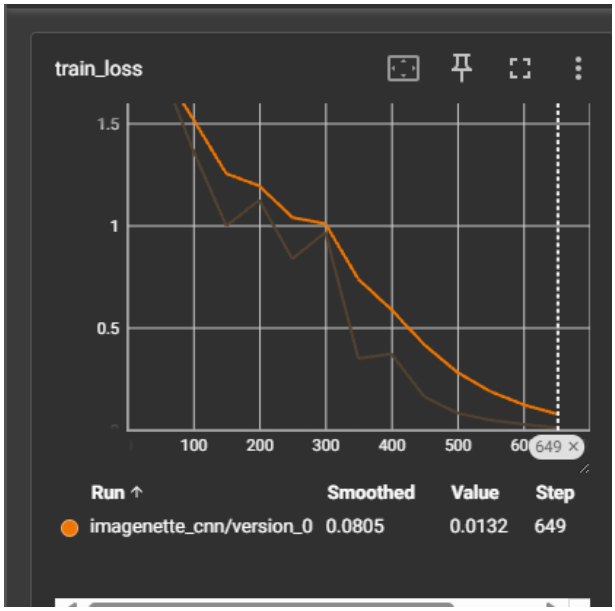
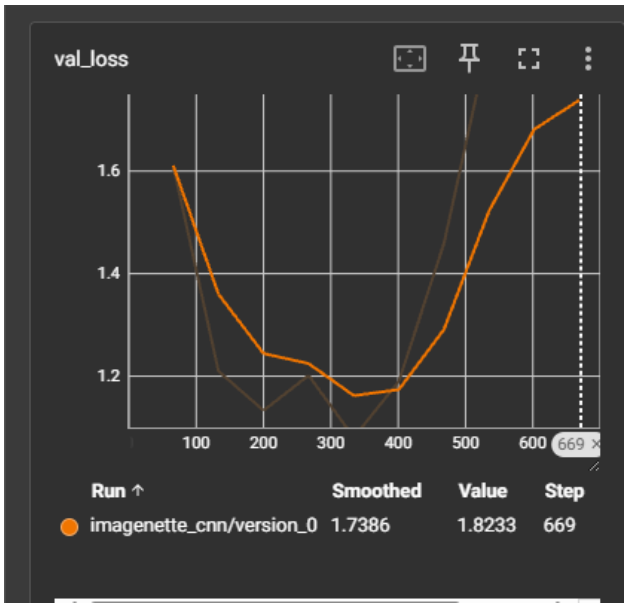
1. BasiCNN

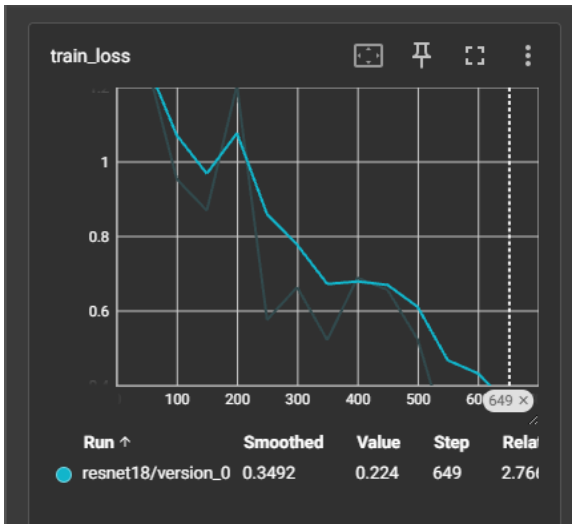
My chosen architecture consists of three convolutional blocks followed by a flattening operation and two fully connected layers. The network accepts 3-channel RGB images with a resolution of 160×160 pixels.

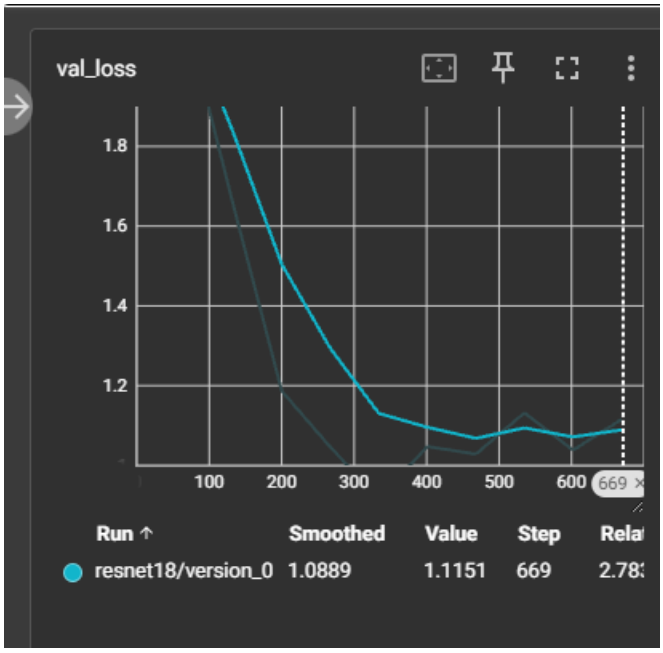




Testing Accuracy: 63.8%

2. ResNet18





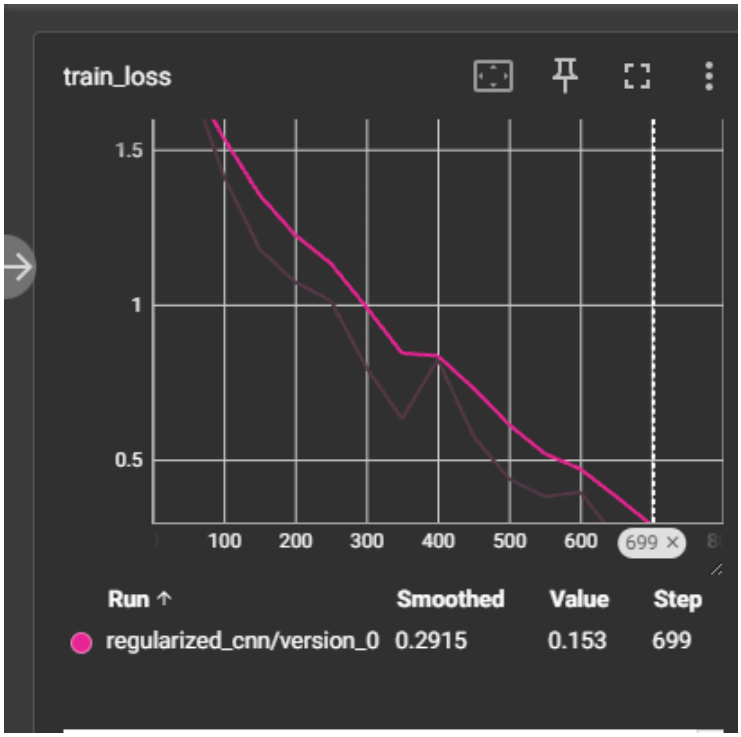
Test Accuracy: 71.4%

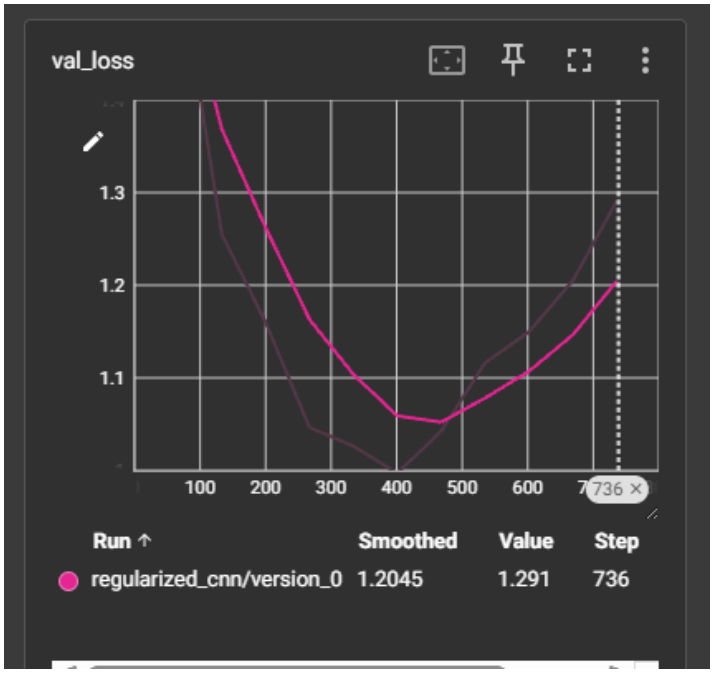
3. Regularized CNN

I picked the CNN model for adding regularization. A Dropout Layer with a rate of 0.5 was added before the final linear layer. Dropout randomly deactivates a fraction of neurons during training, which helps reduce overfitting.

Also, some added augmentation was added to the training data, which includes:

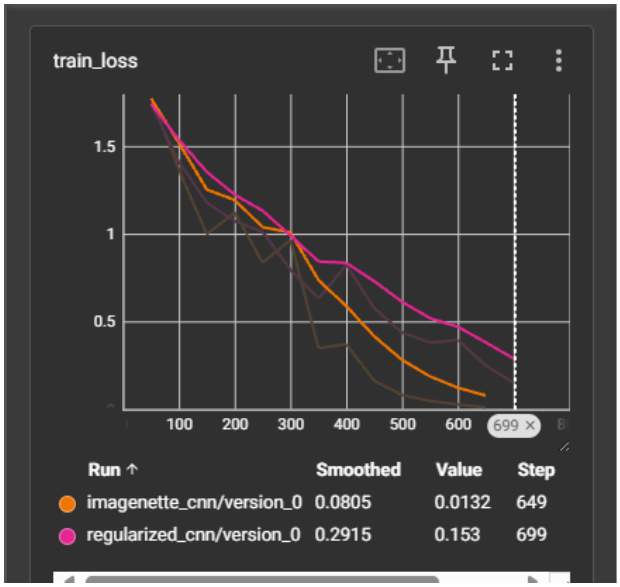
- RandomResizedCrop
- RandomHorizontalFlip
- RandomRotation
- ColorJitter

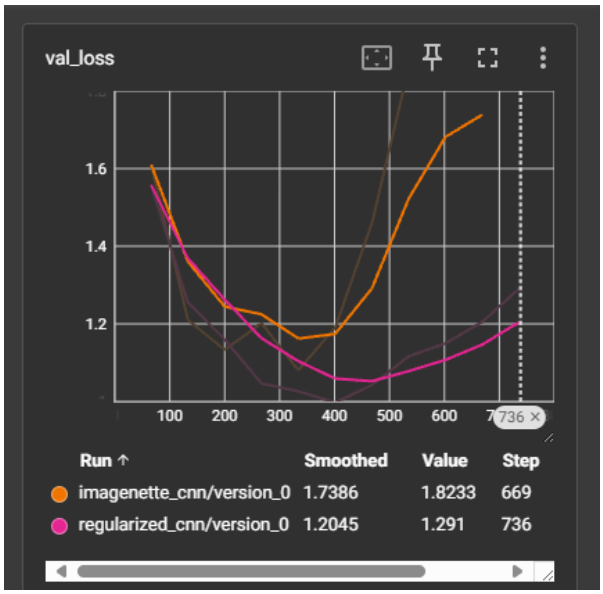




Testing Accuracy: 65.1%

Comparison between Basic CNN and Regularized CNN





Training Loss: Although the training loss was slightly higher compared to the non-regularized version (due to the added noise from dropout and augmentation), it showed a more gradual and stable decrease.

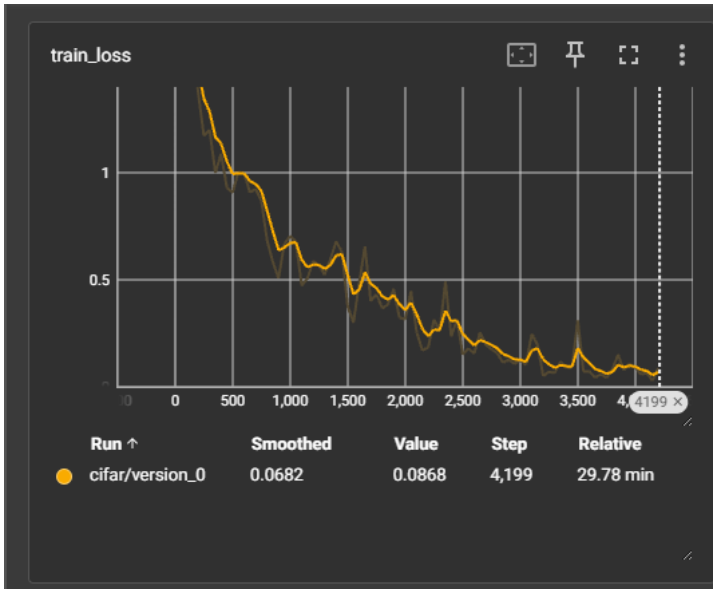
Validation Loss: The validation loss remained lower and more stable across training epochs, with less evidence of overfitting.

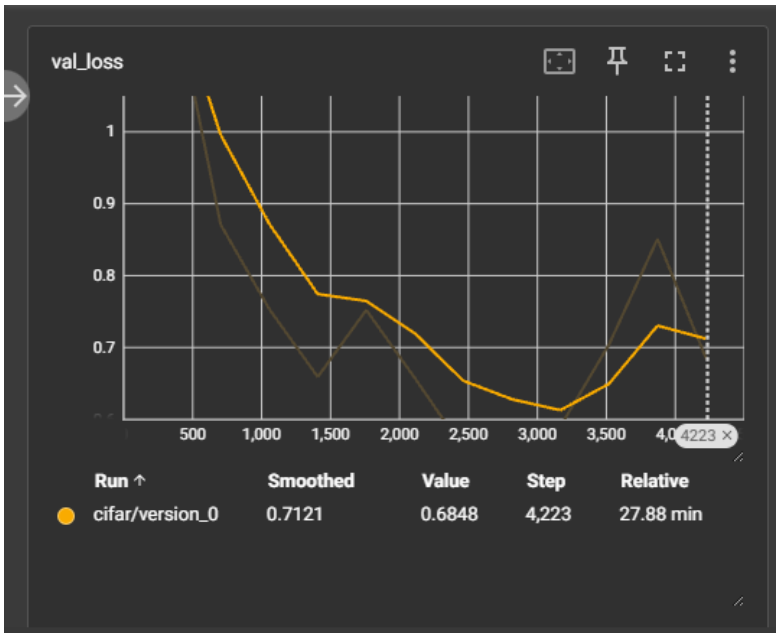
Final Test Accuracy: The regularized model achieved higher test accuracy.

4. Transfer Learning

I chose the ResNet 18 model for finetuning on CIFAR10 database.

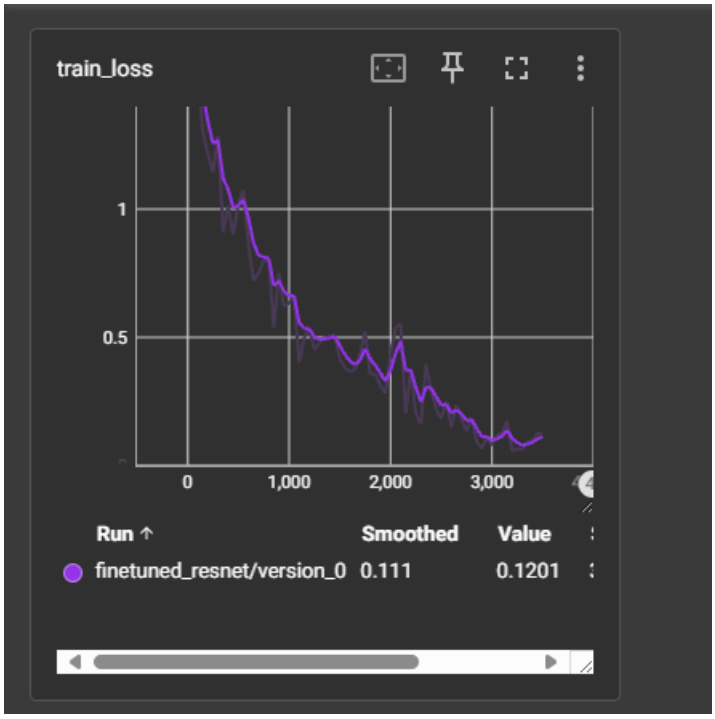
a. ResNet18 on CIFAR10

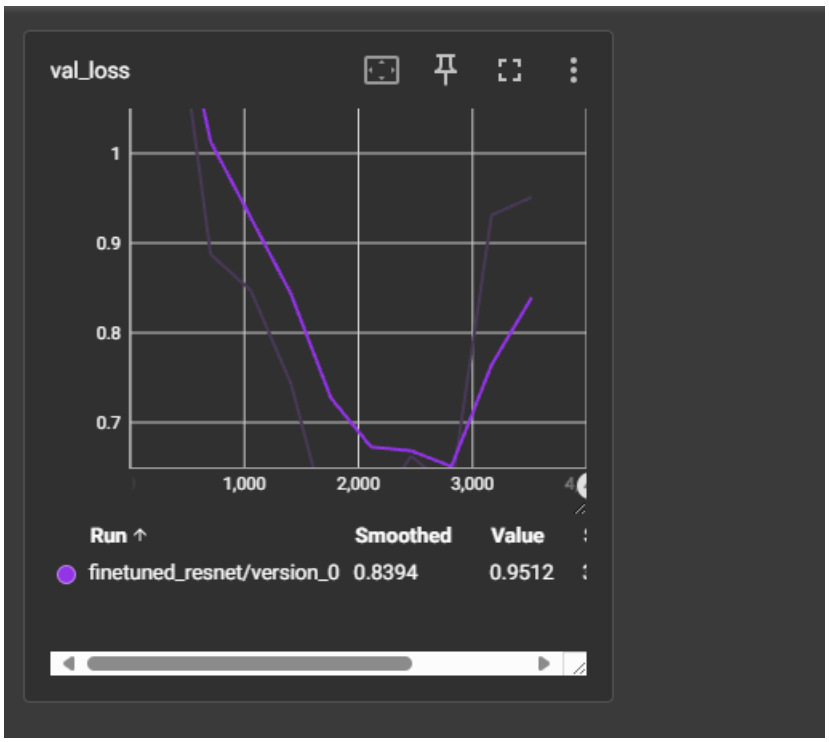




Testing Accuracy: 82.9%

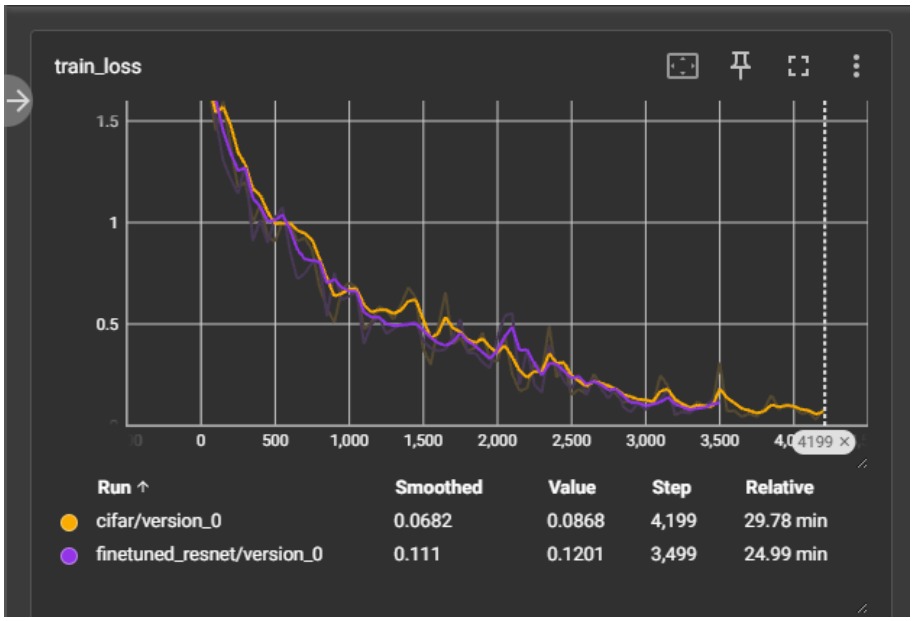
b. CIFAR10 with pre-trained ResNet weights

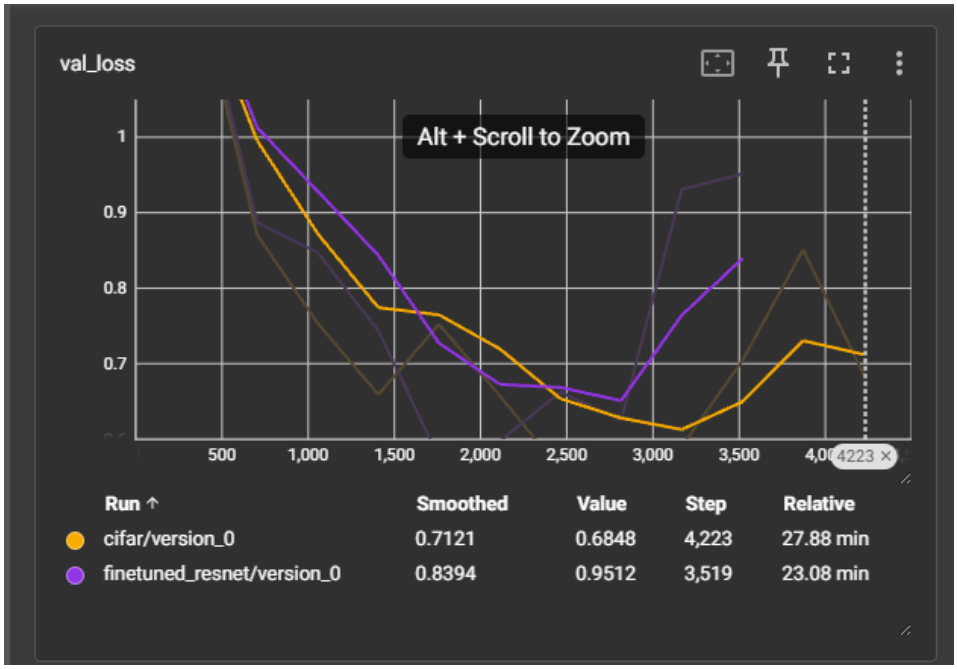




Testing Accuracy: 77.75%

Comparison


train_loss
1.5
1
0.5
0
500
1,000
1,500
2,000
2,500
3,000
3,500
4199
Run
Smoothed
Value
Step
Relative
cifar/version_0
0.0682
0.0868
4,199
29.78 min
finetuned_resnet/version_0
0.111
0.1201
3,499
24.99 min


val_loss
Alt + Scroll to Zoom
1
0.9
0.8
0.7
500
1,000
1,500
2,000
2,500
3,000
3,500
4223
Run
Smoothed
Value
Step
Relative
cifar/version_0
0.7121
0.6848
4,223
27.88 min
finetuned_resnet/version_0
0.8394
0.9512
3,519
23.08 min