

Report on Transfer Learning with Fine-Tuning

Pre-Trained Model:

For transfer learning, we utilized a pre-trained ResNet-18 model, which is renowned for its effective use of residual connections to enhance learning in deep neural networks. The ResNet-18 model, originally trained on the ImageNet dataset, is known for its robust feature extraction capabilities. By leveraging this pre-trained model, we can fine-tune it on our specific task of classifying CIFAR-10 images.

Fine-Tuning Training Results:

Training and Validation Loss:

- **Training Loss Plot:** The training loss decreased steadily over the epochs, starting from an initial value of 2.530 and converging to approximately 0.725 by the end of the fine-tuning process. This steady decline indicates that the model learned effectively during training.
- **Validation Loss Plot:** The validation loss followed a similar trend, beginning at around 2.480 and reducing to approximately 0.690. The gap between training and validation loss indicates that the model generalized well without significant overfitting.

Final Model Accuracy:

- **Test Accuracy:** The final test accuracy achieved by the fine-tuned model was approximately **0.828**, representing a notable improvement over the baseline model. This high accuracy reflects the effectiveness of leveraging the pre-trained ResNet-18 model for the CIFAR-10 classification task.

Conclusion:

The use of the pre-trained ResNet-18 model for transfer learning proved highly beneficial. Fine-tuning the model led to significant improvements in both training and validation loss, with the final test accuracy reaching approximately 82.8%. This demonstrates the power of transfer learning in leveraging pre-trained networks to achieve high performance on new tasks with relatively small amounts of additional training.