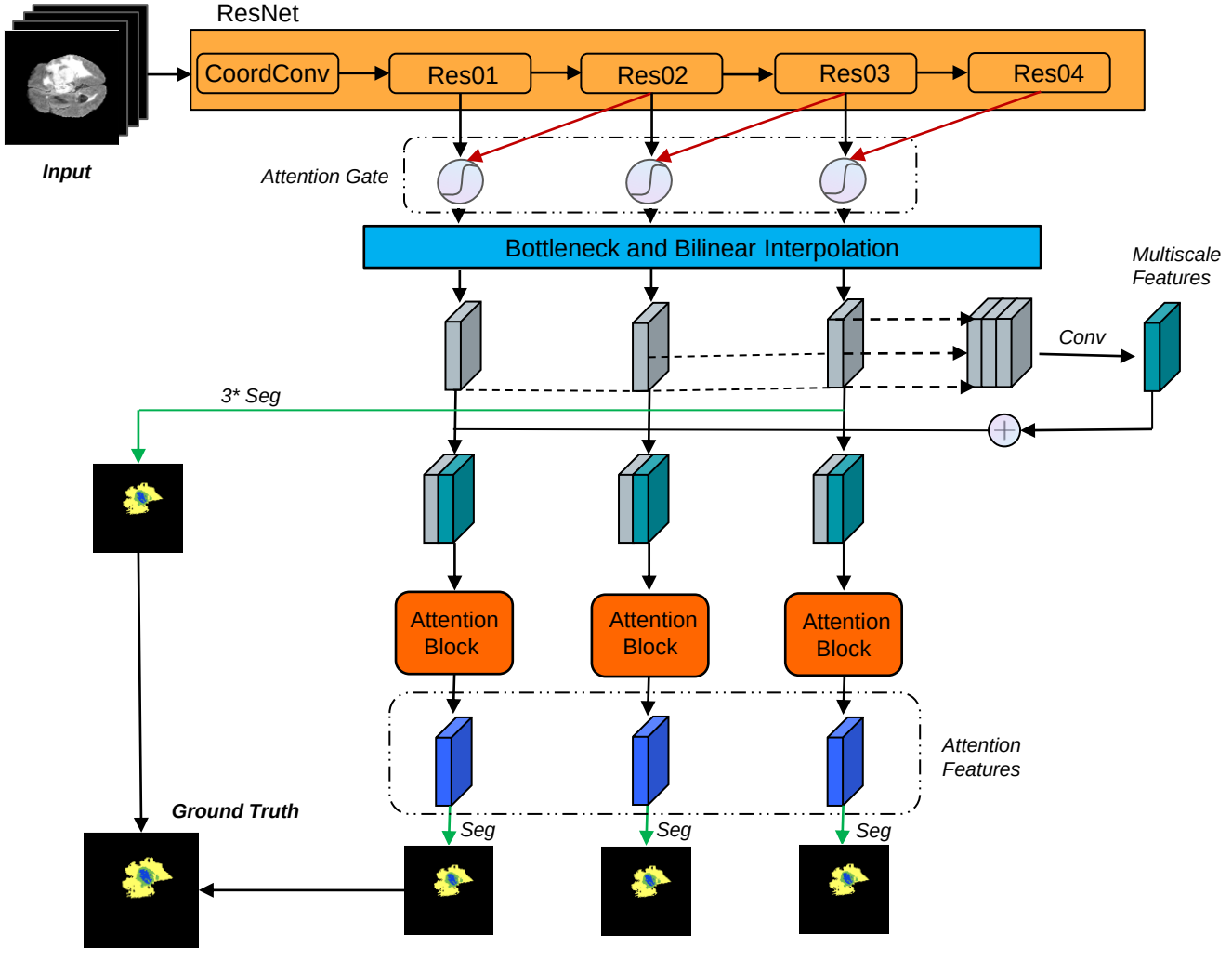
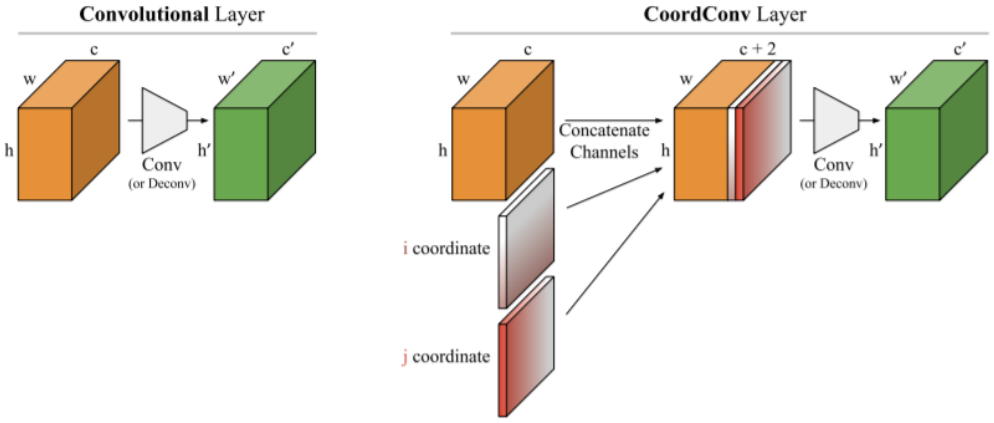
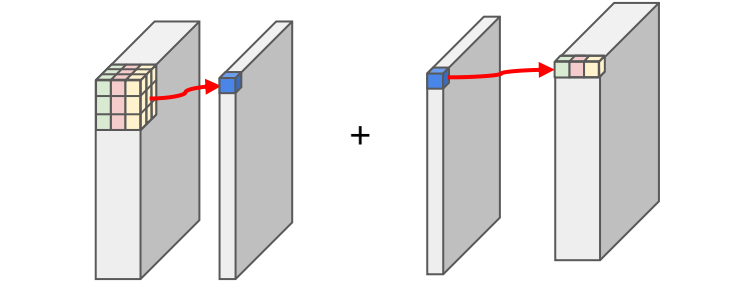

