

After 2017 is there any CNN?

1. EfficientNet (2019)

Authors: Google Brain

Paper: EfficientNet: Rethinking Model Scaling for Convolutional Neural Networks

Key Idea:

- Introduces compound scaling, which uniformly scales depth, width, and resolution of a network.
- Uses MBConv (Mobile Inverted Bottleneck Convolution) from MobileNetV2 for efficiency.

Advantages:

- Achieves state-of-the-art accuracy with fewer parameters.
- EfficientNet-B7 outperforms previous CNNs with significantly fewer computations.

Example Performance:

- EfficientNet-B0 (smallest) has 5.3M parameters but outperforms ResNet-50.
- EfficientNet-B7 (largest) achieves top-1 accuracy of 84.4% on ImageNet.

2. RegNet (2020)

Authors: Facebook AI

Paper: Designing Network Design Spaces

Key Idea:

- Instead of manually designing CNNs, RegNet searches for the best architecture based on a set of rules.
- Uses stage-wise scaling rules for better efficiency.

Advantages:

- Automatically optimizes model architecture for efficiency and performance.
- Outperforms ResNet and EfficientNet on ImageNet.

Example Performance:

- RegNetY-8GF has 39M parameters, achieving 80% top-1 accuracy on ImageNet.

3. NFNets (2021)

Authors: DeepMind

Paper: High-Performance Large-Scale Image Recognition Without Normalization

Key Idea:

- Avoids batch normalization (BN), replacing it with adaptive gradient clipping (AGC).
- Uses Scalable Weight Standardization (SWS) to stabilize training.

Advantages:

- Faster training and better generalization.
- Outperforms ResNets and EfficientNet without BN.

Example Performance:

- NFNet-F6 achieves 86.0% accuracy on ImageNet, surpassing EfficientNet-B7.

4. ConvNeXt (2022)

Authors: Meta AI

Paper: A ConvNet for the 2020s

Key Idea:

- Inspired by Vision Transformers (ViTs), ConvNeXt modernizes CNN design.
- Uses depth-wise convolutions, LayerNorm, and GELU activations.

Advantages:

- Matches transformer models like Swin Transformer in performance.
- Fully convolutional, making it easier to deploy than ViTs.

Example Performance:

- ConvNeXt-Large achieves 87.8% accuracy on ImageNet.

5. RepVGG (2021)

Authors: Tencent AI Lab

Paper: RepVGG: Making VGG-Style ConvNets Great Again

Key Idea:

- Uses re-parameterization to train a complex model but deploy a simple VGG-style model.

- Merges multiple branches in training into a single 3×3 convolution at inference.

Advantages:

- Much faster inference compared to ResNet.
- Very simple deployment for real-world applications.

Example Performance:

- RepVGG-B3 achieves 81.1% accuracy on ImageNet with lower latency than ResNet.