

Deep Learning Driven Automated Alzheimer's Disease Detection using Magnetic Resonance Imaging (MRI)

Leveraging cutting-edge artificial intelligence to revolutionize early Alzheimer's detection through advanced brain imaging analysis.

Global Impact

Alzheimer's Disease causes 60–70% of dementia cases worldwide, affecting millions of families.

Early Detection

Crucial for slowing disease progression and reducing long-term healthcare costs.

MRI Technology

Non-invasive brain imaging provides detailed structural analysis for accurate diagnosis.

AI Power

Deep learning extracts complex patterns from MRI data for early, precise detection.



Challenges in Current AD Detection

Current Alzheimer's detection faces significant barriers that limit effectiveness and accessibility of early diagnosis.

Manual Analysis Limitations

Time-intensive MRI interpretation prone to human error and subjective bias

Traditional ML Constraints

Support Vector Machines require handcrafted features, limiting generalization capabilities

Automation Gap

Absence of accurate, fast automated systems for early-stage detection

Data Challenges

High class imbalance and dataset variability significantly reduce model performance



Deep Learning Framework for AD Detection

Our innovative solution harnesses the power of ResNet architecture with transfer learning to transform Alzheimer's detection.



ADNI Dataset Integration

Transfer learning using pretrained ResNet on MRI slices from the Alzheimer's Disease Neuroimaging Initiative



End-to-End CNN Model

Eliminates manual feature extraction and reduces complex preprocessing requirements



High Accuracy Classification

Achieves approximately 98% accuracy in classifying Normal Control, Mild Cognitive Impairment, and Alzheimer's stages



GPU-Optimized Training

Efficiently handles large-scale image data processing with advanced computational resources



Real-World Applications



Transforming healthcare delivery through intelligent automation and enhanced diagnostic capabilities.



Clinical Screening

Early and accurate screening capabilities integrated directly into hospital workflows



Clinical Decision Support

Advanced diagnostic tool supporting neurologists and radiologists in complex cases



CAD System Integration

Seamless integration into Computer-Aided Diagnosis systems for enhanced workflow

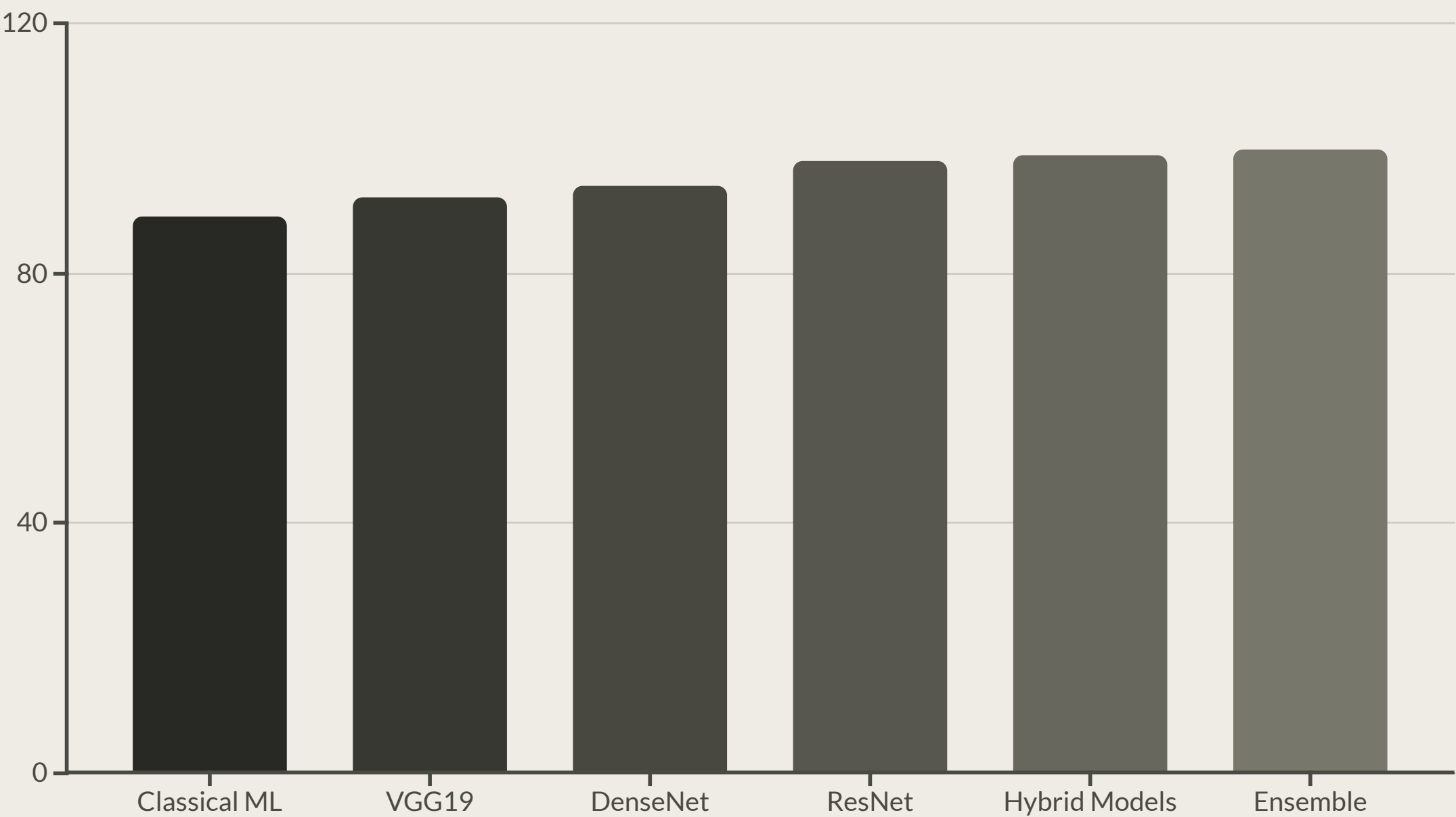


Population Screening

Telemedicine applications enabling large-scale community health screening programs

Superiority Over Other Models

Our ResNet-based approach demonstrates exceptional performance compared to alternative machine learning methods.



Performance Excellence

Hybrid ResNet + InceptionV3 models achieve up to 99% accuracy, while ensemble approaches reach 99.83%

Superior Generalization

Enhanced robustness to noise variations and reduced manual intervention requirements

Clinical Advantage

Significantly outperforms traditional methods like Support Vector Machine and Random Forest