Our study suggests the significance of structural diversity in deep network design.

Our PolyNet design yields higher accuracy than Inception-ResNet given the same computation budget.

Our best PolyNet model achieves 4.25% classification error on the ImageNet validation set, substantially better than the state-of-the-art.

Inception-ResNet-v2 [1] is the base model

Two effective ways to extend the structure: Poly and K-way, were evaluated

Data augmentation: random crop.
Optimization: RMS-Prop.
Ultra-deep models are initialized via block insertion, where new blocks are initialized using Xavier.
Distributed training on 4 machine, each with 8 TitanX GPUs, using synchronous scheme.
Overfitting observed for ultra-deep networks, and tackled by adaptive stochastic depth [2].
Multi-crop: 144 crops [3] with selective pooling
Ensemble: weighted combination of PolyNets and ResNets.

Developed by us from scratch
Very low memory consumption
Highly optimized pre-processing and I/O pipeline
Efficient distributed training on multiple machines

References: