1 ROBUST GENDER CLASSIFICATION UNDER CHALLENGING VISUAL CONDITIONS USING DEEP LEARNING

TEAM NAME: Code_Slayers

DATE: July 2, 2025

1.1.1 Technical Summary

Objective:
The paper presents a robust gender classification model using deep learning to handle challenging visual conditions like blur, rain, fog, low light, and overexposure. The focus is on binary classification (male/female) without applying noise-specific preprocessing, testing real-world generalization.

Dataset & Preprocessing:
Images are organized into `train/` and `val/` folders, each with `male/` and `female/` subfolders. Images are resized, normalized (zero mean, unit variance), and augmented (random flips, rotations). PyTorch's `ImageFolder` and `DataLoader` were used for loading and batching.

Model Architecture:
Built in PyTorch, the CNN includes:

- Convolutional layers with ReLU
- MaxPooling
- Fully Connected layers
- Dropout
- Sigmoid output for binary classification

Trained using **BCELoss** and **Adam Optimizer**, with optional GPU support.

Evaluation & Results:
Evaluated via Scikit-learn:

- Accuracy: **91%**
- Male F1-score: **0.95**
- Female F1-score: **0.74**

Performance drop for female class likely due to class imbalance, image variance, and model bias.

Innovation & Contribution:
Demonstrates effective gender classification under noisy, unprocessed data. No distortion-specific preprocessing is applied, ensuring raw generalization.

Future Scope:
Improve fairness and female recall by addressing class imbalance and incorporating synthetic noise-aware data augmentation.