**Neural Networks Project – Gesture Recognition**

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We have experimented with Conv3D , CNN + RNN & GRU + MobileNet architectures.

So followed the process as below

* Data Generator
* Data Pre-processing
* Model Architectures building
* Testing

Observation as below:

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| **Experiment** | **Model** | **Result** | **Decision + Explanation** |
| 1 | Conv3D | Train. Acc: 0.49  Val. Acc : 0.42 | Lets increase the epochs & image resolution. So as to increase the overall accuracy |
| 2 | Conv3D | Train. Acc: 0.68  Val. Acc : 0.35 | Next increasing the frame count & batch size. As we see that the accuracy can be further improved and reduce over fitting |
| 3 | Conv3D | Train. Acc: 0.68  Val. Acc : 0.54 | