**OBSERVATIONS:**

* It was observed that as the Number of trainable parameters increase, the model takes much more time for training.
* A large batch size can throw *GPU Out of memory error,* and thus here we had to play around with the batch size till we were able to arrive at an optimal value of the batch size which our GPU could support.
* Increasing the batch size greatly reduces the training time but this also has a negative impact on the model accuracy. This made us realise that there is always a trade-off here on basis of priority -> If we want our model to be ready in a shorter time span, choose larger batch size else you should choose lower batch size if you want your model to be more accurate.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Experiment Number | Model | Result | Parameters | Decision + Explanation |
| 1 | Conv3D | OOM Error | 7,708,109 | Reduce the batch size and Reduce the dimensions of image. |
| 2 | Conv3D | Training accuracy- 0.29  Validation accuracy-0.16 | 1,283,909 | Batch size=20,reduce the dimension of image to 60x60,epochs=10 |
| 3 | Conv3D | Training Accuracy: 0.33  Validation accuracy:0.20 | 1,429,621 | Not much improvement after adding more layers and increase the epochs to 15 |
| 4 | Conv3D | Training Accuracy: 0.791  Validation accuracy:-0.79 | 2,177,829 | By increasing the dense neurons, image to 80x80, batch size=10, epochs=20, frames=30. |
| 5 | Conv3D | Training Accuracy: 0.90  Validation accuracy:-0.92 | 2,881,829 | Here we change the image dim to 100x100, epochs=30 and the rest is same. We got best results but parameters are more. frames=30 |
| 6 | Conv3D | Training Accuracy: 0.94  Validation accuracy:-0.88 | 697,445 | Here we decrease the parameters by decreasing the dense neurons and the rest remain same as above experiment.by far this is best model. |
| 9 | ConvLSTM with GRU | Training Accuracy: 0.631  Validation accuracy:-0.69 | 1,000,293 | Here 1 GRU layer and 1 dense layer is used and the rest is same as conv3d |
| 10 | ConvLSTM with GRU | Training Accuracy: 0.77  Validation accuracy:-0.69 | 1,934,949 | We add more GRU cells and  DENSE neurons, the model training accuracy is increased, the model slightly tend to over fit. |
| 11 | ConvLSTM with GRU | Training Accuracy: 0.92  Validation accuracy:-0.68 | 2,034,021 | We added one more layer of GRU, the model over fits in this experiment. |
| 12 | ConvLSTM with GRU | Training Accuracy: 0.85  Validation accuracy:-0.70 | 2,034,021 | We add dropouts and set the learning rate to 0.0001 thus we saw the decrease in training accuracy, but the model still over fits, as no increase in validation accuracy. |
| 13 | ConvLSTM with GRU+mobilenet | Training Accuracy: 0.46  Validation accuracy:-0.42 | 3,693,253 | Trainable parameters are- 462,341 only. We did not train the parameters of mobile net.  Thus we got lower accuracies. Batch\_size=5 |

Final Model=Experiment no 6 –Conv3d with Training Accuracy: 0.94, Validation accuracy:-0.88 with least number of parameters.