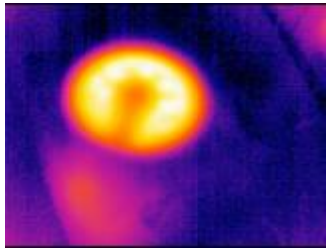
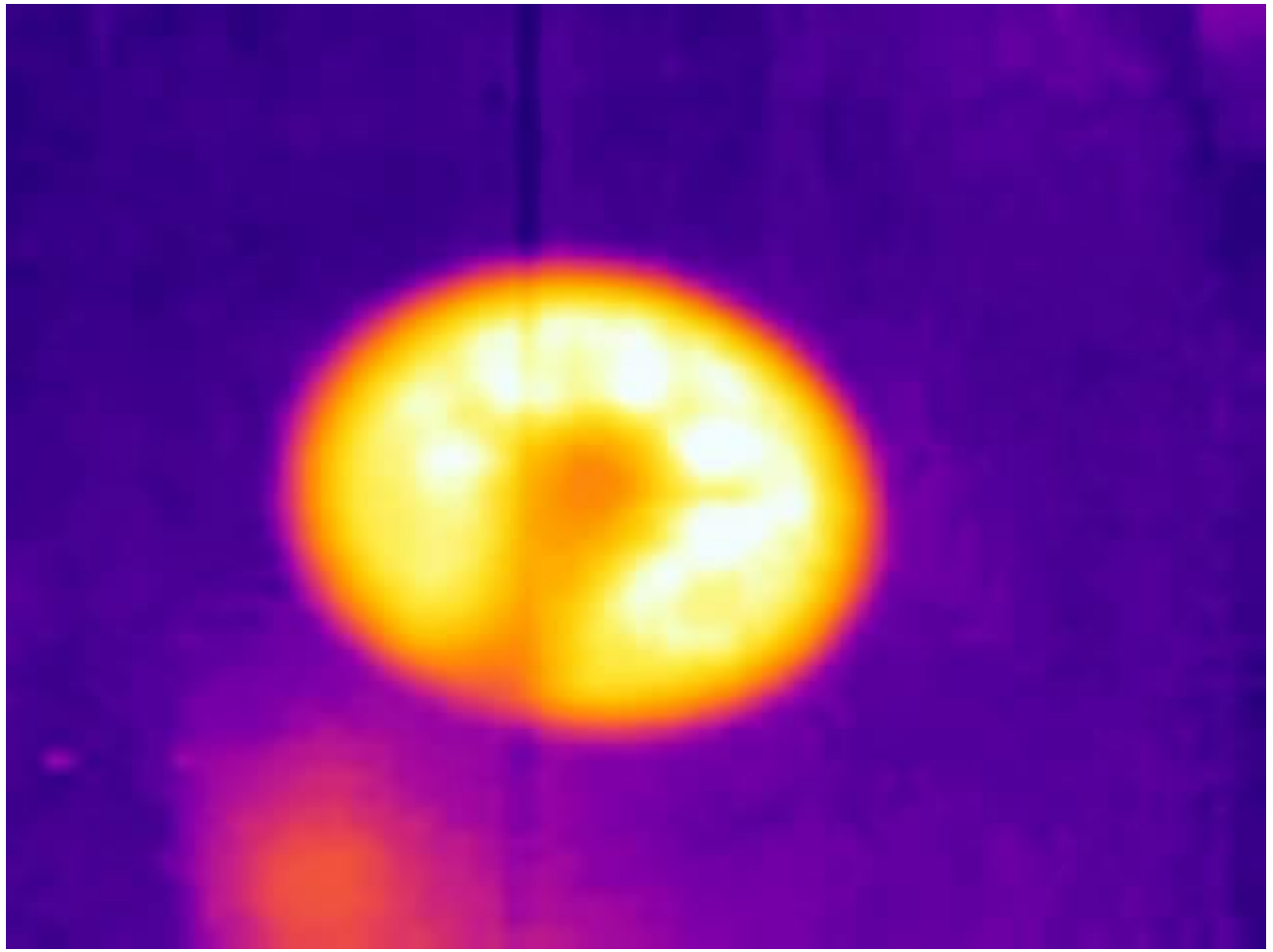
Temperature Super Resolution

2025-05-30

Data Procurement



Low-Res Image



High-Res Image

Total number of procured images		Resolution
High-Res	9864	480×640
Low-Res	9864	122×160

Data Splitting

Train/Val/Test Ratio: $0.8: 0.1: 0.1$

	#Train images	#Val images	#Test images	Resolution
High-Res	7891	986	987	480×640
Low-Res	7891	986	987	120×160

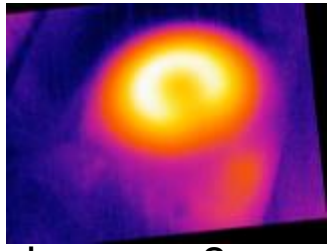
Re-shaped the low_res images from $122 \times 160 \rightarrow 120 \times 160$

Data Augmentation

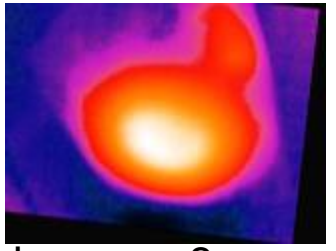
Augmentation is performed only on training images

Augmentations performed
Horizontal/Vertical Flip
Rotate, Shift and Scale
Elastic Transformation
Random Brightness
Random Contrast
Random Gamma
Hue Saturation
Noise

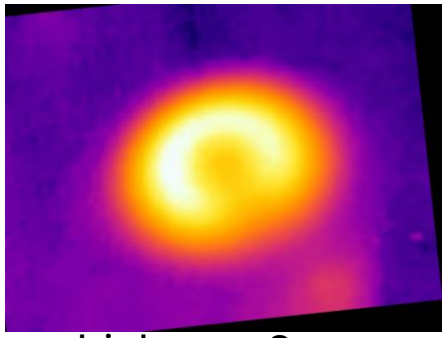
Sample Images



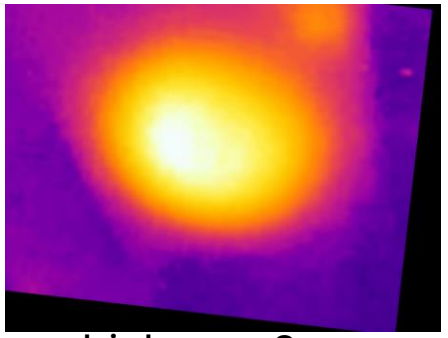
low-res_3.png



low-res_8.png



high-res_3.png

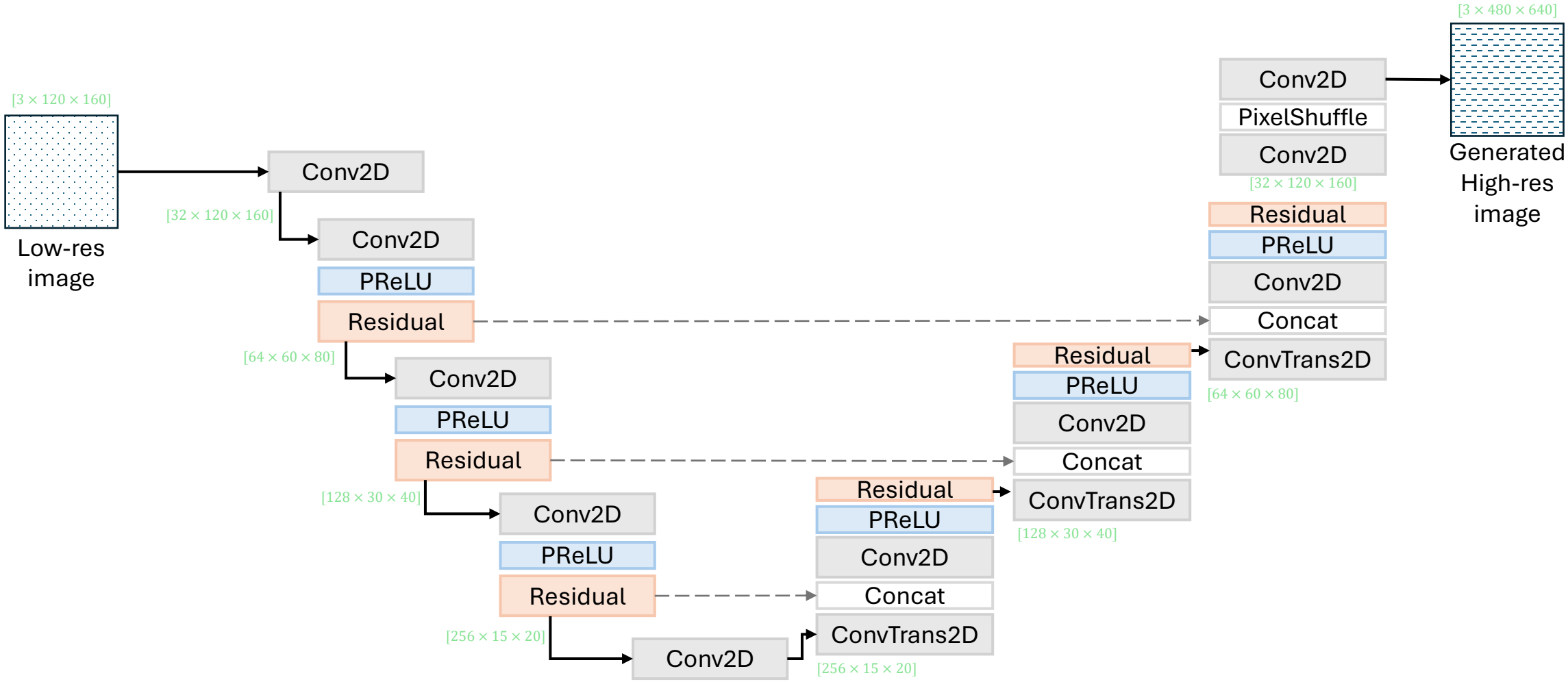


high-res_8.png

Total number of augmented training images		Resolution
High-Res	23673	480×640
Low-Res	23673	120×160

Model Configuration

Used Residual U-Net based on the SRResUNet[1] paper.



[1] Super-Resolution Residual U-Net Model for the Reconstruction of Limited-Data Tunable Diode Laser Absorption Tomography | ACS Omega

Other Training Configuration

Loss Function:	L2 Loss (as used in the SRResUNet)
Epochs:	100
Batch Size:	32
Optimizer:	Adam
Learning Rate:	0.0001
Logging:	Weights and Biases

[1] Super-Resolution Residual U-Net Model for the Reconstruction of Limited-Data Tunable Diode Laser Absorption Tomography | ACS Omega

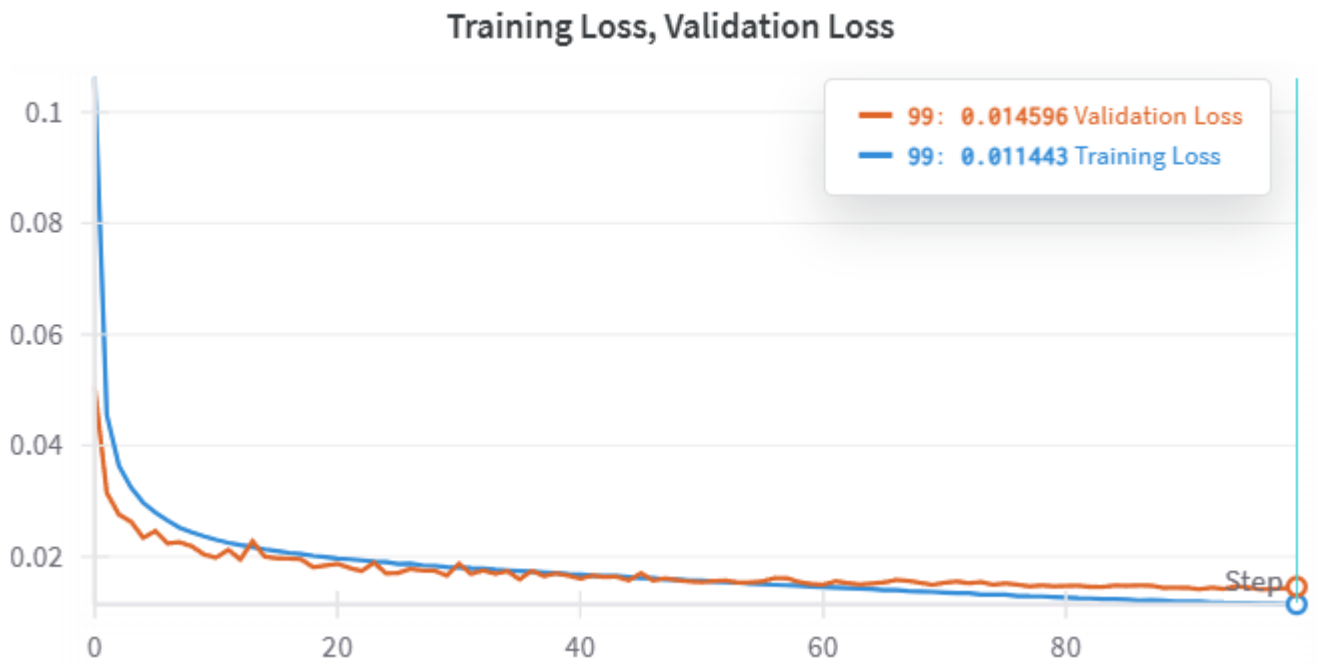
Training Output

Training Reconstruction Loss: 0.0114428

Validation Reconstruction Loss: 0.0145960

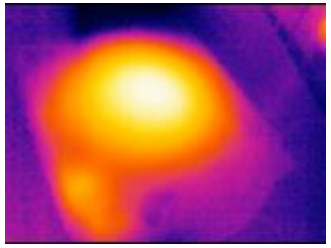
Test Reconstruction Loss: 0.0139822

Training Graph

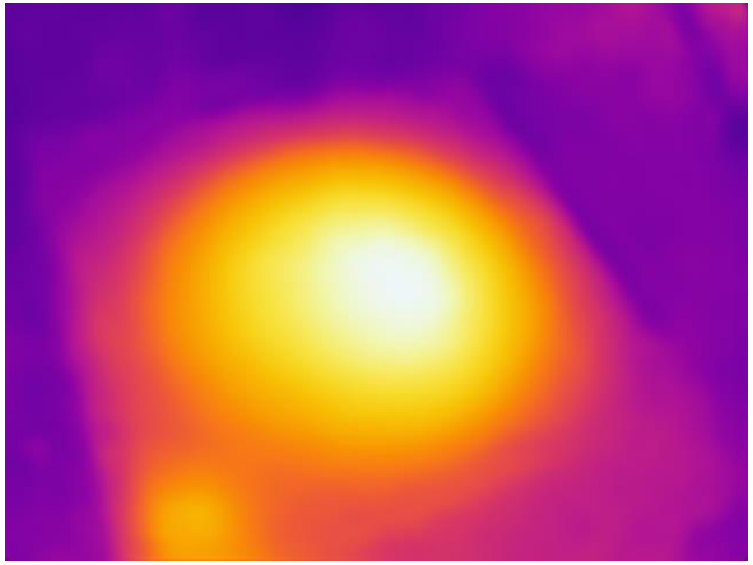


Test Output

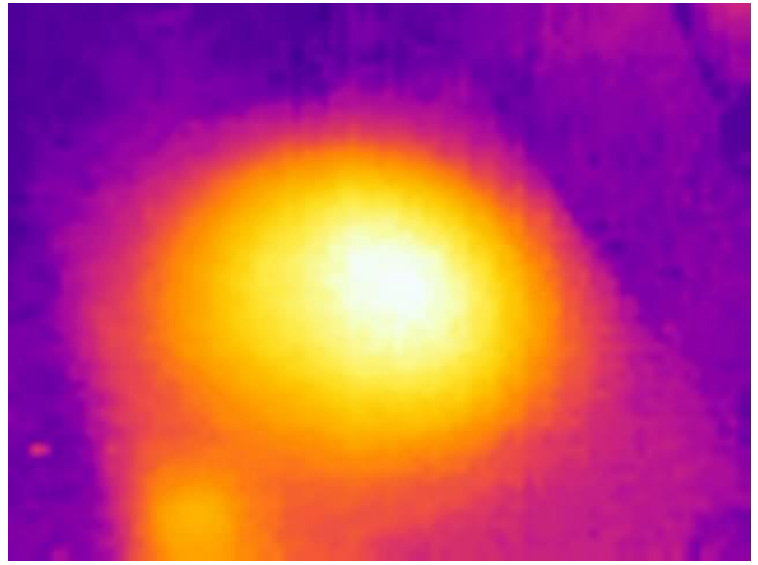
Low-res input 1



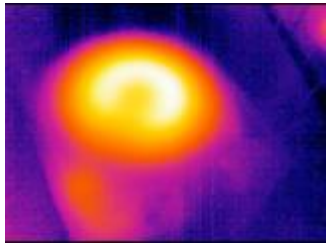
Generated High-res output 1



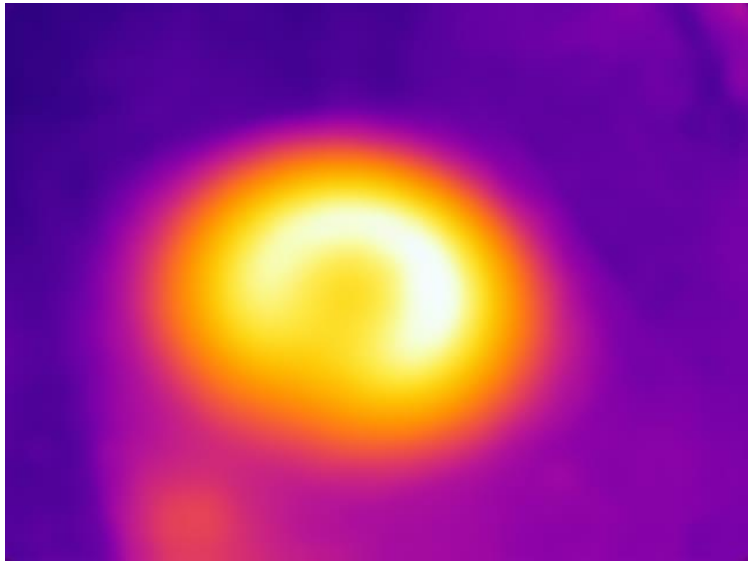
Ground truth High-res output 1



Low-res input 2



Generated High-res output 2



Ground truth High-res output 2