Deep Learning Image Classification Project Report

This report compares three image classification approaches using the CIFAR-10 dataset: a custom CNN architecture and two transfer learning methods using VGG16.

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Methodology & Architecture Decisions

Custom CNN Architecture

A VGG-style architecture with progressive depth, regularization techniques, and an optimization strategy.

Transfer Learning with VGG16

Two approaches: basic transfer learning with frozen layers and fine-tuned transfer learning with unfrozen layers.

Results Analysis
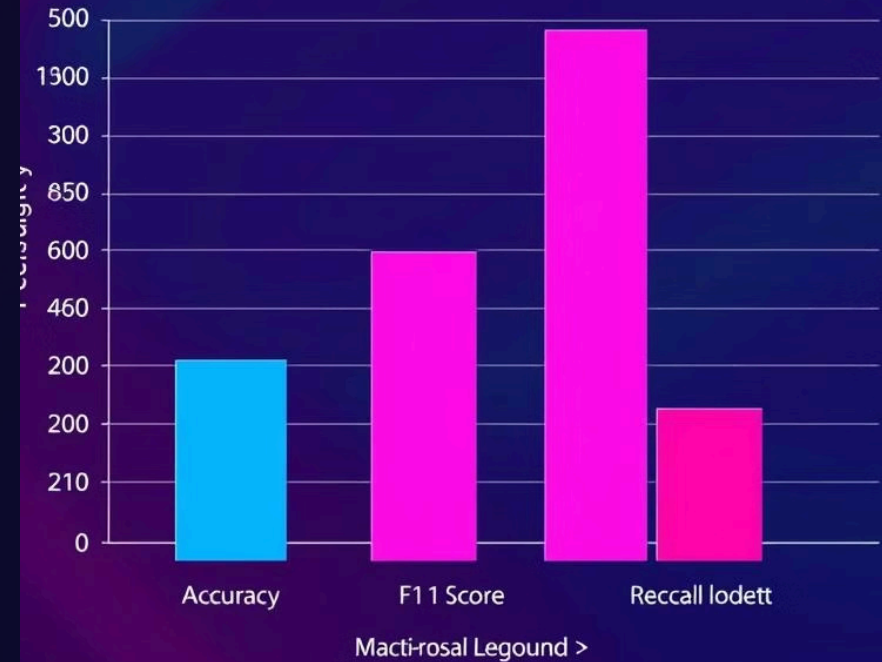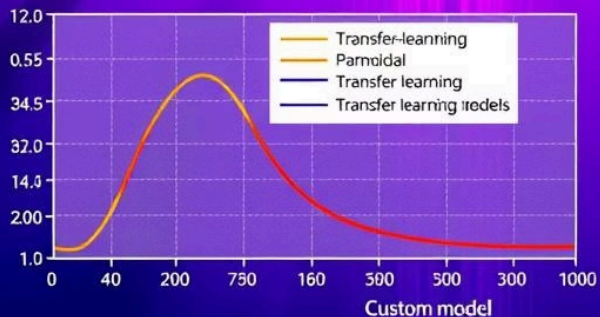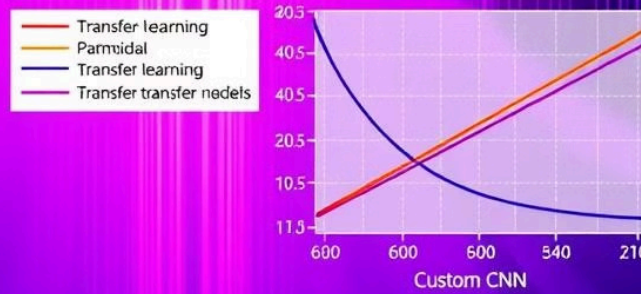
88%
Custom CNN

63%
VGG16 Transfer

75%
VGG16 Fine-tuned

500	
1900	
300	
850	
460	
200	
210	
0	

Accuracy   F1 1 Score   Reccall lodett

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Findings

Custom CNN Performance

Best overall performance (88% accuracy) with consistent metrics.

Basic Transfer Learning Limitations

Unexpectedly lower performance (63% accuracy) due to possible reasons.

Fine-tuning Improvements

Significant improvement over basic transfer learning with a 12% accuracy increase.

Conclusion

Custom CNN
Most effective for this task.

Transfer Learning
Powerful but needs adaptation.

Dataset Characteristics
Consider model complexity.

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