Inception Network

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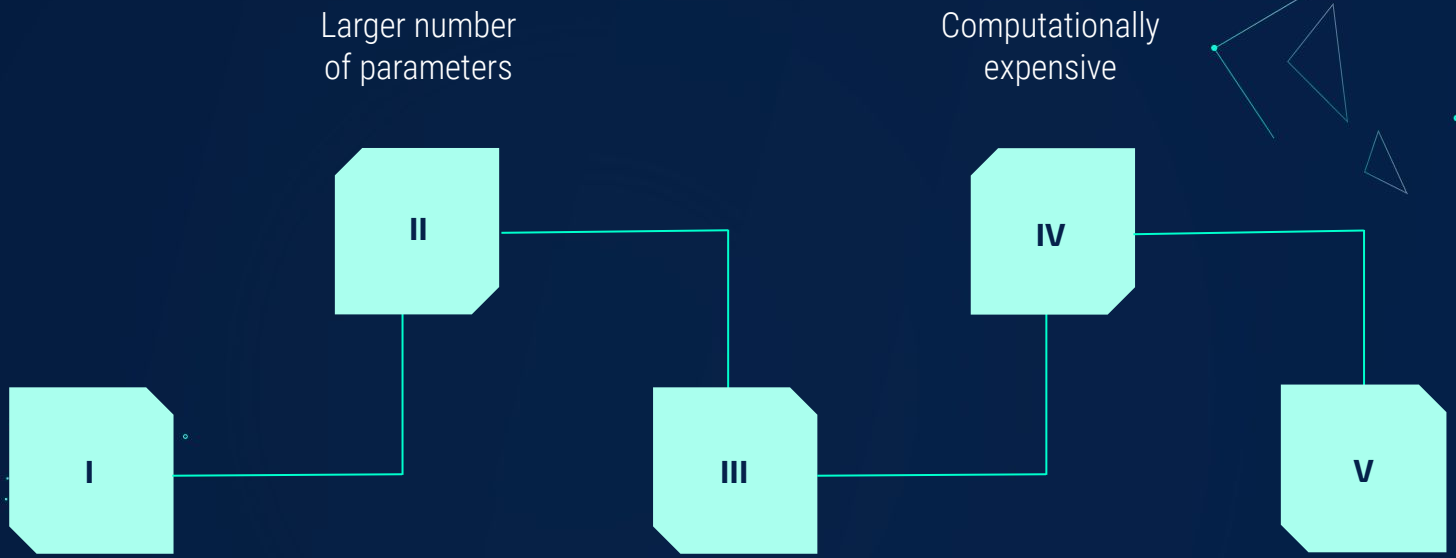
Motivation

Inception

Tasks: Object classification and detection
Improvement approaches:

1. **Accuracy:** Not achieved by only larger models and dataset
2. **Efficiency:** Necessary for real world applications

Contribution



Contribution

Problem: Inefficient computation of sparse matrices

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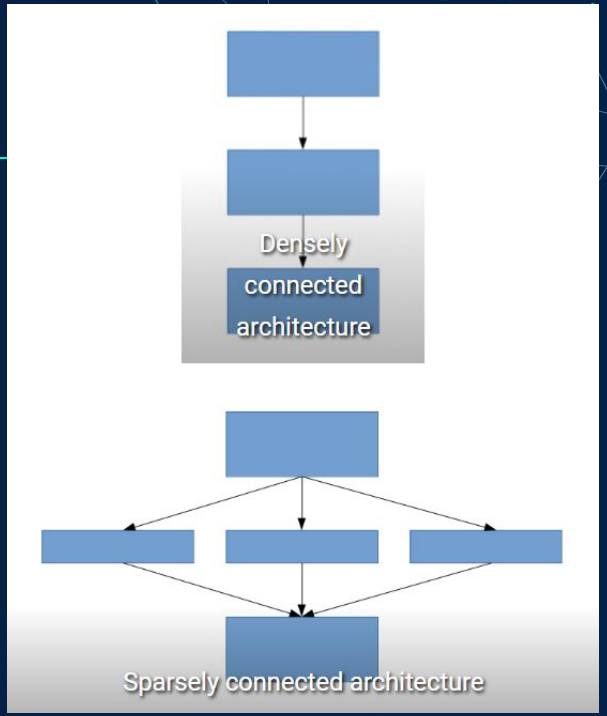
Solution: Filter-level sparsity

Contribution: Approximation of a sparse architecture

VIII



Architecture

Inception Modules

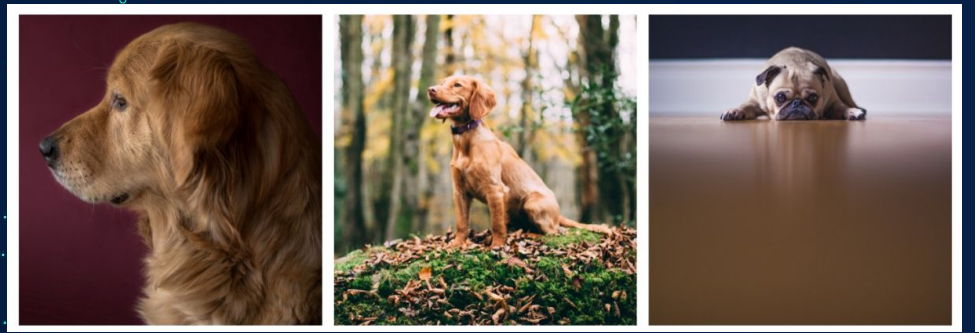
Used to implement Sparsity

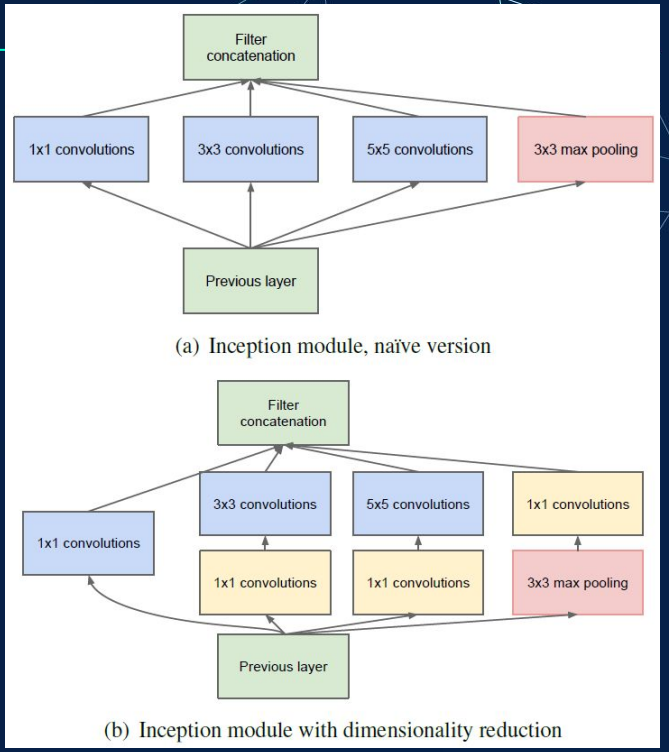
Multiple scale handling

Using different kernels with different sizes

Dimensionality Reduction

Using 1x1 conv to reduce the number of parameters





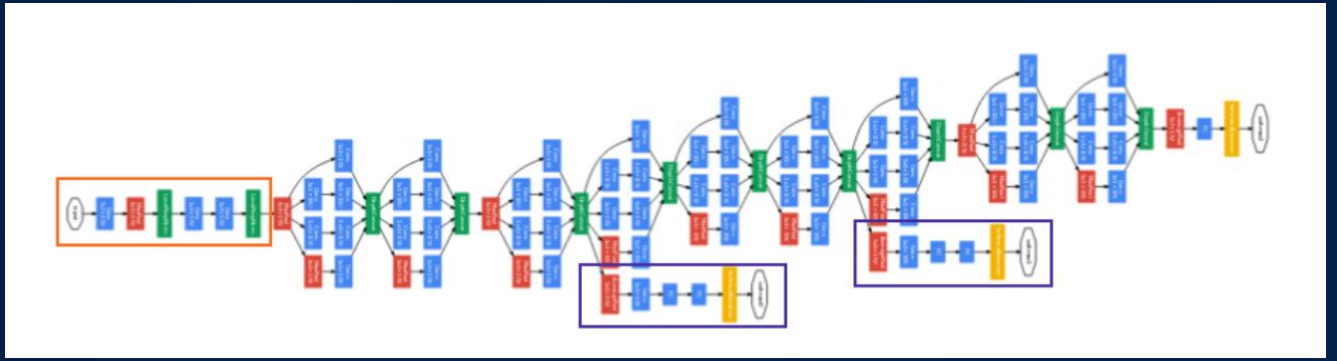
GoogLeNet

Characteristics

1. 9 inception modules
2. 22 layer
3. Relu activation
4. Dropout applied
5. Average pooling instead of FC
6. 1x1 conv as reduction and projection

Auxiliary Classifier

1. Used to deal with vanishing gradient in the training.
2. Small cnn at the top of one or two inception modules
3. Total loss is a weighted sum of the final loss and auxiliary loss



Results in ILSVRC 2014

Input: 1.2 million images from ImageNet
Output: Probability of 1000 categories
Details: Ensemble method using 7 versions of GoogLeNet
Result: Best performance with top-5 error = 6.67%

Classification Challenge

Output: boxes around objects among 200 classes
Details:
1. Ensemble using 6 versions of GoogLeNet.
2. External Data from ILSVRC12
Result: Mean average precision = 43.9

Detection Challenge

Conclusion

Notion

Approximation of sparsity using dense components

Process

1. Stacking up Inception modules.
2. Filter with different size to capture features at different scales.
3. using dimensionality reduction and pooling to reduce the number of parameters

Achievement

A less expensive network with less error rate compared with state-of-the-art approaches

THANKS