100-Class Image Classification using Transfer Learning with ResNet50

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Introduction

Objective:

- To build an image classification model using transfer learning with ResNet50 to classify 100 different categories of images.

Advantage of Pre-Trained Models:

- Efficiency
- Accuracy
- Simplified Development
- Cost-Effective

Dataset Overview

Dataset:

- Number of images: 14492
- Number of classes: 100
- Image dimensions: 224x224x3

Train, validation, and test splits:

```
Found 13492 files belonging to 100 classes.
Found 500 files belonging to 100 classes.
Found 500 files belonging to 100 classes.
```

Visualization of training data images

Transfer Learning Concept

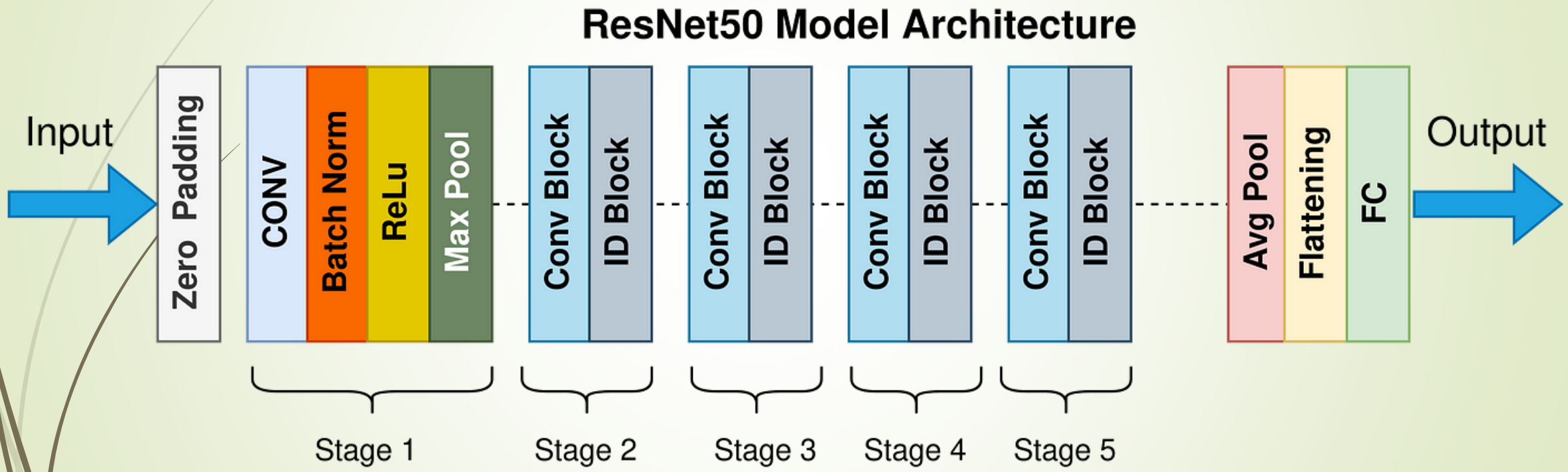
What is Transfer Learning?

- Transfer Learning is a machine learning technique where a pre-trained model's knowledge and features are transferred to a new, related task or domain, enabling faster adaptation and improved performance.

Why ResNet50?

- Depth (50 layers), well-known for solving vanishing gradient problems using residual blocks.
- Proven performance on large-scale classification tasks.

