Progress Report on Transfer Learning with VGG16

Model Used: VGG16

Training Epochs: 50

Accuracy Achieved: 87.61%

Data Preprocessing:

- Top 10 Labels: Images were filtered to include only the top 10 most frequent labels.
- Image Resizing: All images were resized to 224x224 pixels.
- Label Encoding: Labels were encoded using LabelEncoder and transformed to categorical format.
- Data Splitting: Data was split into training (80%) and testing (20%) sets.
- Normalization: Pixel values were normalized to the range [0, 1].

Data Augmentation:

- Techniques Used: Rotation, width shift, height shift, horizontal flip, zoom, and shear.

Model Architecture:

- VGG16 pre-trained on ImageNet, with the top layers removed. (Base Model)
- Flatten layer
- Dense layer with 256 units and ReLU activation
- Dropout layer with a rate of 0.5
- Dense output layer with softmax activation (number of units = number of classes)

Training Configuration:

- Optimizer: Adam with a learning rate of 1e-4.
- Loss Function: Categorical cross-entropy.
- Metrics: Accuracy.
- Reduce learning rate on plateau (Callback)
- Early stopping with patience for 10 epochs and restoring best weights ((Callback))

Results:

Test Accuracy: 87.61%

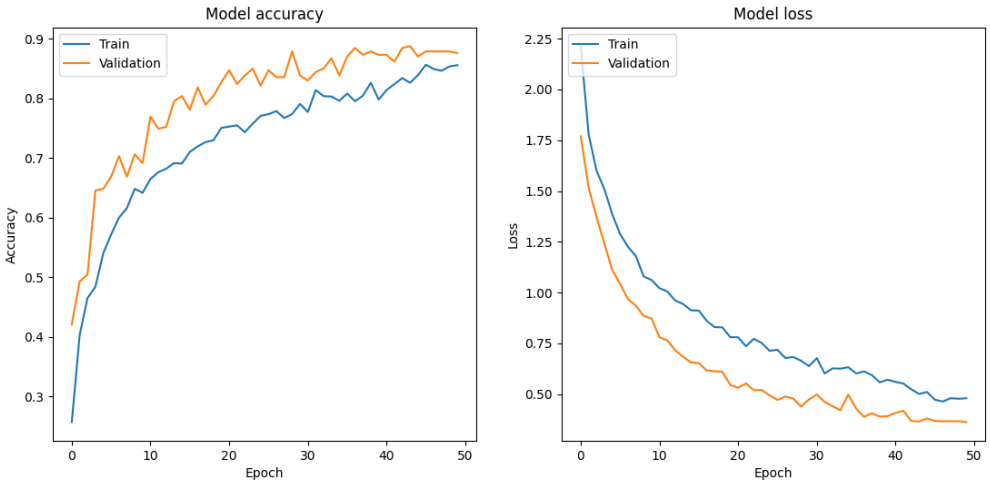

Figure 1, Training and Validation Accuracy and Loss

Summary:

The application of transfer learning using VGG16 significantly improved model performance, achieving an accuracy of 87.61%. The model was trained for 50 epochs with data augmentation techniques applied to the training set. Learning rate reduction and early stopping callbacks helped in optimizing the training process.

Future Work:

Hyperparameter Tuning: Experiment with different learning rates, batch sizes, and optimizers to further enhance model performance.

Architecture Exploration: Experiment with more complex architectures, including deeper networks and different types of layers.