Pose Classification Model Exploration Report

1) **Model 1: Siamese Neural Network**

Goal:

Use a pair-based similarity learning approach to determine whether a test posture matches the correct posture.

Dataset Setup:

- **Correct Frames**: Extracted from trainer's video (e.g., `Trainer1`)
- **Incorrect Frames**: Extracted from another individual (e.g., `Karthi`) doing the same exercise with bad form.
- **Exercise**: Shoulder Press
- **Epochs**: 20

Observations:

- The model failed to generalize well.
- Even the same trainer's unseen videos gave incorrect results.
- **Majority of frames were misclassified**, even when form was correct.

2) **Model 2: MobileNetV2 (Binary Classifier)**

Goal:

Use a lightweight CNN (MobileNetV2) as a binary classifier (correct vs incorrect) for frame-level classification.

Dataset Setup:

- **Exercise**: Front Raises
- **Correct Frames**: 617
- **Incorrect Frames**: 603
- **Split**: 50–50 videos between classes
- **Epochs**: 50
- **Image Size**: 224x224
- **Batch Size**: 32

Data Augmentation Code:

```
train_datagen = ImageDataGenerator(
    rescale=1./255,
    rotation_range=15,
    width_shift_range=0.1,
    height_shift_range=0.1,
    zoom_range=0.1,
    shear_range=0.1,
    brightness_range=(0.8, 1.2),
    horizontal_flip=True,
    fill_mode='nearest'
))
```

- Validation data was only rescaled (no augmentation).

Model Architecture:

- Pretrained MobileNetV2 (frozen)
- Global Average Pooling + Dense + Dropout
- Binary output (sigmoid)

Results:

- Slightly better accuracy compared to the Siamese model.
- Worked reasonably well on known people.
- **Poor generalization to new individuals**: Low confidence, misclassifications.
- The video is correct or incorrect the output what I'm getting is correct for all the videos even it is in correct