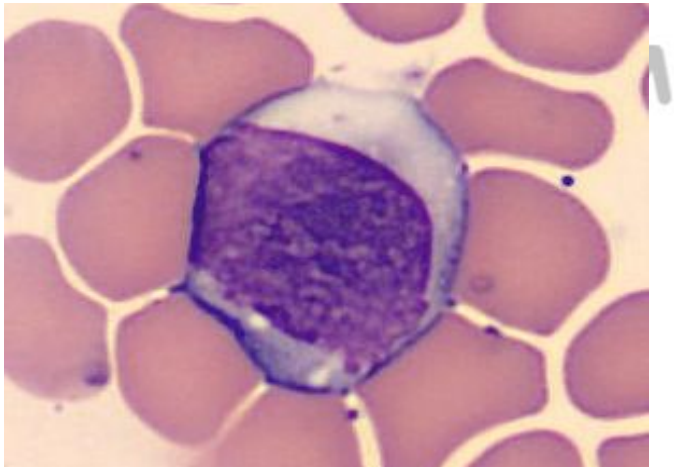
Understanding DL Architectures for Image Segmentation

Analytics Vidhya

Approach to solve Blood Cell Segmentation



Advanced
Deep Learning

Understanding DL Architectures for Image Segmentation

- UNet Family
- DeepLab Family
- R-CNN Family

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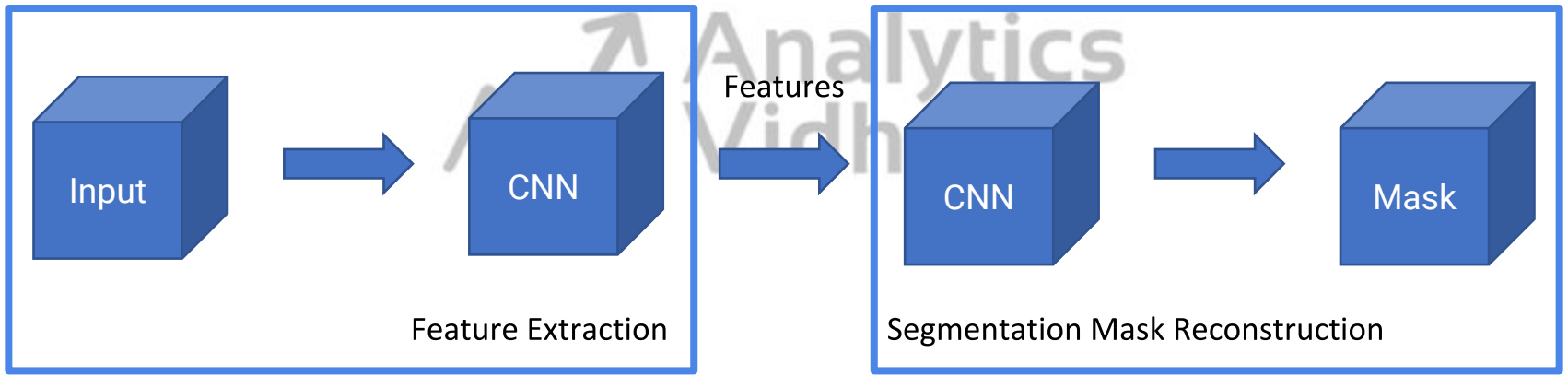
Key Takeaways of DeepLab Family

- Encoder-Decoder Network with depthwise separable convolutions and point wise separable convolutions

