ML Engineering Assignment

Objective:
Build a machine learning model that can accurately detect whether an image shows the front, back, or neither side of a mobile phone.

Provided Data:
- 100 images of front of phones
- 100 images of back of phones

The candidate can download additional images (front, back, or unrelated) from the internet to augment the dataset.

Final Deliverable:
A Python-based solution (Jupyter Notebook or script) that:
1. Loads an image.
2. Runs inference using the trained model.
3. Outputs one of three labels: 'front', 'back', or 'none'.

Requirements:
1. Data Preparation
   - Preprocess images (resizing, normalization, etc.).
   - Optionally perform data augmentation.
   - Optionally add 'none' class with unrelated images (hands, laptops, keyboards, etc.).

2. Model Training
   - Use any architecture (custom CNN or pretrained like ResNet/MobileNet, etc.).
   - Explain design/architecture choices.

3. Evaluation
   - Use proper metrics (accuracy, confusion matrix, etc.).
   - Handle class imbalance (if adding many 'none' examples).

4. Inference Script
   - Given a new image, return prediction ('front', 'back', or 'none').
   - Include a confidence score if applicable.

5. Code Quality
   - Clean, readable, well-documented code.
   - Requirements.txt or environment.yml for dependencies.