**Quick Recap:**

We are Able to achieve the Good Accuracy at our 7th model.Hence 7th model is our best Model.Training Accuracy 87% and Test Accuracy is 80%.

**Outcome of Exp 1:** We started with minimum batch size- leads to Low Accuracy ~ 0.24 and Loss ~12.8- Hence this cant be treated as good model, hence we decided to proceed further by changing the Batch Size and image width for better model accuracy.

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| Models | CONV3D |
| Experience | 1 |
| Batch\_Size | 10 |
| Image\_Size | 84\*84 |
| No.Of Epoch | 10 |
| No.of image Processed | [0,1,2,4,6,8,10,12,14,16,18,20,22,24,26,28,29] |
| Model Method | Sequential |
| Optimizer | Adam |
| Activation | Relu |
| Layer | 64,128,256 |
| Drop Out | No |
| Dense Layer | 1000 & 500 |
| Train\_Accuracy | 24% |
| Test\_Accuracy | 23% |

**Outcomes of Exp 2:** By increasing batch size, there is no much improvement in accuracy rather there was a drop in accuracy from ~0.24 to 0.17.so decided to change the Optimizer for the better model accuracy.

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| Models | CONV3D |
| Experience | 2 |
| Batch\_Size | 30 |
| Image\_Size | 84\*84 |
| No.Of Epoch | 20 |
| No.of image Processed | [0,1,2,4,6,8,10,12,14,16,18,20,22,24,26,28,29] |
| Model Method | Sequential |
| Optimizer | Adam |
| Activation | Relu |
| Layer | 64,128,256 |
| Drop Out | No |
| Dense Layer | 1000 & 500 |
| Train\_Accuracy | 17% |
| Test\_Accuracy | 16% |

**Outcomes of Exp 3 :** By changing the optimizer from Adam to SGD - we can able to see the drastic change in the Accuracy in very positive manner .Accuracy raised up to ~76% .From this what we infer is "SGD" Optimizer working better than Adam in this experiment.And also for more better we planned to hyper tuning by increasing the image size and decrease the epoch values.

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| Models | CONV3D |
| Experience | 3 |
| Batch\_Size | 30 |
| Image\_Size | 84\*84 |
| No.Of Epoch | 20 |
| No.of image Processed | [0,1,2,4,6,8,10,12,14,16,18,20,22,24,26,28,29] |
| Model Method | Sequential |
| Optimizer | SGD |
| Activation | Relu |
| Layer | 64,128,256 |
| Drop Out | No |
| Dense Layer | 1000 & 500 |
| Train\_Accuracy | 76% |
| Test\_Accuracy | 72% |

**Outcomes of Exp 4:** When we increased in Image size and decrease the batch size - leads to decrease in Accuracy from 76 to 71%- due to increase in image size large computational memory required for the performance so decreased the batch size.

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| Models | CONV3D |
| Experience | 4 |
| Batch\_Size | 30 |
| Image\_Size | 100\*100 |
| No.Of Epoch | 20 |
| No.of image Processed | [0,1,2,4,6,8,10,12,14,16,18,20,22,24,26,28,29] |
| Model Method | Sequential |
| Optimizer | SGD |
| Activation | Relu |
| Layer | 64,128,256 |
| Drop Out | No |
| Dense Layer | 1000 & 500 |
| Train\_Accuracy | 71% |
| Test\_Accuracy | 71% |

**Outcomes of Exp 5:** Train Accuracy 86% & test 75%- better accuracy due to change in image size and decrease the 1st filter values to 32 and used only one dense layer with 512.but still we have difference in the train &test accuracy - adjusting dense values for better model .

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| Models | CONV3D |
| Experience | 5 |
| Batch\_Size | 30 |
| Image\_Size | 120\*120 |
| No.Of Epoch | 20 |
| No.of image Processed | [0,1,2,4,6,8,10,12,14,16,18,20,22,24,26,28,29] |
| Model Method | Sequential |
| Optimizer | SGD |
| Activation | Relu |
| Layer | 32,128,256 |
| Drop Out | No |
| Dense Layer | 512 |
| Train\_Accuracy | 86% |
| Test\_Accuracy | 75% |

**Outcomes of exp6 :** when we decrease the dense values, there was drop in both train & test accuracy level dropped to 58%.

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| Models | CONV3D |
| Experience | 6 |
| Batch\_Size | 40 |
| Image\_Size | 120\*120 |
| No.Of Epoch | 20 |
| No.of image Processed | [0,1,2,4,6,8,10,12,14,16,18,20,22,24,26,28,29] |
| Model Method | Sequential |
| Optimizer | SGD |
| Activation | Relu |
| Layer | 32,64,128 |
| Drop Out | No |
| Dense Layer | 64 & 128 |
| Train\_Accuracy | 58% |
| Test\_Accuracy | 64% |

**Outcomes of Exp 7 :** By keeping Model 6 and just twist in epoch would lead to achieve the better model accuracy Train 87% and test 80% .

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| Models | CONV3D |
| Experience | 7 |
| Batch\_Size | 40 |
| Image\_Size | 120\*120 |
| No.Of Epoch | 10 |
| No.of image Processed | [0,1,2,4,6,8,10,12,14,16,18,20,22,24,26,28,29] |
| Model Method | Sequential |
| Optimizer | SGD |
| Activation | Relu |
| Layer | 32,64,128 |
| Drop Out | No |
| Dense Layer | 64 & 128 |
| Train\_Accuracy | 87% |
| Test\_Accuracy | 80% |

**Conclusion :**

We stop tuning further when the model achieve the better accuracy rate.From the Model 7 = we can infer that less Epoch, High Image size,fine tuning the filter and Dense layer are vital parameters for the archiving the better model.From our experience, the learning rate of our optimizer has the most impact. So at first keeping all other parameters fixed and just finding a good learning rate is a good start.

Relu basically not vanishing gradient and More computationally efficient to compute ,so we used Relu in our model.

SGD -To avoid the redundant and inefficient and it will computes on a small subset or random selection of data examples. Instead of performing computations on the whole dataset .

Epoch : increase the number of epochs, will lead to over-fitted model.Hence used very low epochs

Based on the previous layer/model outcomes we just keep fine tuning the layers until the test error does not improve anymore, so using two Dense layers than one layer.

**Our final model Accuracy rate is**

**Train Accuracy = 87%**

**Test Accuracy = 80%**