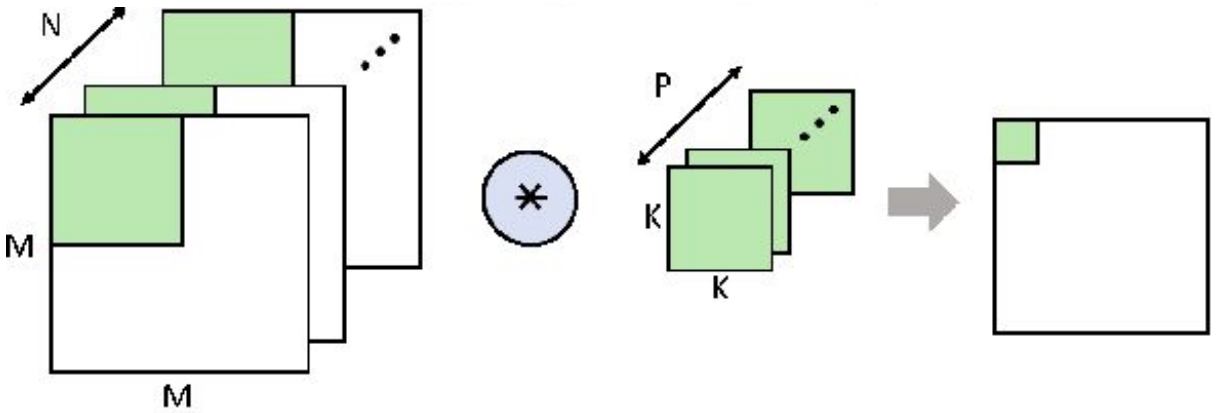
Key Takeaways of DeepLab Family

- Encoder-Decoder Network with depthwise separable convolutions



Key Takeaways of DeepLab Family

- Encoder-Decoder Network with depthwise separable convolutions



(a) standard convolution

Source: Lin Bai et. al. (2018) "A CNN Accelerator on FPGA Using Depthwise Separable Convolution"

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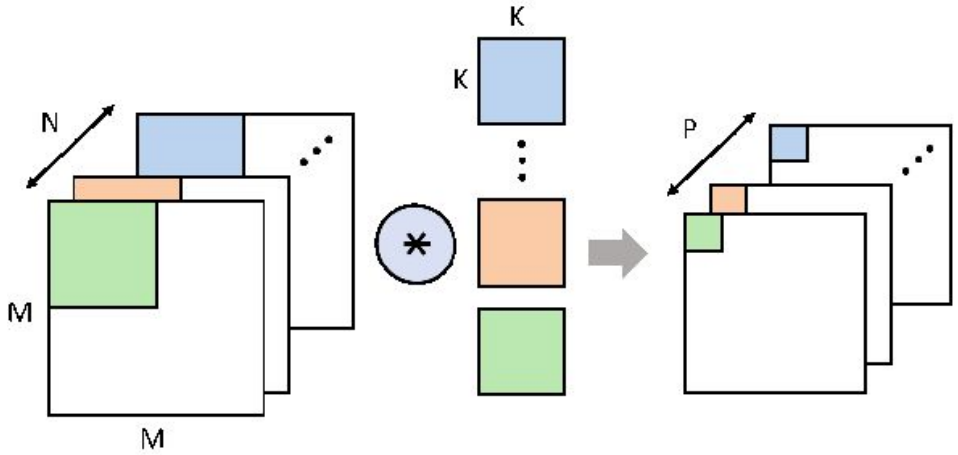
- Encoder-Decoder Network with depthwise separable convolutions



(b) depthwise convolution

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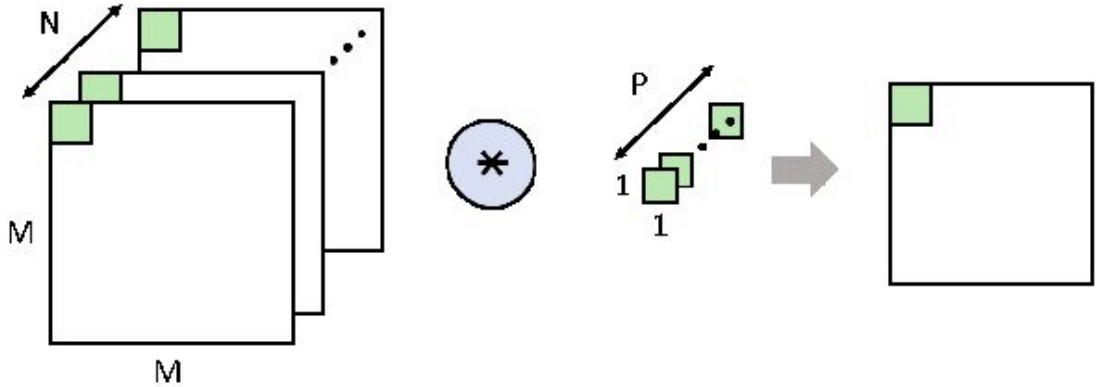
Key Takeaways of DeepLab Family

- Encoder-Decoder Network with pointwise separable convolutions



(c) pointwise convolution

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Key Takeaways of DeepLab Family

- Encoder-Decoder Network with pointwise separable convolutions
- Spatial Pyramid Pooling Networks to capture multi-scale information

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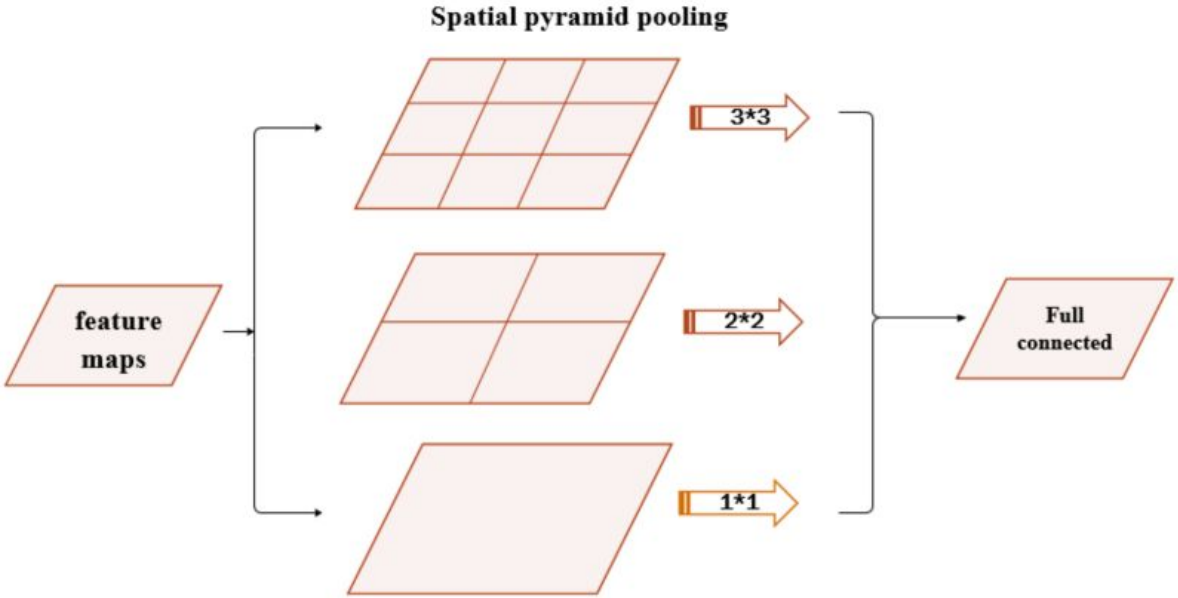

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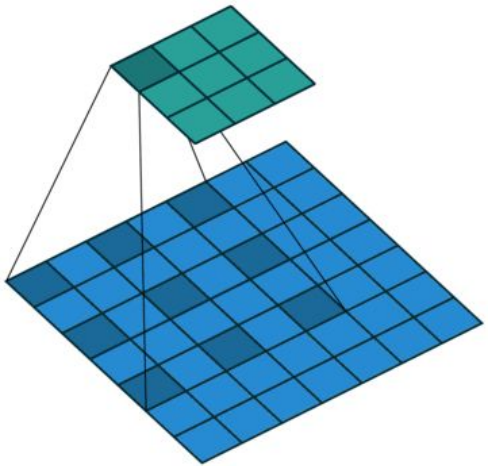
Key Takeaways of DeepLab Family

- Encoder-Decoder Network with depthwise separable convolutions
- Spatial Pyramid Pooling Networks to capture multi-scale information
- Atrous Convolutions (or Dilated Convolutions) for larger effective field of view and to reduce computational complexity

