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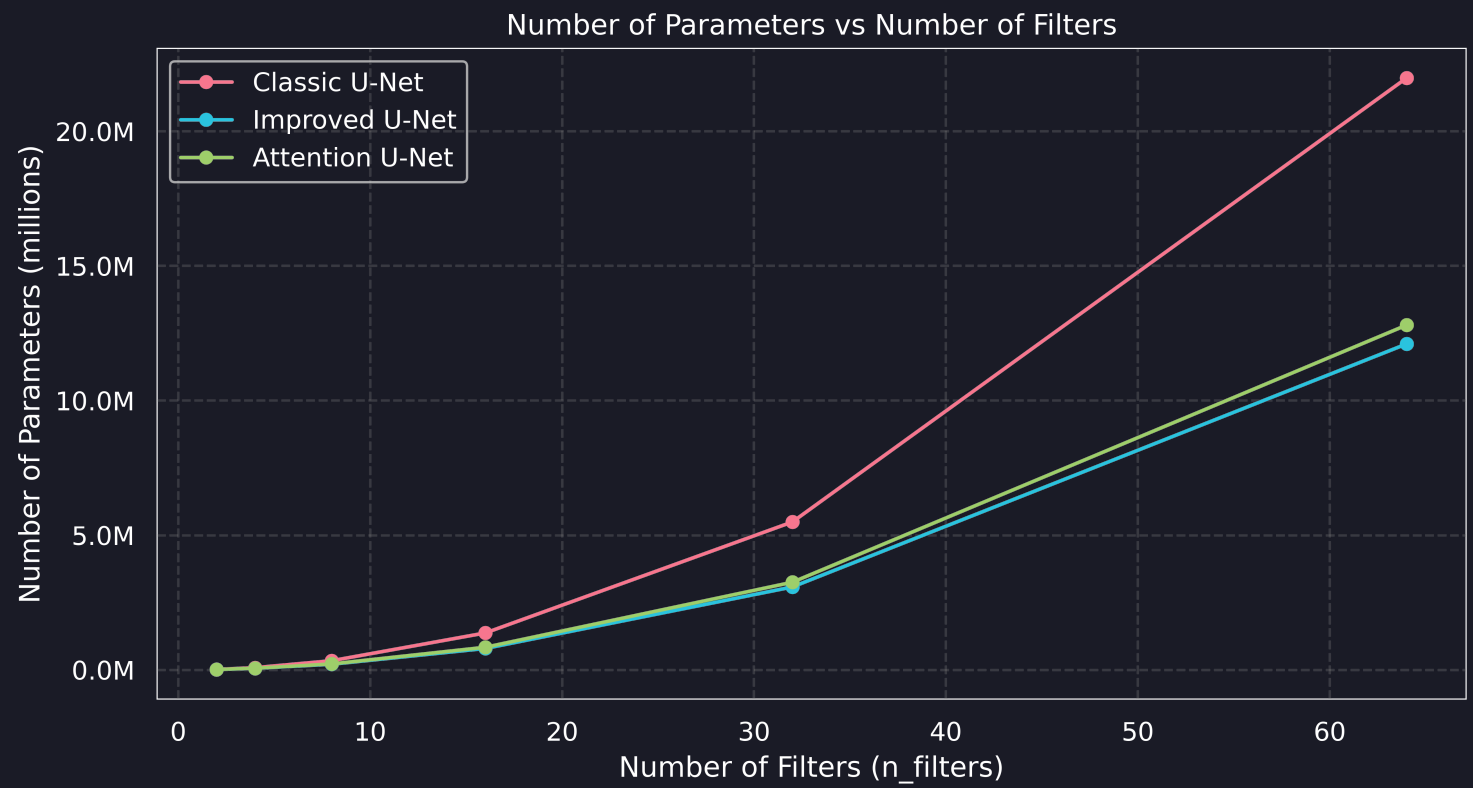
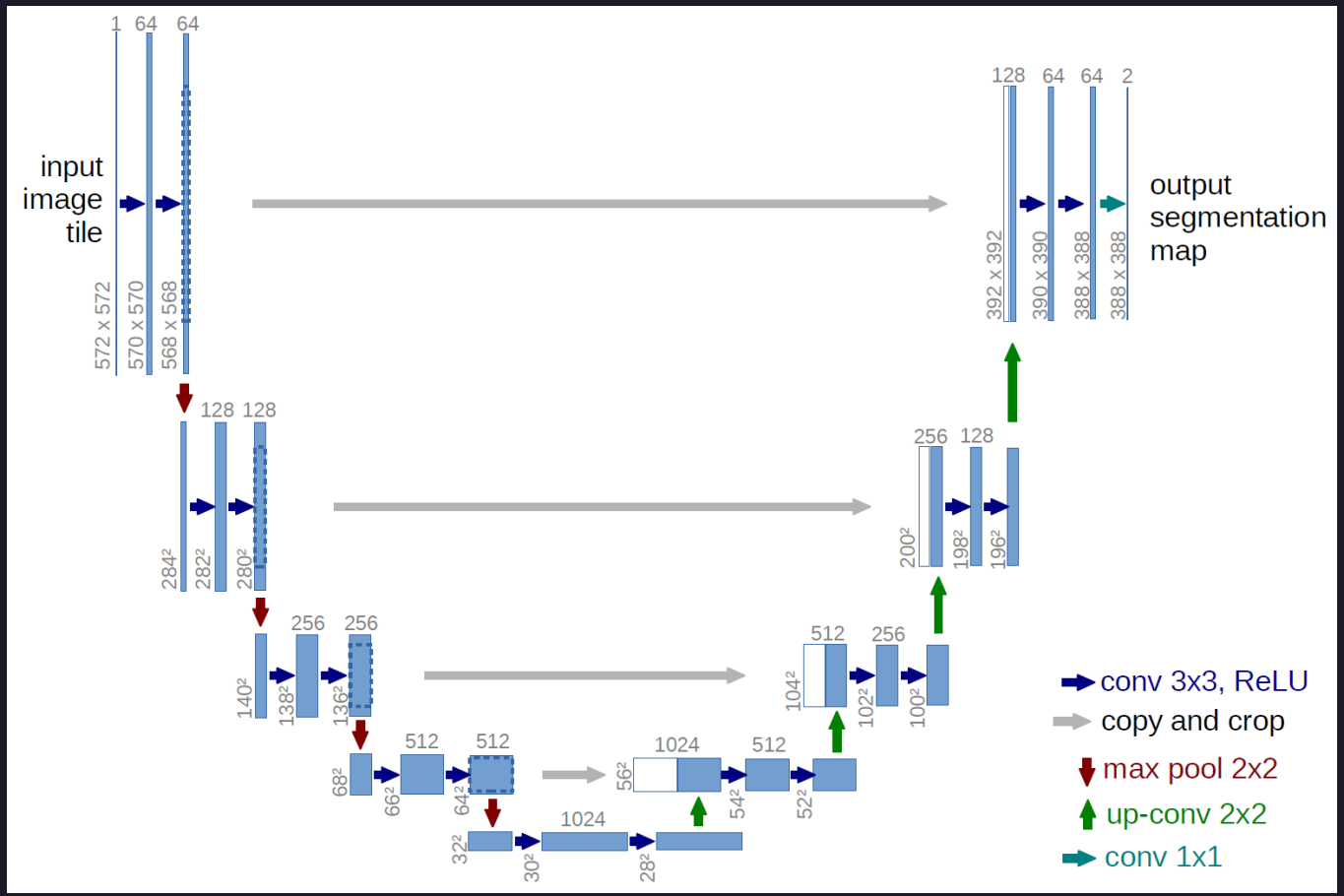


Classic U-Net

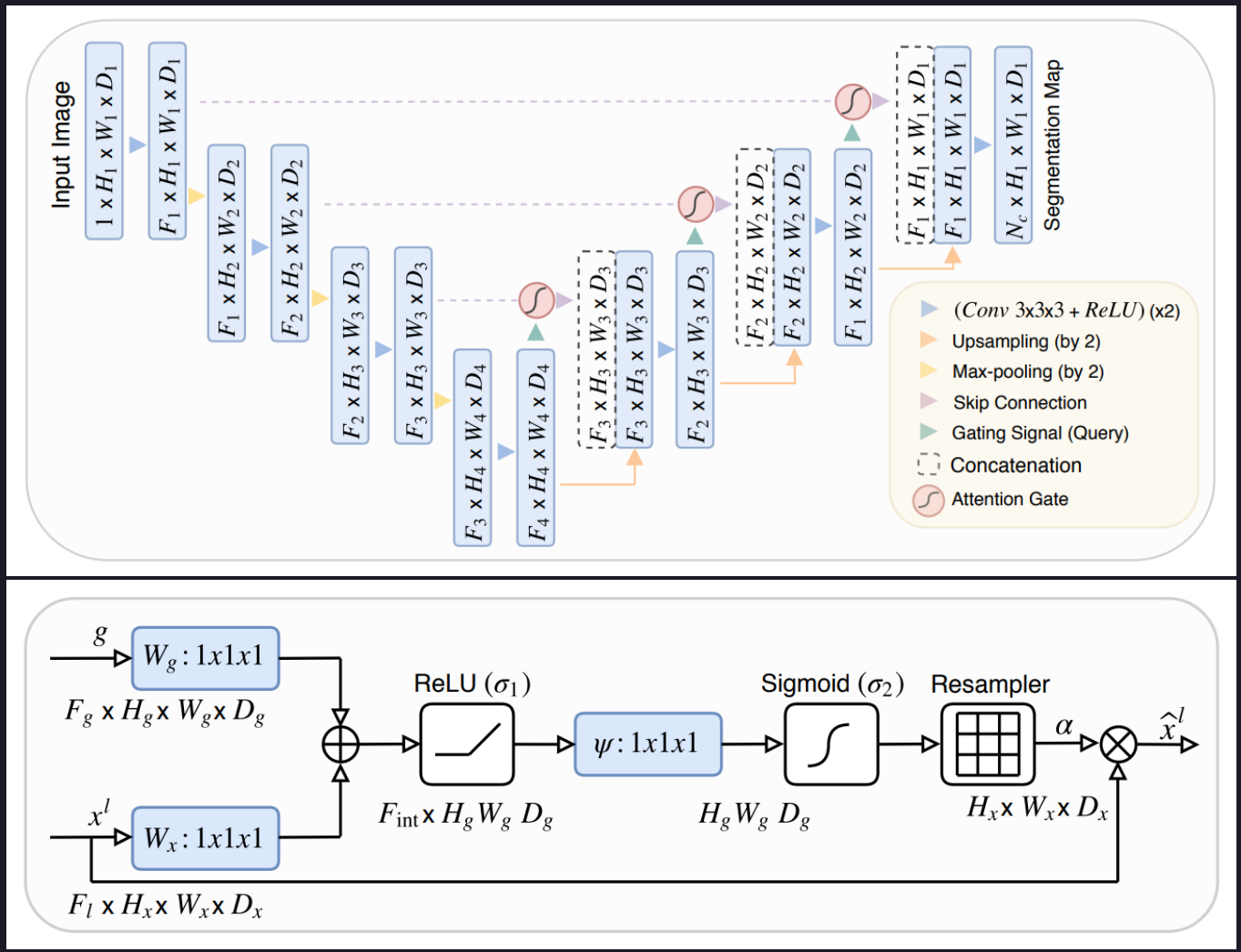


Improved U-Net

Small improvements from previous $\rightarrow$ to reduce n° of parameters and improve performance:

- **Separable Convolutions**: depthwise + pointwise convolutions
- **Batch Normalization**: to improve training and generalization
- **Larger Kernel Size**: 7×7 kernels instead of 3×3
- **Inverse Bottleneck**: expands + compresses channels
- **Additive Skip Connections**: instead of concatenated ones

Attention U-Net

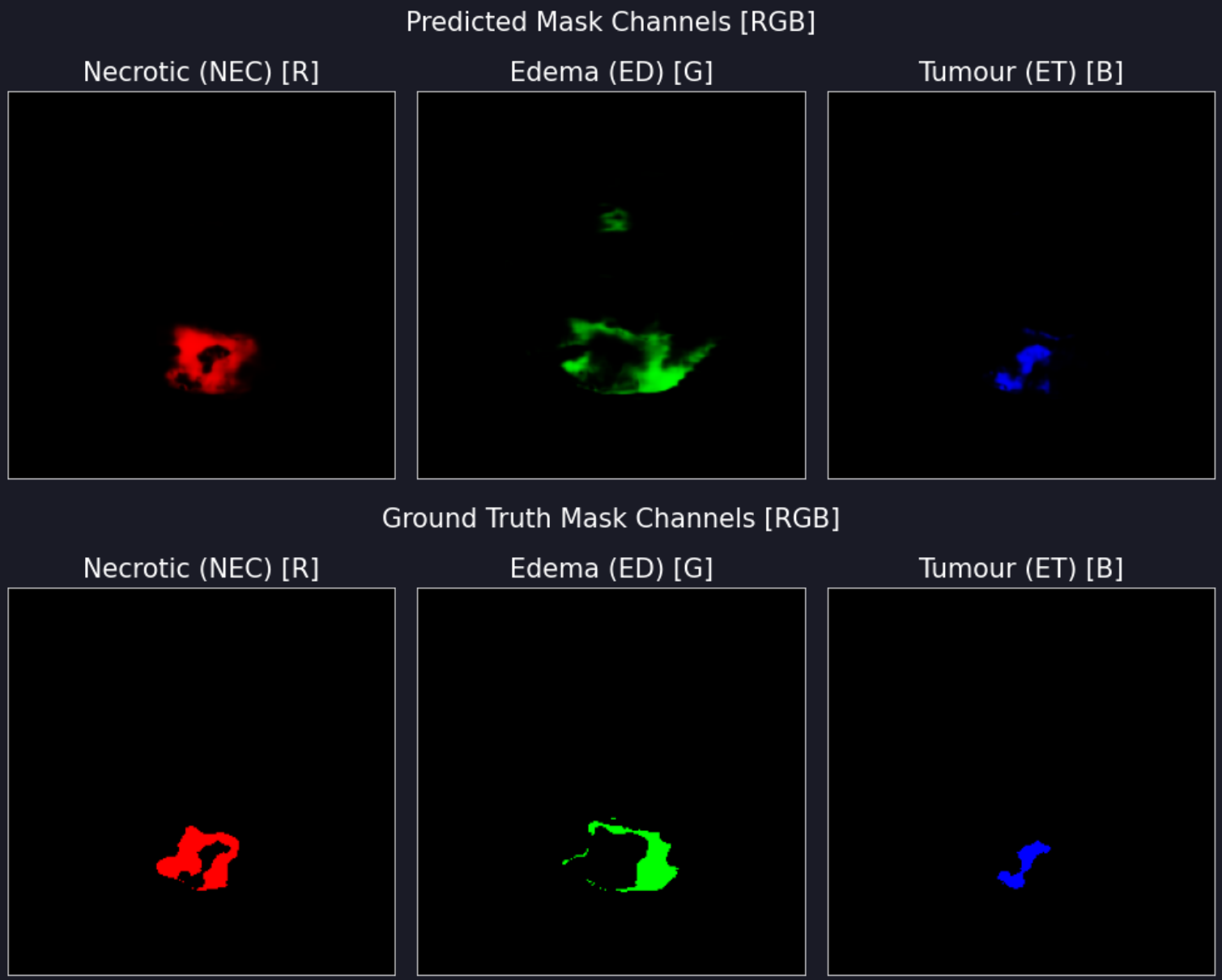


Training Details

U-Net Models training parameters:

- **epochs**: 20
- **Optimizer**: Adam (with weight decay (1×10^{-2}))
- **Scheduler**: Exponential Decay $(\gamma = 0.9)$
- **Loss Function**: BCE with Logits Loss
- **learning rate**: 2×10^{-3}
- **batch size**: 32 (both training and validation)
- **image size**: 240×240
- **first encoder filters**: 32

Visualizing a prediction



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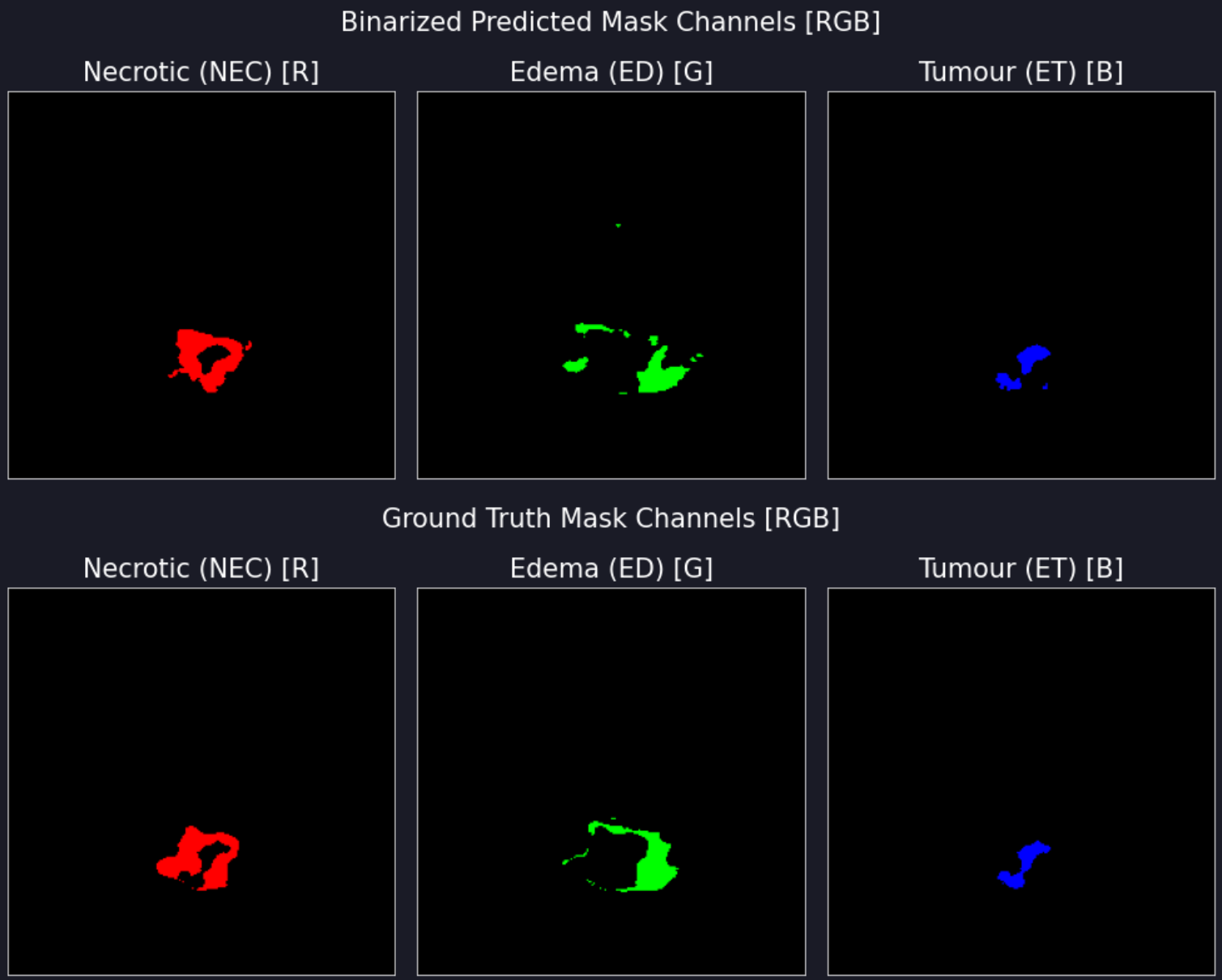


Performance Assessment

$$\text{Dice} = \frac{2\times|X\cap Y|}{|X|+|Y|}$$

Dice Coefficient

"overlap" metric

$$\text{Precision} = \frac{TP}{TP+FP}$$

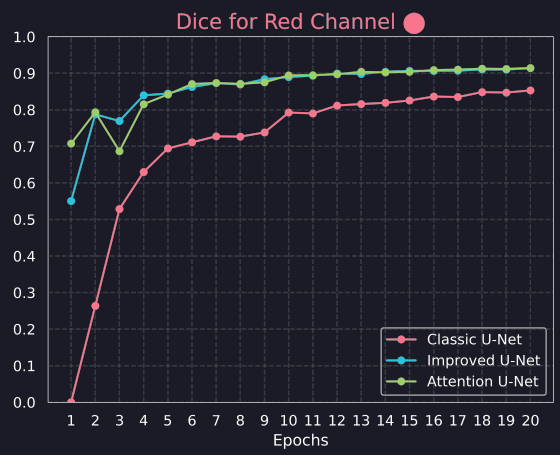
Precision

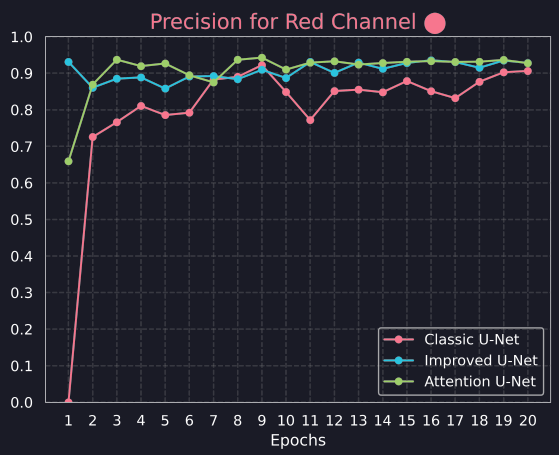
prediction quality

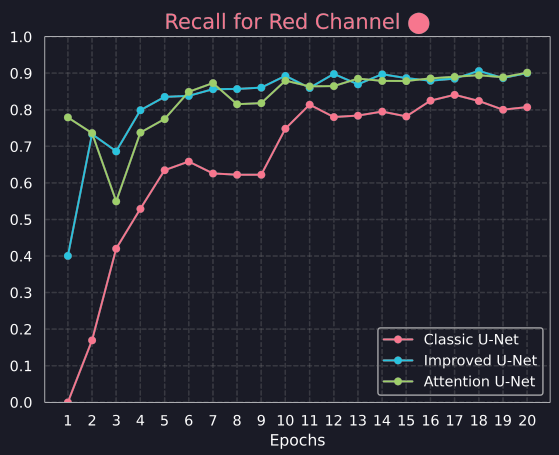
$$\text{Recall} = \frac{TP}{TP+FN}$$

Recall

prediction quantity







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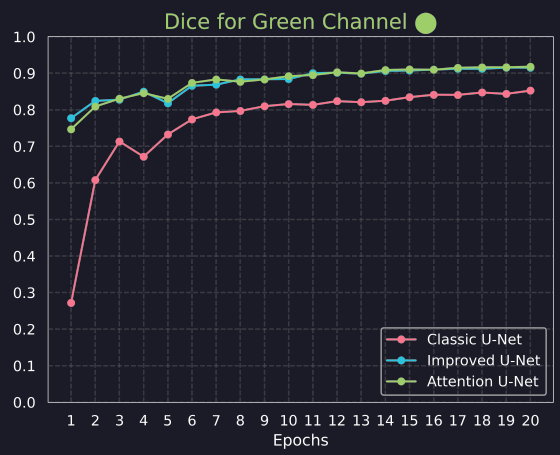

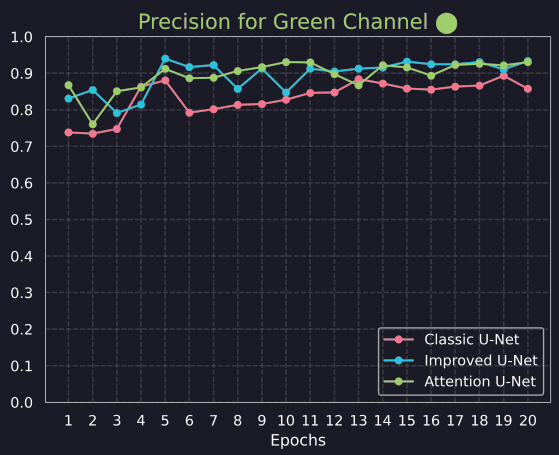

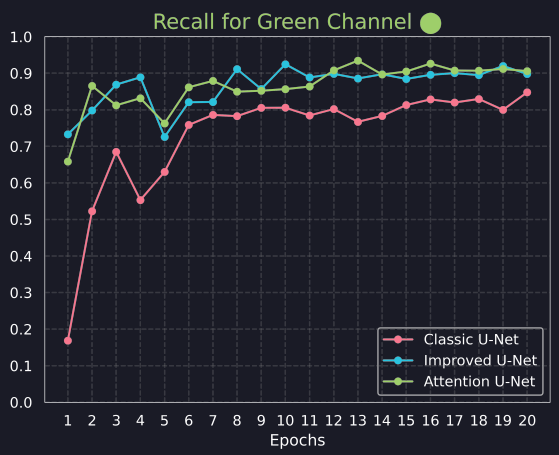

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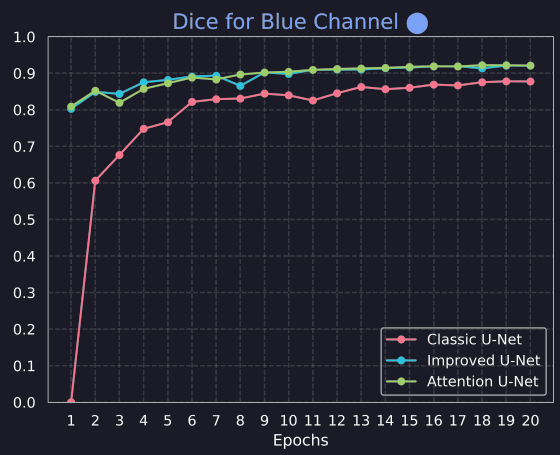

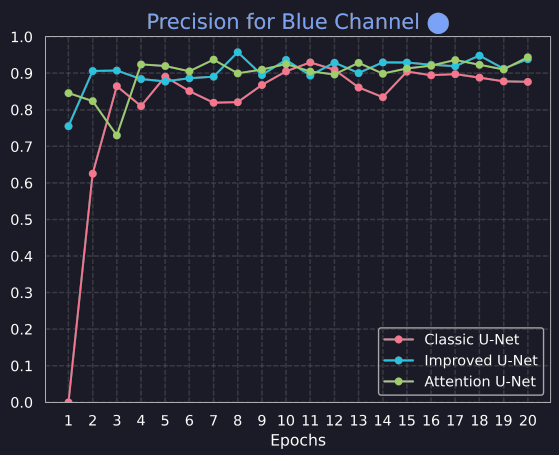

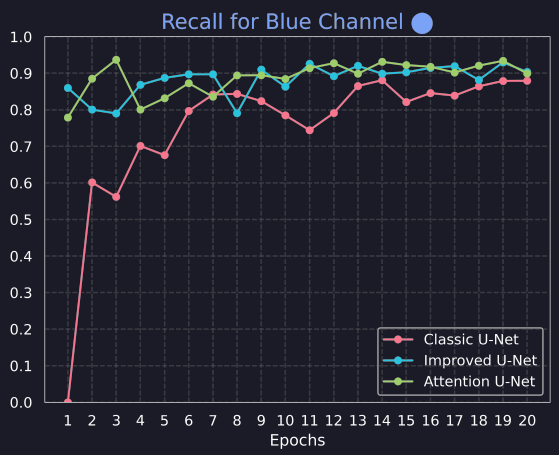

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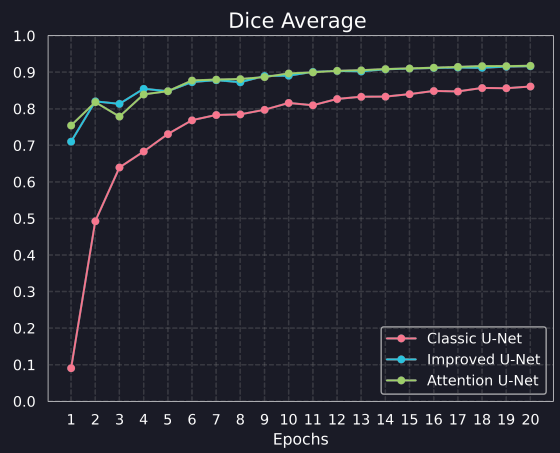

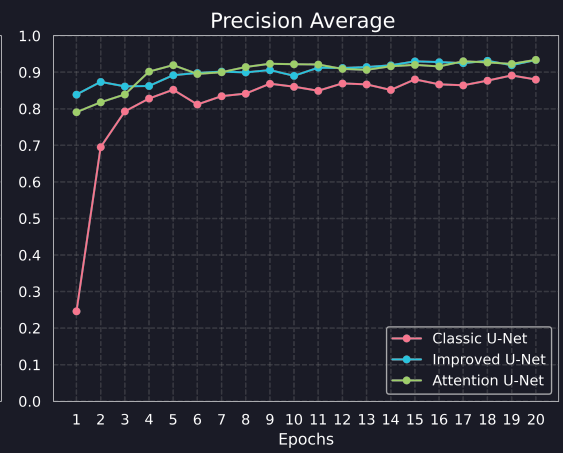

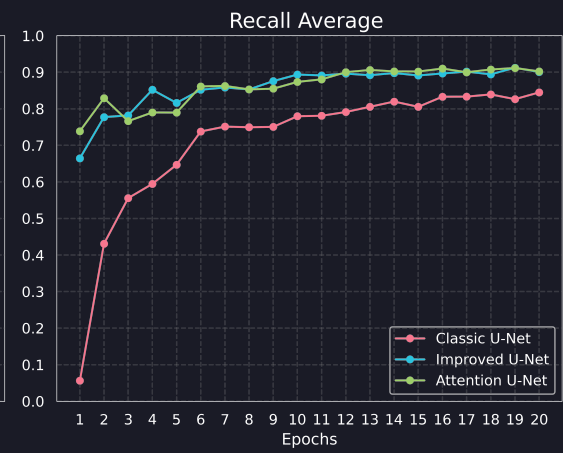

Visualizing Attention Maps