ResNet
CoordConv
Res01
Res02
Res03
Res04
Input
Attention Gate
Bottleneck and Bilinear Interpolation
Multiscale Features
Conv
3* Seg
Attention Block
Attention Block
Attention Block
Attention Features
Ground Truth
Seg
Seg
Seg

Convolutional Layer Variations

CoordConv.



Seperable Conv.

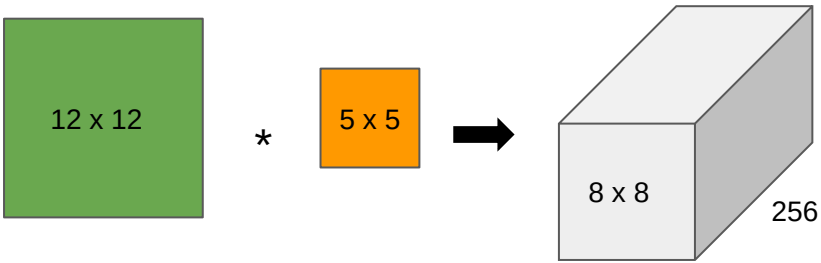


Depthwise Convolution

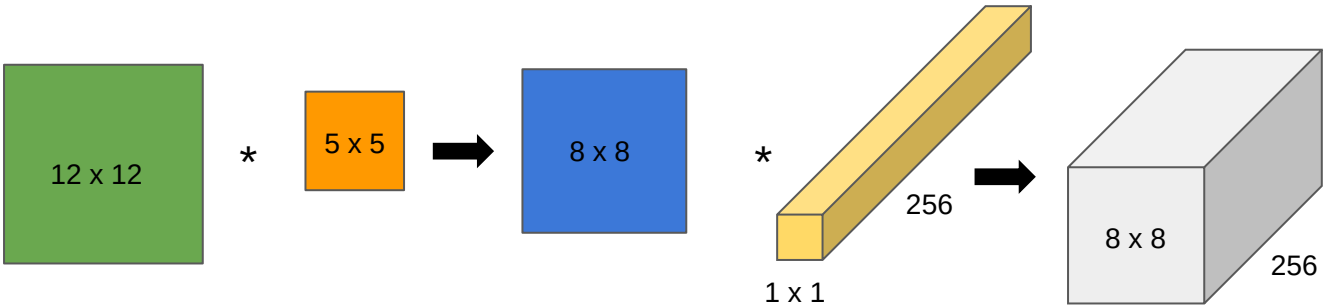
+

Pointwise Convolution

Separable Convolutional Layer (Computation Example)

