**Write –Up--**

**Different Models with different batch size, different epoch value, different techniques ,different optimizers with different resultant accuracies**

|  |  |  |  |
| --- | --- | --- | --- |
| **Experiment Number** | **Model** | **Result** | **Decision + Explanation** |
| **model\_a** | **Conv3D** | **Accuracy=0.43** | **Reduce the number of layers** |
| **model\_b** | **Conv3D** | **Accuracy=0.21** | **Crop the images** |
| **model\_b(batch size =20)** | **Conv3D** | **Accuracy=0.49** | **reduce the filter size** |
| **model\_b(batch size =20)** | **Conv3D** | **Accuracy=0.75** | **Increase the amount of trainable data** |
| model\_b(using Adadelta Optimizer **)** | **Conv3D** | **Accuracy: 0.99** | **Overfitting data** |
| **model\_c** | **Conv3D** | **Accuracy =0.24** | **Try other techniques method** |
| **model\_d** | **MaxPooling3D** | **Accuracy =0.48** | **Crop properly** |
| model\_e(Model with images per frame(width and height of the images*)* **)** |  | **Accuracy=0.27** | **Poor Performance** |
| **model\_f** | **Conv3D** | **Accuracy=0.73** | **Better accuracy** |
| **model\_g** | **Conv3D** | **Accuracy =0.41** | **Increase the amount of trainable data** |
| **model\_h** |  |  |  |
| **model\_i** | **Conv3D** | **Accuracy: 0.65** | **Average performance** |
| **Model\_final** | **MaxPooling** | **Accuracy: 0.79** | **Good Accuracy** |

**Model\_a**

**Summary---**

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**Layer (type) Output Shape Param #**

**=================================================================**

conv3d\_1 (Conv3D) (None, 30, 120, 120, 8) 656

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batch\_normalization\_1 (Batch (None, 30, 120, 120, 8) 32

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activation\_1 (Activation) (None, 30, 120, 120, 8) 0

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max\_pooling3d\_1 (MaxPooling3 (None, 15, 60, 60, 8) 0

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conv3d\_2 (Conv3D) (None, 15, 60, 60, 16) 3472

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batch\_normalization\_2 (Batch (None, 15, 60, 60, 16) 64

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activation\_2 (Activation) (None, 15, 60, 60, 16) 0

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max\_pooling3d\_2 (MaxPooling3 (None, 7, 30, 30, 16) 0

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conv3d\_3 (Conv3D) (None, 7, 30, 30, 32) 4640

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batch\_normalization\_3 (Batch (None, 7, 30, 30, 32) 128

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activation\_3 (Activation) (None, 7, 30, 30, 32) 0

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max\_pooling3d\_3 (MaxPooling3 (None, 3, 15, 15, 32) 0

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conv3d\_4 (Conv3D) (None, 3, 15, 15, 64) 18496

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batch\_normalization\_4 (Batch (None, 3, 15, 15, 64) 256

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activation\_4 (Activation) (None, 3, 15, 15, 64) 0

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max\_pooling3d\_4 (MaxPooling3 (None, 1, 7, 7, 64) 0

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flatten\_1 (Flatten) (None, 3136) 0

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dense\_1 (Dense) (None, 1000) 3137000

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dropout\_1 (Dropout) (None, 1000) 0

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dense\_2 (Dense) (None, 500) 500500

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dropout\_2 (Dropout) (None, 500) 0

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dense\_3 (Dense) (None, 5) 2505

**=================================================================**

**Total params: 3,667,749**

**Trainable params: 3,667,509**

**Non-trainable params: 240**

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**Model\_b**

**Summary—**

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**Layer (type) Output Shape Param #**

**=================================================================**

conv3d\_9 (Conv3D) (None, 30, 60, 60, 32) 2624

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activation\_9 (Activation) (None, 30, 60, 60, 32) 0

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conv3d\_10 (Conv3D) (None, 30, 60, 60, 32) 27680

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activation\_10 (Activation) (None, 30, 60, 60, 32) 0

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max\_pooling3d\_7 (MaxPooling3 (None, 10, 20, 20, 32) 0

