Neural Network Pruning Report

Model: ResNet-18 | **Type:** ResNet
Dataset: CIFAR-10 | **Pruning:** 51.1%

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Framework: CleanAI v0.1.0

Executive Summary

This report presents a comprehensive analysis of neural network pruning operations. The model was successfully pruned with a reduction of 51.1% in parameters while maintaining 9.20% accuracy.

Metric	Before Pruning	After Pruning	Change
Parameters	11,181,642	5,464,069	-51.1%
Model Size (MB)	42.65	20.84	-51.1%
GFLOPs	3.64	1.81	-50.3%
Inference Time (ms)	4.65	11.50	0.40x faster
Accuracy (%)	9.00	9.20	--0.20%

2. Model & Experiment Information

Model Architecture

Property	Value
Model Name	ResNet-18
Model Type	ResNet
Total Layers	21
Dataset	CIFAR-10

Architecture Summary:

ResNet with 21 layers

4. Pruning Decision Mechanism

This section explains the pruning strategy and importance criteria used to determine which parameters to prune.

Pruning Configuration

Parameter	Value
Pruning Method	coverage
Target Pruning Ratio	30.0%
Iterative Steps	1
Actual Parameters Pruned	51.13%

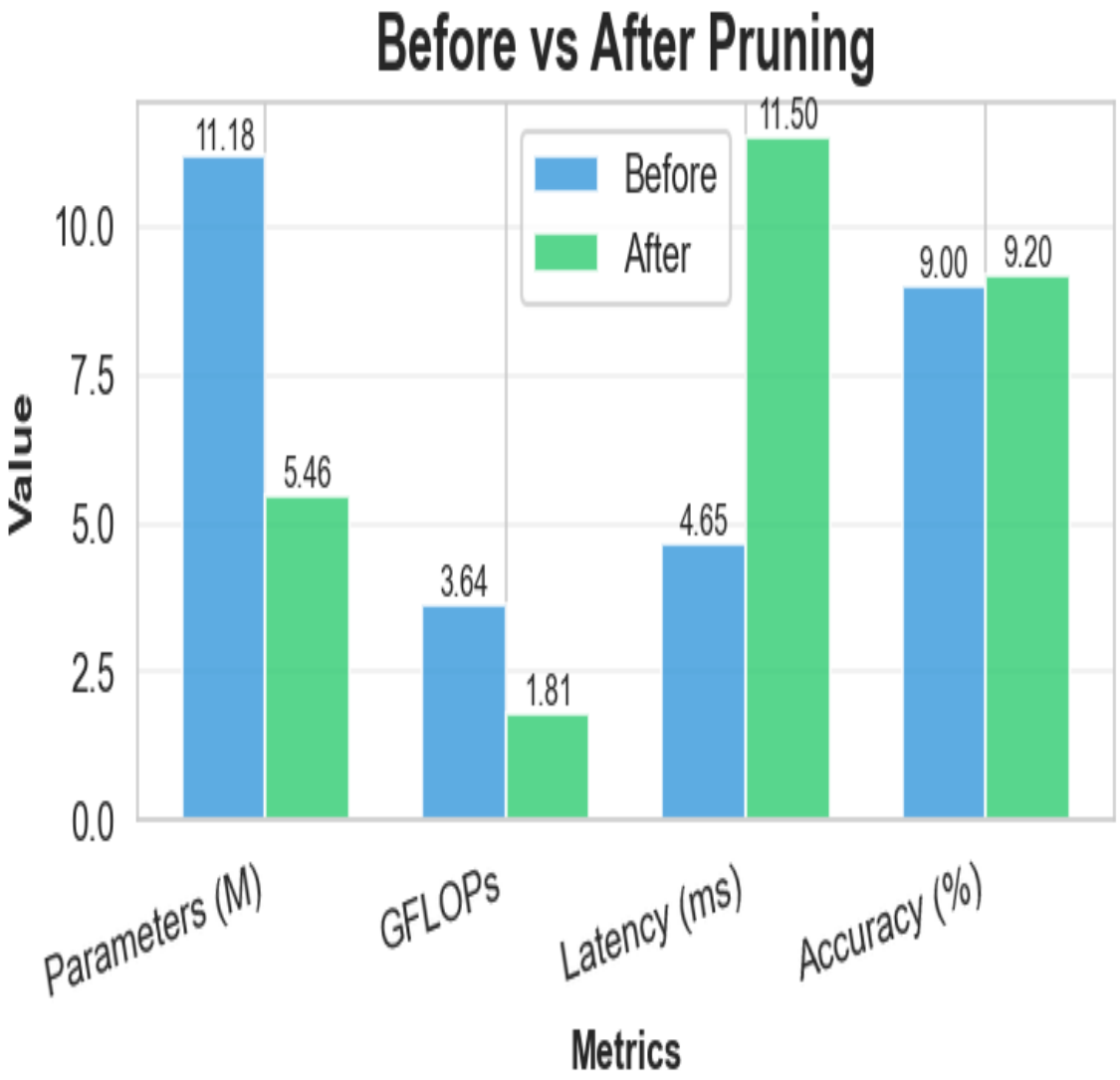
Importance Criterion Explanation

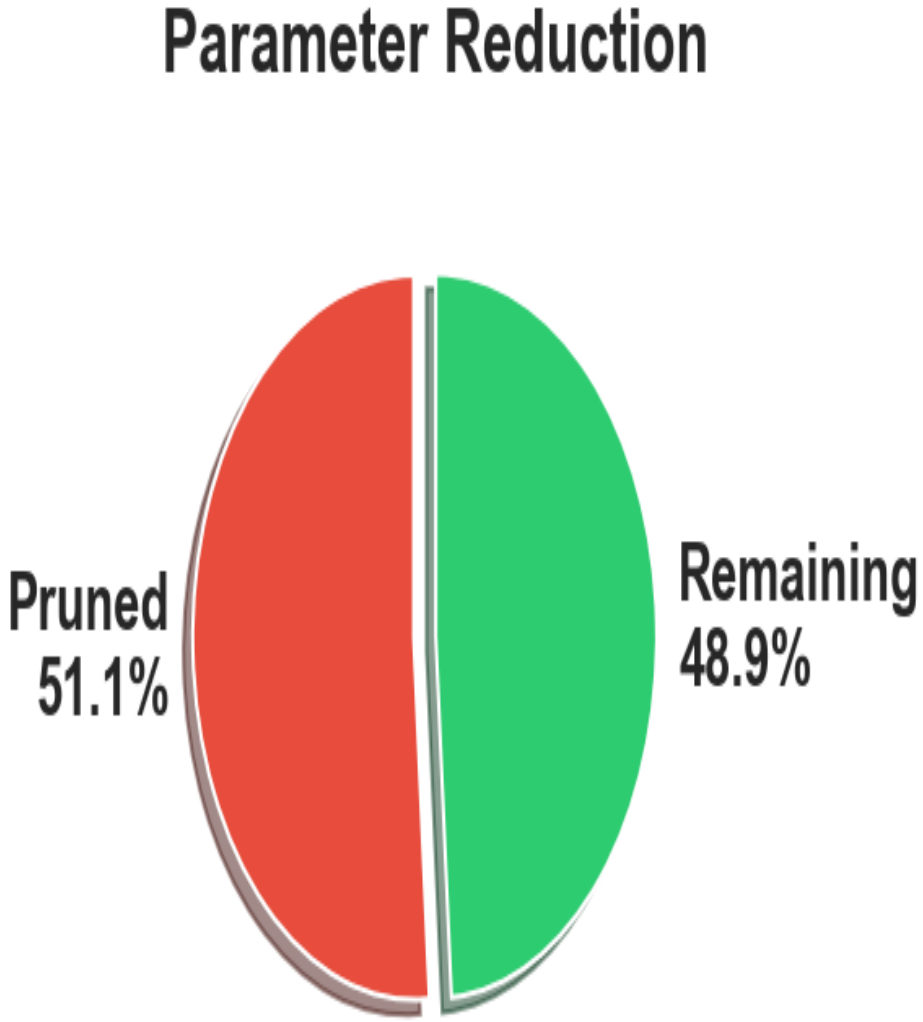
Coverage-Based Pruning: This method uses neuron activation patterns to determine importance. Neurons that are rarely activated across the dataset are considered less important and are prioritized for pruning. This ensures that frequently-used pathways in the network are preserved.

5. Post-Pruning Model Structure

Analysis of the pruned model architecture and remaining parameters.