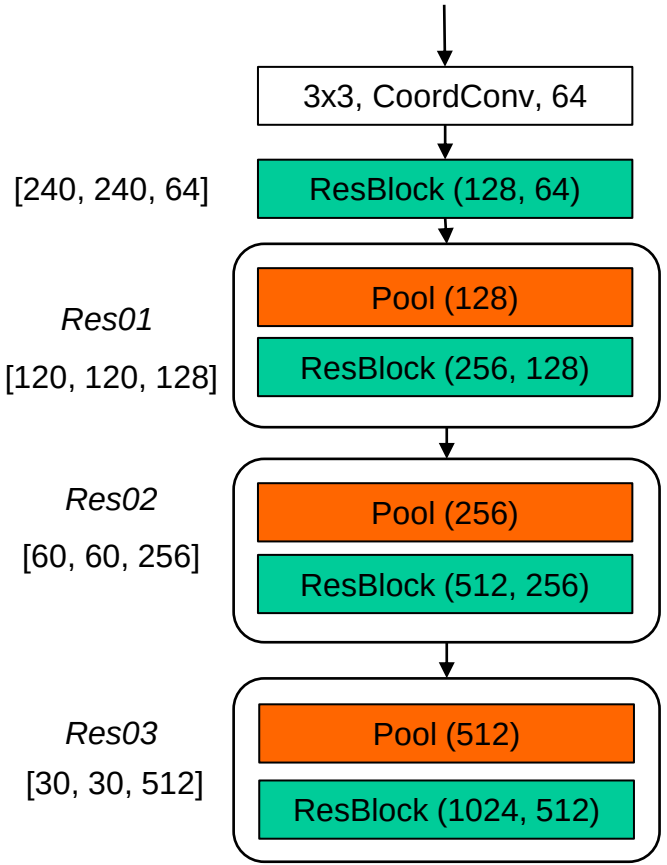


(Normal) Multiplication: 5x5*8x8*256 = 409,600



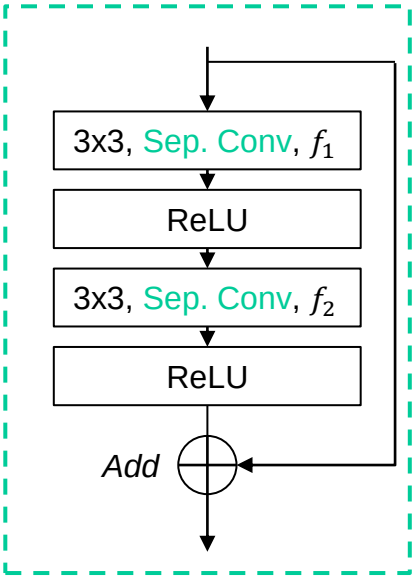
(Separable) Multiplication: 5x5*8x8+8x8*1x1x256 = 17,984

ResNet

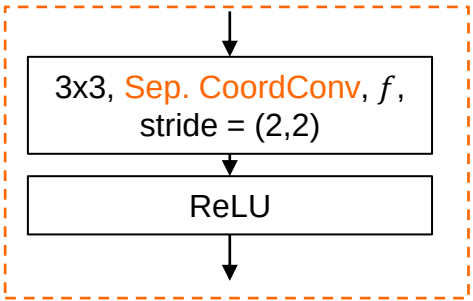


*Dim: [*w, h, c*]

ResBlock (f_1 , f_2) :

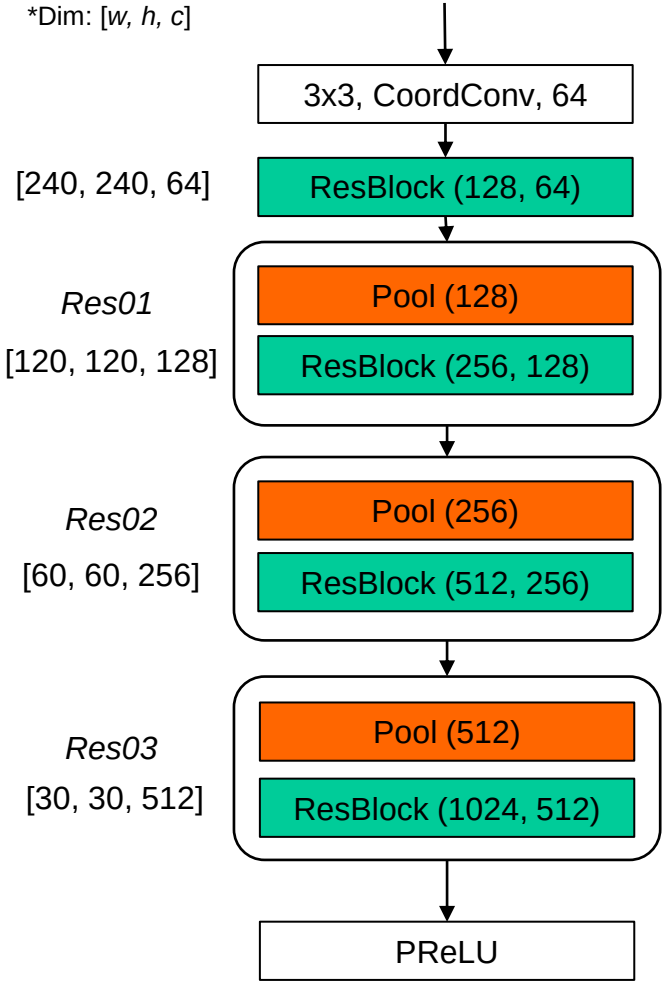


Learnable Pooling Layer(f):

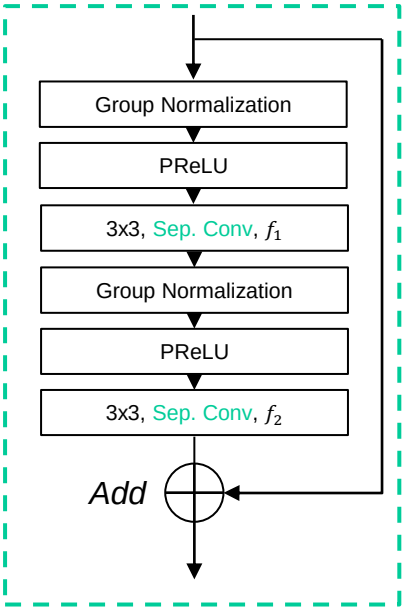


ResNet v02

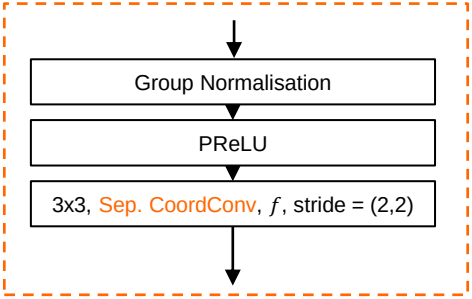
*Dim: [*w, h, c*]



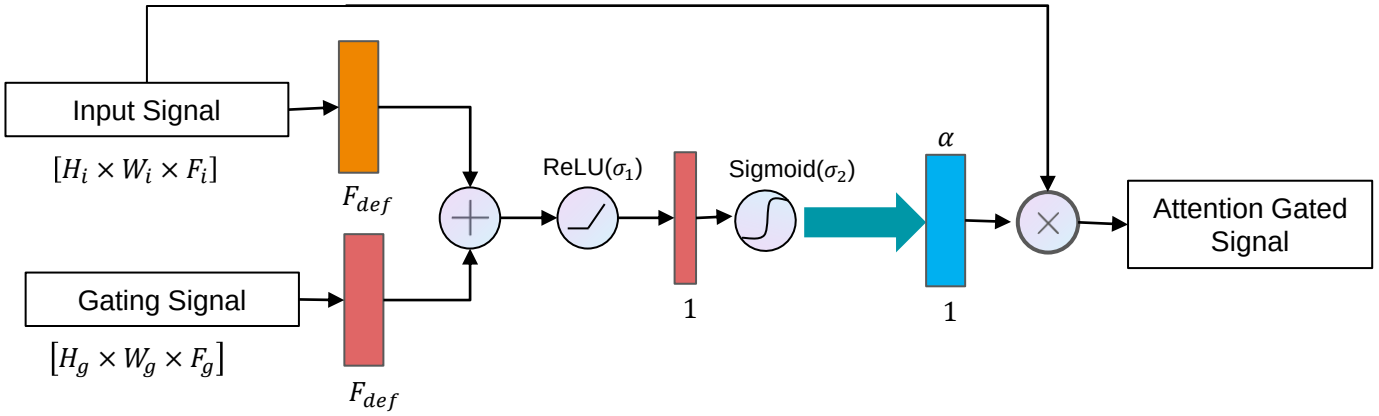
ResBlock (f_1 , f_2) :

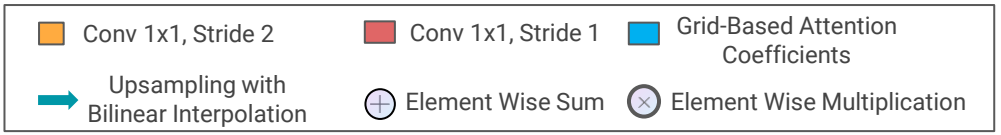


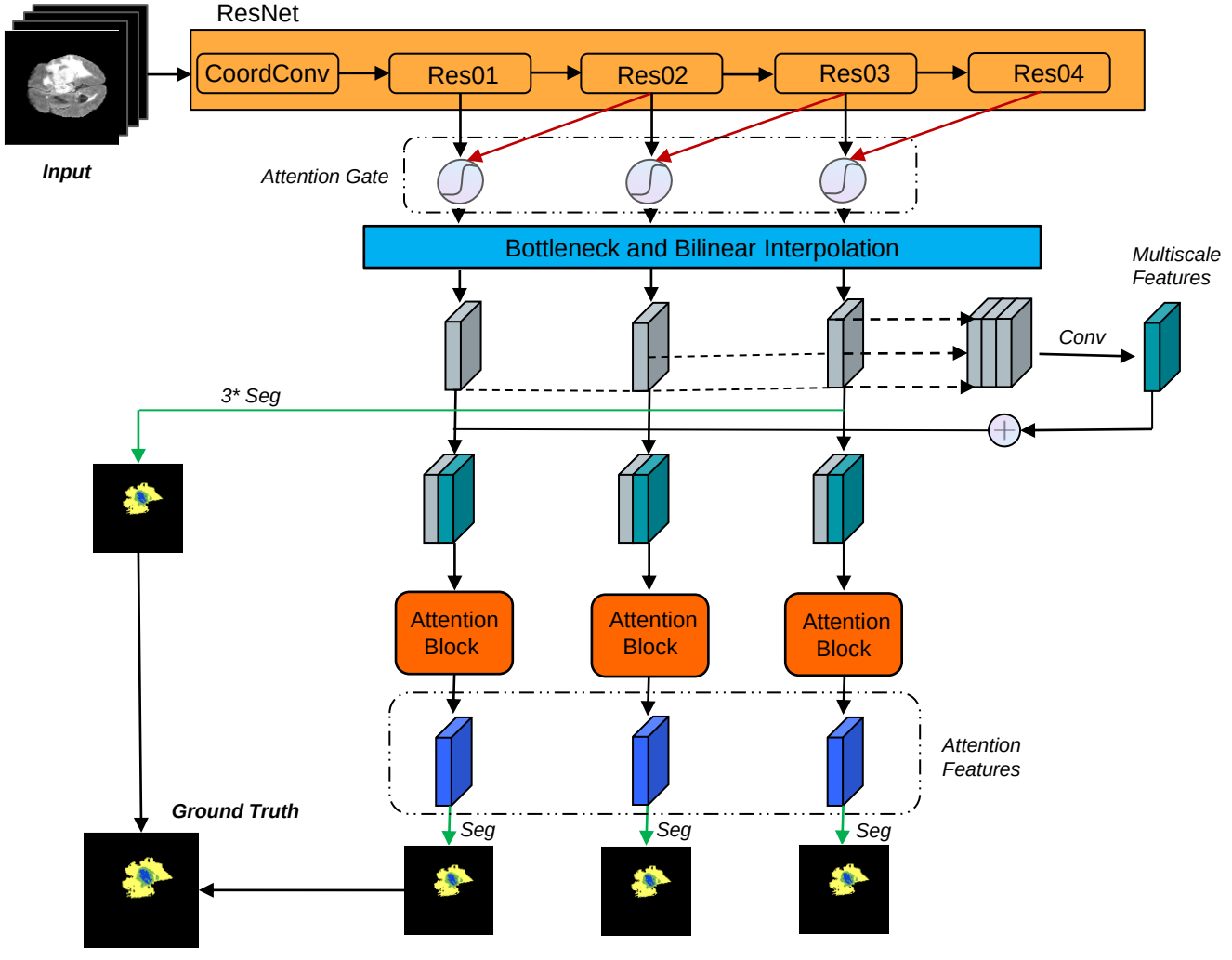
Learnable Pooling Layer(f):



Attention Gate



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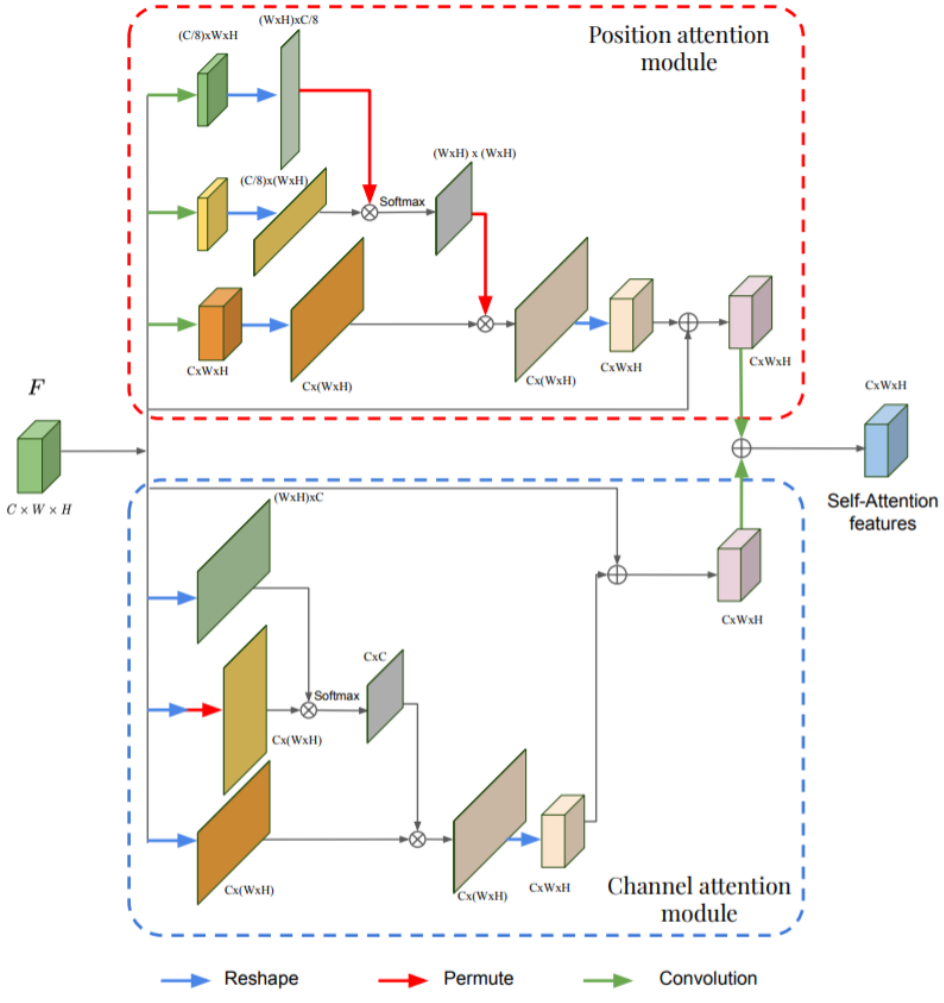
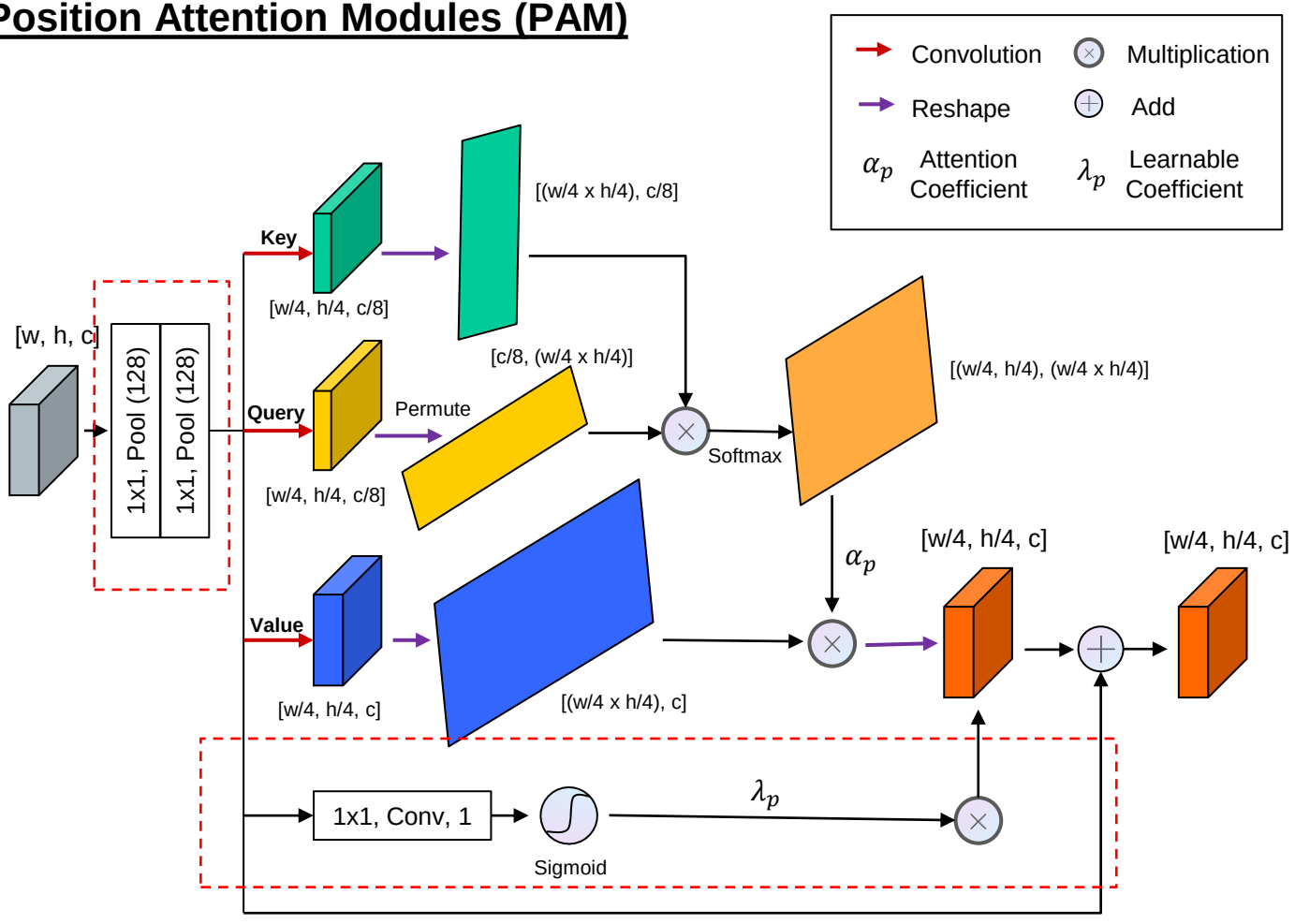
Attention Block
Attention Features
Ground Truth
Seg
Seg
Seg

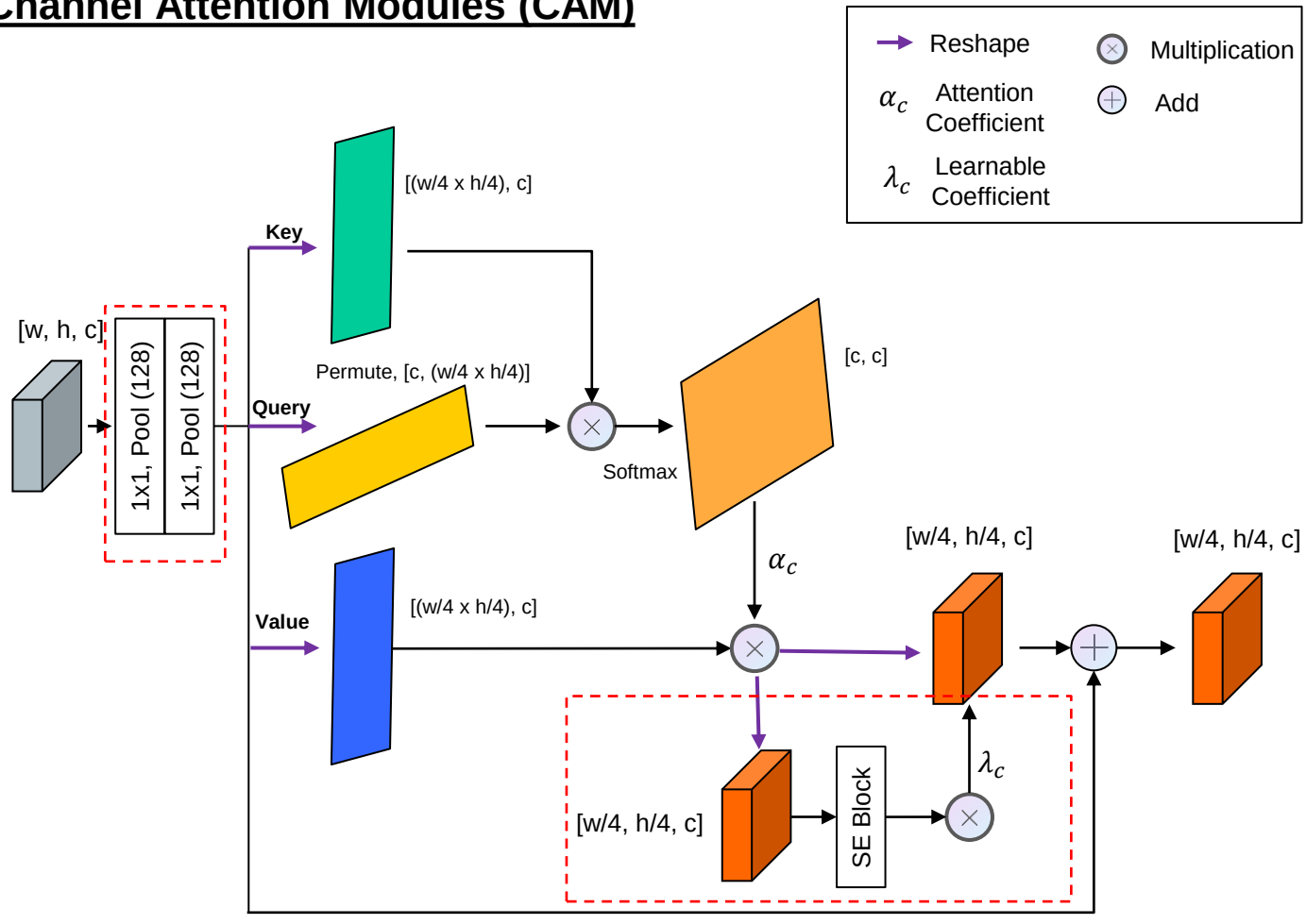
PAM and CAM


Position attention module
(C/8)xWxH
(WxH)xC/8
(C/8)x(WxH)
(WxH) x (WxH)
Softmax
CxWxH
Cx(WxH)
CxWxH
CxWxH
F
C × W × H
CxWxH
Self-Attention features
(WxH)xC
CxC
Softmax
Cx(WxH)
Cx(WxH)
Cx(WxH)
CxWxH
CxWxH
Channel attention module
Reshape
Permute
Convolution

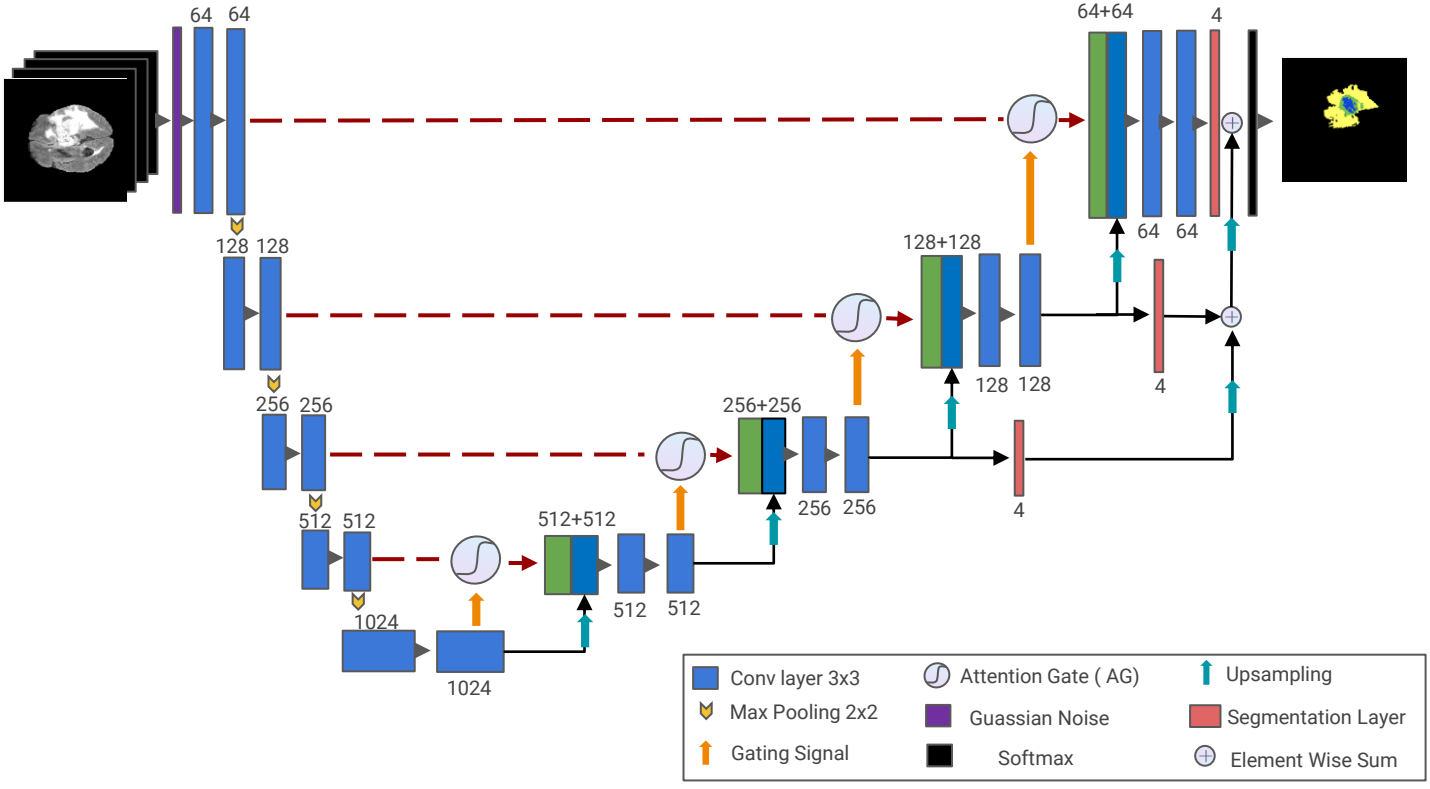
Position Attention Modules (PAM)



Channel Attention Modules (CAM)



Deep Supervised Attention Unet



Attention Mechanism

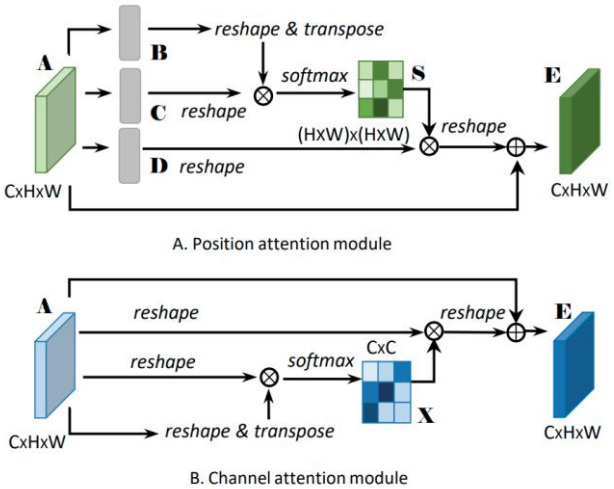


Fig.1A. Spatial self attention *(A)* Position attention module (PAM) and channel self attention *(B)* Channel attention module (CAM). Figure from [1]

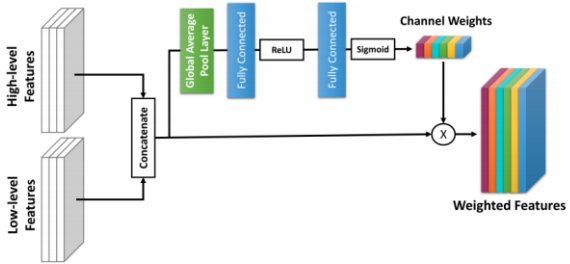


Fig.2A. Channel attention block(CAB) with squeeze and attention block. Figure from [2]

[1] Image source: Fu.J., Liu.J., Tian.H., Li.Yong., Bao. Y., Fang.Z., Lu.H., Dual Attention Network for Scene Segmentation, Computer Vision and Pattern Recognition 2019.

[2] Image source: Noori, M., Bahri, A., Mohammadi, K.: Attention-guided version of 2d unet for automatic brain tumor segmentation. In: 2019 9th International Conference on Computer and Knowledge Engineering (ICCKE). pp. 269–275.