Key Takeaways of DeepLab Family

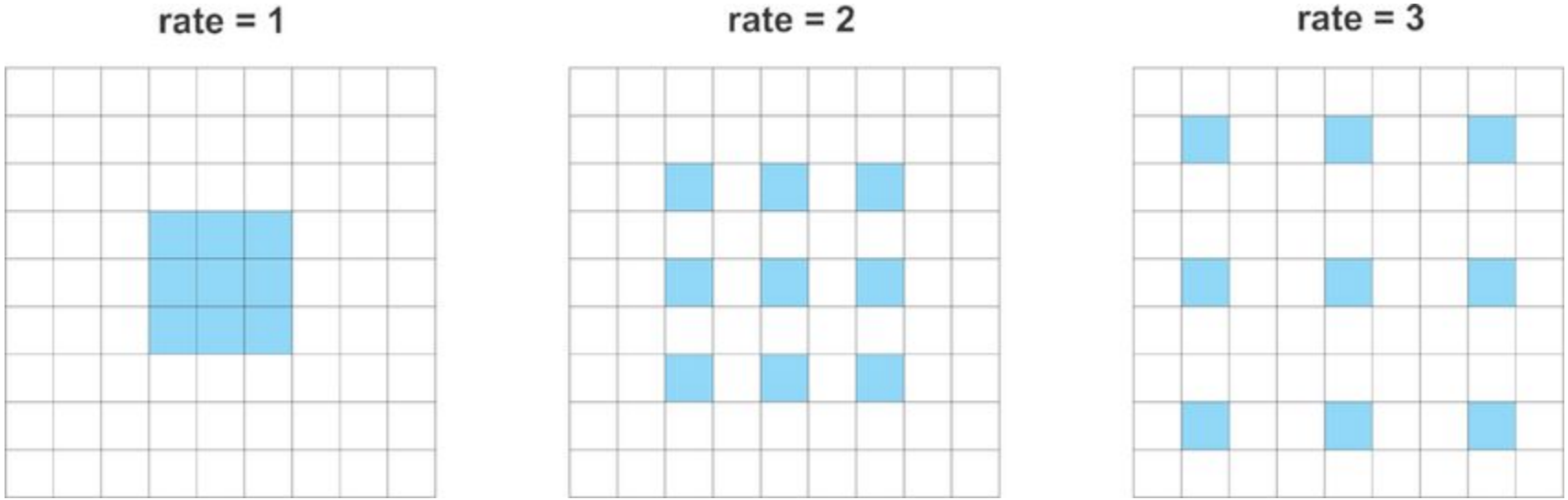
- Atrous Convolutions (or Dilated Convolutions) for larger effective field of view and to reduce computational complexity



Source - Francesco Visin et. al. (2016) A guide to convolution arithmetic for deep learning

Key Takeaways of DeepLab Family

- Atrous Convolutions (or Dilated Convolutions)



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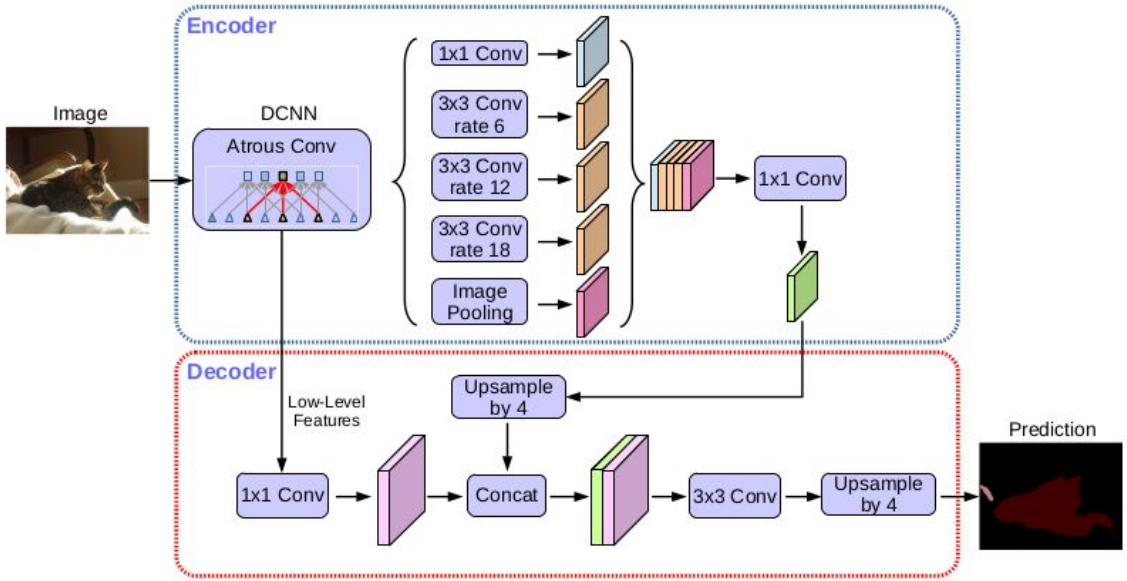
Key Takeaways of DeepLab Family

- Overall DeepLabv3+ model



Source - Yukun Zhu et. al. (2018) Encoder-Decoder with Atrous Separable Convolution for Semantic Image Segmentation

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Steps for Image Segmentation using DeepLabv3 model

1. Data Loading and Preprocessing

1.1 Load the Data

1.2 Define custom dataset and dataloader

1.3 Data Exploration

2. Image Segmentation through DeepLabv3 model

2.1 Define model architecture

2.2 Train the model

2.3 Calculate IoU score

Code Walkthrough of DeepLabv3

Thank you