a deep learning model trained on labeled data, ensuring high accuracy and generalization.

2. Dataset

- **Train:** Images organized by class in `train/`.
- **Validation:** Separate labeled samples in `val/`.

3. Preprocessing

- Resize to 224×224 .
- Normalize using ImageNet stats.
- Train augmentations: horizontal flip, color jitter, rotation.

4. Model

- **Backbone:** Pretrained `EfficientNet-B0`.
- Final FC layer replaced with 2-class output.
- Optimized using Adam (2×10^{-4} LR) and cosine annealing scheduler.

5. Training Setup

- **Batch Size:** 32, **Epochs:** 6, **Loss:** CrossEntropy.
- Trained on GPU (if available) with PyTorch + torchvision.
- Best model saved as `best_gender_model.pt`.

6. Results

Training Metrics

- Accuracy: 0.9933
- Precision: 0.9980
- Recall: 0.9935
- F1 Score: 0.9957

Validation Metrics

- Accuracy: 0.9238
- Precision: 0.8739
- Recall: 0.9905
- F1 Score: 0.9286

7. Summary

EfficientNet-B0, combined with data augmentation and proper regularization, yields strong gender classification performance with 99.3% training and 92.4% validation accuracy. The pipeline is lightweight, effective, and suitable for deployment.