COMSYS Hackathon 2025 – Technical Summary

👥 Team Details

- **Team Name**: CorpusX
- **Members**: Shirsha Das, Pritam Kumar Roy
- **GitHub Repository**: https://github.com/Shirshadas24/Comsys_hack_2025

Task A: Gender Classification

Objective

To build a robust binary classifier that categorizes face images as either **male** or **female** using facial features.

Approach

- **Model Used**: EfficientNet-B0 (pretrained on ImageNet, fine-tuned)
- **Loss Function**: `BCEWithLogitsLoss`
- **Optimizer**: Adam (lr = 0.0003)
- **Data Augmentation**: Resize to (224x224), Normalize, RandomHorizontalFlip
- **Evaluation Metrics**: Accuracy, Precision, Recall, F1-Score

Validation Results

- **Accuracy**: 92.89%
- **Precision**: 92.58%
- **Recall**: 98.42%
- **F1-Score**: 95.41%

Highlights

- Fine-tuned only the final classification layer
- Lightweight and fast inference with good generalization
- Visualized model architecture (`efficientnet_gender_diagram.png`)

Task B: Face Matching (Face Verification)

Objective

To match a given test/distorted image to its correct identity folder using **similarity-based learning** (not classification).

Approach

- **Model**: Custom **Siamese Network**
- **Backbone**: Lightweight CNN with embedding projection
- **Loss Function**: Contrastive Loss
- **Embedding Size**: 128
- **Threshold**: Cosine similarity threshold for positive match

Validation Results

- **Accuracy**: 96.10%
- **Precision**: 97.55%
- **Recall**: 98.24%
- **F1-Score**: 97.89%

Highlights

- Handles distorted face matching using learned embeddings
- Embeds all images into a common vector space
- Model architecture provided (`siamese_model_diagram.png`)
- Model size >100MB stored via external GDrive link

Innovations

- Efficient fine-tuning pipeline for transfer learning
- Generalizable Siamese network for one-shot matching
- Dataset pair creation and threshold tuning techniques

Submission Artifacts

- Well-documented code in separate `taska/` and `taskb/` folders
- Evaluation scripts return Accuracy, Precision, Recall, F1
- Diagrams, pretrained models, test scripts included
- Hosted model weights via Git or Google Drive