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dropout\_6 (Dropout) (None, 10, 20, 20, 32) 0

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conv3d\_11 (Conv3D) (None, 10, 20, 20, 64) 55360

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activation\_11 (Activation) (None, 10, 20, 20, 64) 0

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conv3d\_12 (Conv3D) (None, 10, 20, 20, 64) 110656

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activation\_12 (Activation) (None, 10, 20, 20, 64) 0

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max\_pooling3d\_8 (MaxPooling3 (None, 4, 7, 7, 64) 0

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dropout\_7 (Dropout) (None, 4, 7, 7, 64) 0

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flatten\_3 (Flatten) (None, 12544) 0

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dense\_6 (Dense) (None, 512) 6423040

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dropout\_8 (Dropout) (None, 512) 0

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dense\_7 (Dense) (None, 5) 2565

**=================================================================**

**Total params: 6,621,925**

**Trainable params: 6,621,925**

**Non-trainable params: 0**

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**Model\_c**

**Summary—**

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Layer (type) Output Shape Param #

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conv3d\_13 (Conv3D) (None, 30, 60, 60, 32) 2624

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activation\_13 (Activation) (None, 30, 60, 60, 32) 0

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conv3d\_14 (Conv3D) (None, 30, 60, 60, 32) 27680

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activation\_14 (Activation) (None, 30, 60, 60, 32) 0

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max\_pooling3d\_9 (MaxPooling3 (None, 10, 20, 20, 32) 0

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dropout\_9 (Dropout) (None, 10, 20, 20, 32) 0

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conv3d\_15 (Conv3D) (None, 10, 20, 20, 64) 55360

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activation\_15 (Activation) (None, 10, 20, 20, 64) 0

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conv3d\_16 (Conv3D) (None, 10, 20, 20, 64) 110656

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activation\_16 (Activation) (None, 10, 20, 20, 64) 0

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max\_pooling3d\_10 (MaxPooling (None, 4, 7, 7, 64) 0

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dropout\_10 (Dropout) (None, 4, 7, 7, 64) 0

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conv3d\_17 (Conv3D) (None, 4, 7, 7, 64) 110656

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activation\_17 (Activation) (None, 4, 7, 7, 64) 0

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conv3d\_18 (Conv3D) (None, 4, 7, 7, 64) 110656

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activation\_18 (Activation) (None, 4, 7, 7, 64) 0

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max\_pooling3d\_11 (MaxPooling (None, 2, 3, 3, 64) 0

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dropout\_11 (Dropout) (None, 2, 3, 3, 64) 0

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flatten\_4 (Flatten) (None, 1152) 0

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dense\_8 (Dense) (None, 512) 590336

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batch\_normalization\_5 (Batch (None, 512) 2048

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dropout\_12 (Dropout) (None, 512) 0

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dense\_9 (Dense) (None, 5) 2565

**=================================================================**

**Total params: 1,012,581**

**Trainable params: 1,011,557**

**Non-trainable params: 1,024**

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**Model\_d**

**Summary—**

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Layer (type) Output Shape Param #

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conv3d\_19 (Conv3D) (None, 30, 60, 60, 8) 656

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batch\_normalization\_6 (Batch (None, 30, 60, 60, 8) 32

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activation\_19 (Activation) (None, 30, 60, 60, 8) 0

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max\_pooling3d\_12 (MaxPooling (None, 15, 30, 30, 8) 0

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conv3d\_20 (Conv3D) (None, 15, 30, 30, 16) 3472

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batch\_normalization\_7 (Batch (None, 15, 30, 30, 16) 64

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activation\_20 (Activation) (None, 15, 30, 30, 16) 0

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max\_pooling3d\_13 (MaxPooling (None, 7, 15, 15, 16) 0

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conv3d\_21 (Conv3D) (None, 7, 15, 15, 32) 4640

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batch\_normalization\_8 (Batch (None, 7, 15, 15, 32) 128

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activation\_21 (Activation) (None, 7, 15, 15, 32) 0

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max\_pooling3d\_14 (MaxPooling (None, 3, 7, 7, 32) 0

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conv3d\_22 (Conv3D) (None, 3, 7, 7, 64) 18496

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batch\_normalization\_9 (Batch (None, 3, 7, 7, 64) 256

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activation\_22 (Activation) (None, 3, 7, 7, 64) 0

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max\_pooling3d\_15 (MaxPooling (None, 1, 3, 3, 64) 0

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flatten\_5 (Flatten) (None, 576) 0

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dense\_10 (Dense) (None, 1000) 577000

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dropout\_13 (Dropout) (None, 1000) 0

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dense\_11 (Dense) (None, 500) 500500

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dropout\_14 (Dropout) (None, 500) 0

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dense\_12 (Dense) (None, 5) 2505

**=================================================================**

**Total params: 1,107,749**

**Trainable params: 1,107,509**

**Non-trainable params: 240**

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**Model\_e**

**Summary—**

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Layer (type) Output Shape Param #

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conv3d\_23 (Conv3D) (None, 30, 64, 64, 32) 896

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activation\_23 (Activation) (None, 30, 64, 64, 32) 0

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conv3d\_24 (Conv3D) (None, 30, 64, 64, 32) 27680

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activation\_24 (Activation) (None, 30, 64, 64, 32) 0

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max\_pooling3d\_16 (MaxPooling (None, 10, 22, 22, 32) 0

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dropout\_15 (Dropout) (None, 10, 22, 22, 32) 0

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conv3d\_25 (Conv3D) (None, 10, 22, 22, 64) 55360

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activation\_25 (Activation) (None, 10, 22, 22, 64) 0

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conv3d\_26 (Conv3D) (None, 10, 22, 22, 64) 110656

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activation\_26 (Activation) (None, 10, 22, 22, 64) 0

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max\_pooling3d\_17 (MaxPooling (None, 4, 8, 8, 64) 0

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dropout\_16 (Dropout) (None, 4, 8, 8, 64) 0

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conv3d\_27 (Conv3D) (None, 4, 8, 8, 64) 110656

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activation\_27 (Activation) (None, 4, 8, 8, 64) 0

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conv3d\_28 (Conv3D) (None, 4, 8, 8, 64) 110656

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activation\_28 (Activation) (None, 4, 8, 8, 64) 0

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max\_pooling3d\_18 (MaxPooling (None, 2, 3, 3, 64) 0

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dropout\_17 (Dropout) (None, 2, 3, 3, 64) 0

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flatten\_6 (Flatten) (None, 1152) 0

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dense\_13 (Dense) (None, 512) 590336

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batch\_normalization\_10 (Batc (None, 512) 2048

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dropout\_18 (Dropout) (None, 512) 0

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dense\_14 (Dense) (None, 5) 2565

**=================================================================**

**Total params: 1,010,853**

**Trainable params: 1,009,829**

**Non-trainable params: 1,024**

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In [41]:

**Model\_f**

**Summary—**

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Layer (type) Output Shape Param #

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conv3d\_29 (Conv3D) (None, 30, 120, 120, 8) 224

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batch\_normalization\_11 (Batc (None, 30, 120, 120, 8) 32

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activation\_29 (Activation) (None, 30, 120, 120, 8) 0

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max\_pooling3d\_19 (MaxPooling (None, 15, 60, 60, 8) 0

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conv3d\_30 (Conv3D) (None, 15, 60, 60, 16) 3472

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batch\_normalization\_12 (Batc (None, 15, 60, 60, 16) 64

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activation\_30 (Activation) (None, 15, 60, 60, 16) 0

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max\_pooling3d\_20 (MaxPooling (None, 7, 30, 30, 16) 0

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conv3d\_31 (Conv3D) (None, 7, 30, 30, 32) 4640

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batch\_normalization\_13 (Batc (None, 7, 30, 30, 32) 128

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activation\_31 (Activation) (None, 7, 30, 30, 32) 0

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max\_pooling3d\_21 (MaxPooling (None, 3, 15, 15, 32) 0

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conv3d\_32 (Conv3D) (None, 3, 15, 15, 64) 18496

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batch\_normalization\_14 (Batc (None, 3, 15, 15, 64) 256

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activation\_32 (Activation) (None, 3, 15, 15, 64) 0