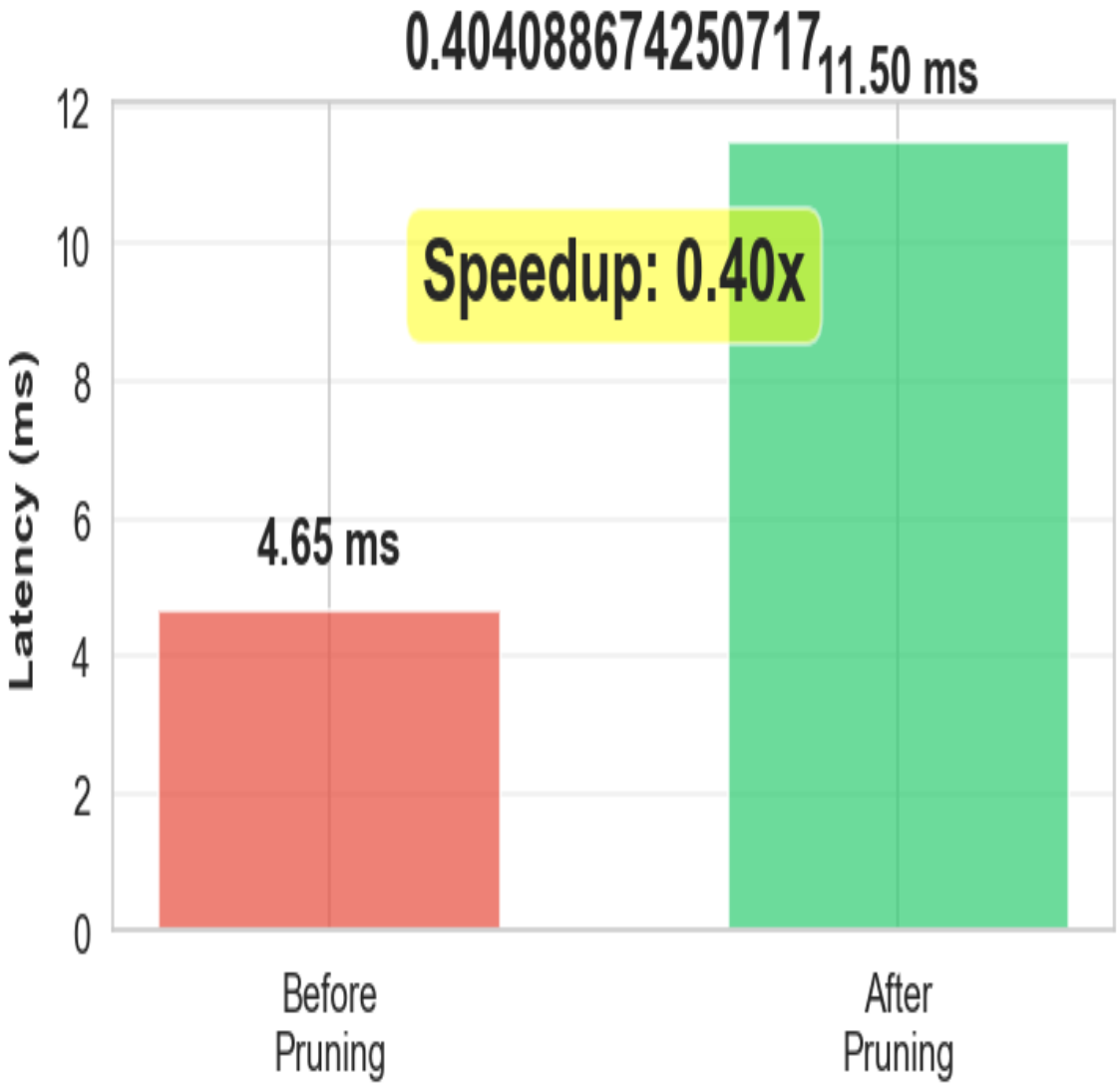
Architecture Comparison




Parameter Reduction
Pruned
51.1%
Remaining
48.9%

6. Performance Comparison

Detailed comparison of model performance before and after pruning.



Accuracy Analysis

Metric	Before	After	Change
Top-1 Accuracy	9.00%	9.20%	--0.20%

Efficiency Gains

Metric	Improvement
Parameter Reduction	51.13%
Model Size Reduction	51.13%

FLOPs Reduction	50.30%
Speedup	0.40x

7. Risk Analysis & Reliability

Assessment of potential risks and reliability concerns with the pruned model.

Risk Analysis

✓ **No significant risks detected.**

Recommendations

✓ **The pruned model shows no significant risks. It is ready for deployment.**

Conclusion

Excellent Result: The pruning operation achieved significant parameter reduction with minimal accuracy loss. The pruned model is highly efficient and maintains strong performance characteristics.