ResNet50 Model Architecture



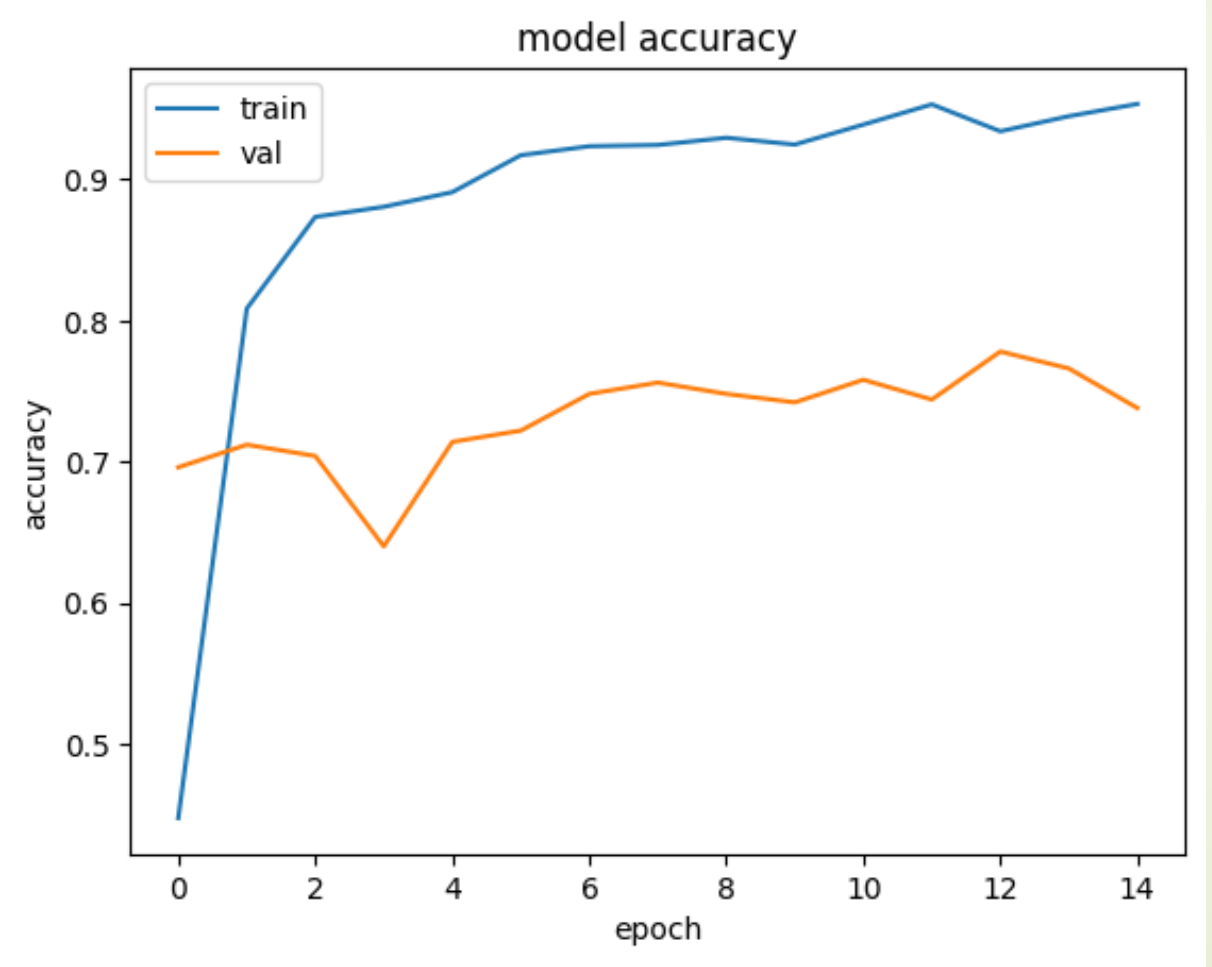
Model Training Strategy

- **Optimizer Used** : Adam
- **Loss Function** : Sparse Categorical Cross-Entropy
- **Number of Epochs** : 15
- **Metrics Used** : Accuracy

Evaluation Metrics

- **Accuracy** : 0.875
- **Precision** : 1.0
- **Recall** : 0.875
- **F1-Score** : 0.921875

Training Accuracy vs. Validation Accuracy



Training Loss vs. Validation Loss

Model Performance on Test data

Conclusion

Summary of Key Points:

- Successfully trained a 100-class image classifier using transfer learning.
- Achieved significant accuracy with ResNet50.

Takeaways:

- Transfer learning with pre-trained models is highly effective for complex tasks with limited data.

Thank you