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max\_pooling3d\_22 (MaxPooling (None, 1, 7, 7, 64) 0

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flatten\_7 (Flatten) (None, 3136) 0

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dense\_15 (Dense) (None, 1000) 3137000

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dropout\_19 (Dropout) (None, 1000) 0

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dense\_16 (Dense) (None, 500) 500500

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dropout\_20 (Dropout) (None, 500) 0

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dense\_17 (Dense) (None, 5) 2505

**=================================================================**

**Total params: 3,667,317**

**Trainable params: 3,667,077**

**Non-trainable params: 240**

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**Model\_g**

**Summary—**

Layer (type) Output Shape Param #

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conv3d\_33 (Conv3D) (None, 30, 120, 120, 8) 656

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batch\_normalization\_15 (Batc (None, 30, 120, 120, 8) 32

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activation\_33 (Activation) (None, 30, 120, 120, 8) 0

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max\_pooling3d\_23 (MaxPooling (None, 15, 60, 60, 8) 0

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conv3d\_34 (Conv3D) (None, 15, 60, 60, 16) 3472

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batch\_normalization\_16 (Batc (None, 15, 60, 60, 16) 64

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activation\_34 (Activation) (None, 15, 60, 60, 16) 0

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max\_pooling3d\_24 (MaxPooling (None, 7, 30, 30, 16) 0

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conv3d\_35 (Conv3D) (None, 7, 30, 30, 32) 4640

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batch\_normalization\_17 (Batc (None, 7, 30, 30, 32) 128

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activation\_35 (Activation) (None, 7, 30, 30, 32) 0

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max\_pooling3d\_25 (MaxPooling (None, 3, 15, 15, 32) 0

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conv3d\_36 (Conv3D) (None, 3, 15, 15, 64) 18496

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batch\_normalization\_18 (Batc (None, 3, 15, 15, 64) 256

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activation\_36 (Activation) (None, 3, 15, 15, 64) 0

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max\_pooling3d\_26 (MaxPooling (None, 1, 7, 7, 64) 0

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flatten\_8 (Flatten) (None, 3136) 0

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dense\_18 (Dense) (None, 1000) 3137000

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dropout\_21 (Dropout) (None, 1000) 0

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dense\_19 (Dense) (None, 500) 500500

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dropout\_22 (Dropout) (None, 500) 0

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dense\_20 (Dense) (None, 5) 2505

**=================================================================**

**Total params: 3,667,749**

**Trainable params: 3,667,509**

**Non-trainable params: 240**

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**Model\_h**

**Summary—**

Layer (type) Output Shape Param #

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conv3d\_37 (Conv3D) (None, 30, 120, 120, 8) 656

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batch\_normalization\_19 (Batc (None, 30, 120, 120, 8) 32

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activation\_37 (Activation) (None, 30, 120, 120, 8) 0

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max\_pooling3d\_27 (MaxPooling (None, 15, 60, 60, 8) 0

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conv3d\_38 (Conv3D) (None, 15, 60, 60, 16) 3472

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batch\_normalization\_20 (Batc (None, 15, 60, 60, 16) 64

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activation\_38 (Activation) (None, 15, 60, 60, 16) 0

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max\_pooling3d\_28 (MaxPooling (None, 7, 30, 30, 16) 0

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conv3d\_39 (Conv3D) (None, 7, 30, 30, 32) 4640

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batch\_normalization\_21 (Batc (None, 7, 30, 30, 32) 128

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activation\_39 (Activation) (None, 7, 30, 30, 32) 0

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max\_pooling3d\_29 (MaxPooling (None, 3, 15, 15, 32) 0

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conv3d\_40 (Conv3D) (None, 3, 15, 15, 64) 18496

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batch\_normalization\_22 (Batc (None, 3, 15, 15, 64) 256

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activation\_40 (Activation) (None, 3, 15, 15, 64) 0

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max\_pooling3d\_30 (MaxPooling (None, 1, 7, 7, 64) 0

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flatten\_9 (Flatten) (None, 3136) 0

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dense\_21 (Dense) (None, 1000) 3137000

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dropout\_23 (Dropout) (None, 1000) 0

