Assignment No.01

- Course: Deep learning for perception
- Section: DS-B
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Short Report

1. Network Details

- **Architecture**:
  - **Base**: MobileNetV2 (width multiplier 1.0, depthwise separable conv blocks).
  - **Classifier Head**: GlobalAveragePooling → Dense(256, ReLU, Dropout 0.4) → Dense(num_classes, softmax).
- **Parameters**: ~3.5 M trainable after fine-tuning top 20 layers (2.2 M frozen).
- **Training Settings**:
  - Image size: 124 × 124 RGB
  - Batch size: 32
  - Optimizer: Adam (lr=1e-4 then 1e-5)
  - Epochs: up to 20 with early stopping.

2. Dataset Splits

Data Distribution:
Data Distribution

- Train: 70 %
- Validation: 15 %
- Test: 15 %
- All images from `/content/drive/MyDrive/Dataset/images`, annotations from `/content/drive/MyDrive/Dataset/annotations`.

3. Training Graphs

- **Loss curves**: Training loss decreased to ~1.54; validation loss plateaued ~1.84.
- **Accuracy curves**: Training accuracy ~44 %, validation ~30 % at best.

4. Performance Measures

- **Classification**
  - Accuracy: **0.296**
  - Macro F1: **0.303**
- **Regression (Valence/Arousal)**
  - RMSE: **0.425**
  - Corr(V): 0.061
  - Corr(A): 0.042 **Results Visualization:**
    Results Visualization

5. Performance Comparison of CNN Architectures

Model	Input Size	Train Time (approx)	Val Accuracy	Test Accuracy
MobileNetV2 (ours)	124×124	~1 hr 50 min	~0.30	0.296
Simple Custom CNN (baseline, earlier test)	96×96	~1 hr	~0.20	~0.18

MobileNetV2 clearly outperformed a simple CNN in both accuracy (~10 % absolute gain) and training stability, while staying within Colab's 2-hour limit.

Summary

The goal was to classify signatures with a CNN and evaluate performance. We used a **transfer learning** approach with MobileNetV2, fine-tuned the top layers, and achieved ~**30 % test accuracy** within the limited runtime on Colab Free GPU. Although the accuracy is modest, it beats a baseline custom CNN and demonstrates that pretrained feature extraction is beneficial even with a constrained training budget.