Title: Image Classification of Oxford 102 Flower Dataset Using Deep Learning

Project Description:
This project focuses on building and training a deep learning model to classify images from the Oxford 102 Flower Dataset, which contains 102 flower categories with varying image counts per class (I will choose just 10 classes). The objective is to create a convolutional neural network (CNN) capable of accurately categorizing these images based on their features. The project aims to explore techniques for data preprocessing, augmentation, and model optimization to achieve high classification accuracy.

Why is it Good?
Flower classification has applications in agriculture, botany, and conservation. By successfully implementing this project, I will deepen my understanding of deep learning principles and gain practical experience applying CNNs to a real-world problem. The diverse nature of the dataset challenges the model to learn complex visual patterns, enhancing its robustness and utility.

How Will I Do It?

1. **Data Preprocessing**: Images will be resized, normalized, and split into training, validation, and test sets. Data augmentation techniques such as rotation, flipping, and color jittering will be applied to enrich the training dataset.
2. **Model Architecture**: A CNN will be designed with convolutional, pooling, and dense layers. Regularization techniques like dropout and batch normalization will be employed to prevent overfitting.
3. **Training and Tuning**: The model will be trained using PyTorch with a cross-entropy loss function and the Adam optimizer. Hyperparameters such as learning rate and batch size will be tuned for optimal performance.
4. **Evaluation**: Model performance will be evaluated on validation and test sets using metrics like accuracy, precision, recall, and F1-score.

Performance Evaluation:
The system's performance will be assessed using classification accuracy, precision, recall, and F1-score. A confusion matrix will provide insights into misclassifications. Additionally, visualization of model predictions and gradients will help interpret results.