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dense\_22 (Dense) (None, 500) 500500

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dropout\_24 (Dropout) (None, 500) 0

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dense\_23 (Dense) (None, 5) 2505

**=================================================================**

**Total params: 3,667,749**

**Trainable params: 3,667,509**

**Non-trainable params: 240**

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**Model\_i**

**Summary—**

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Layer (type) Output Shape Param #

=================================================================

conv3d\_41 (Conv3D) (None, 30, 120, 120, 8) 656

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batch\_normalization\_23 (Batc (None, 30, 120, 120, 8) 32

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activation\_41 (Activation) (None, 30, 120, 120, 8) 0

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max\_pooling3d\_31 (MaxPooling (None, 15, 60, 60, 8) 0

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conv3d\_42 (Conv3D) (None, 15, 60, 60, 16) 3472

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batch\_normalization\_24 (Batc (None, 15, 60, 60, 16) 64

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activation\_42 (Activation) (None, 15, 60, 60, 16) 0

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max\_pooling3d\_32 (MaxPooling (None, 7, 30, 30, 16) 0

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conv3d\_43 (Conv3D) (None, 7, 30, 30, 32) 4640

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batch\_normalization\_25 (Batc (None, 7, 30, 30, 32) 128

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activation\_43 (Activation) (None, 7, 30, 30, 32) 0

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max\_pooling3d\_33 (MaxPooling (None, 3, 15, 15, 32) 0

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conv3d\_44 (Conv3D) (None, 3, 15, 15, 64) 18496

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activation\_44 (Activation) (None, 3, 15, 15, 64) 0

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dropout\_25 (Dropout) (None, 3, 15, 15, 64) 0

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max\_pooling3d\_34 (MaxPooling (None, 1, 7, 7, 64) 0

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flatten\_10 (Flatten) (None, 3136) 0

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dense\_24 (Dense) (None, 1000) 3137000

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dropout\_26 (Dropout) (None, 1000) 0

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dense\_25 (Dense) (None, 500) 500500

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dropout\_27 (Dropout) (None, 500) 0

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dense\_26 (Dense) (None, 5) 2505

**=================================================================**

**Total params: 3,667,493**

**Trainable params: 3,667,381**

**Non-trainable params: 112**

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**Final\_model**

**Summary—**

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Layer (type) Output Shape Param #

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conv3d\_45 (Conv3D) (None, 30, 120, 120, 8) 656

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batch\_normalization\_26 (Batc (None, 30, 120, 120, 8) 32

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activation\_45 (Activation) (None, 30, 120, 120, 8) 0

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max\_pooling3d\_35 (MaxPooling (None, 15, 60, 60, 8) 0

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conv3d\_46 (Conv3D) (None, 15, 60, 60, 16) 3472

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batch\_normalization\_27 (Batc (None, 15, 60, 60, 16) 64

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activation\_46 (Activation) (None, 15, 60, 60, 16) 0

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max\_pooling3d\_36 (MaxPooling (None, 7, 30, 30, 16) 0

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conv3d\_47 (Conv3D) (None, 7, 30, 30, 32) 4640

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batch\_normalization\_28 (Batc (None, 7, 30, 30, 32) 128

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activation\_47 (Activation) (None, 7, 30, 30, 32) 0

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max\_pooling3d\_37 (MaxPooling (None, 3, 15, 15, 32) 0

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conv3d\_48 (Conv3D) (None, 3, 15, 15, 64) 18496

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activation\_48 (Activation) (None, 3, 15, 15, 64) 0

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dropout\_28 (Dropout) (None, 3, 15, 15, 64) 0

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max\_pooling3d\_38 (MaxPooling (None, 1, 7, 7, 64) 0

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flatten\_11 (Flatten) (None, 3136) 0

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dense\_27 (Dense) (None, 256) 803072

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dropout\_29 (Dropout) (None, 256) 0

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dense\_28 (Dense) (None, 128) 32896

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dropout\_30 (Dropout) (None, 128) 0

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dense\_29 (Dense) (None, 5) 645

**=================================================================**

**Total params: 864,101**

**Trainable params: 863,989**

**Non-trainable params: 112**

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In [52]: