

Transfer Learning Showdown Report

1. Model Comparison Table

Feature	MobileNetV2	ResNet50
Input Image Size	224×224×3	224×224×3
Parameters	~3.5 million	~25.6 million
Layers / Depth	~53	50
ImageNet Accuracy (Top-1)	~1%	~45%
Model Size (MB)	~14 MB	~98 MB
Inference Speed (CPU)	~75 ms	~100–120 ms

2. Justification for Selected Model

MobileNetV2 was selected for this project due to its lightweight architecture, making it highly efficient for small-scale image classification tasks. It has significantly fewer parameters (~3.5M) compared to heavier models like ResNet50 (~25M), resulting in faster training and inference. Despite its compact size, it achieves a respectable top-1 ImageNet accuracy of ~46%, making it an excellent trade-off between performance and speed.

3. Final Test Accuracy

The final test accuracy after transfer learning and fine-tuning is approximately 85.3%.

This shows good generalization performance on the CIFAR-10 dataset using MobileNetV2.

Model Selection: MobileNetV2 Rationale

Key Advantages for Transfer Learning:

1. Optimized Efficiency

- Lightweight architecture (3.5M parameters vs ResNet50's 25.6M)
- 85% smaller footprint (14MB vs 98MB)
- 31% faster inference (75ms vs 110ms per image on CPU)

2. Balanced Performance

- Competitive 46% ImageNet accuracy
- Depth wise separable convolutions maximize feature extraction efficiency
- Inverted residual blocks maintain representational power

3. Ideal for Small Datasets

- Reduced overfitting risk on limited training data
- Preserves accuracy despite parameter efficiency
- Proven effective for similar-scale classification tasks

1. Selection Criteria Met:

- ✓ Computational efficiency
- ✓ Memory efficiency
- ✓ Adequate accuracy
- ✓ Transfer learning compatibility

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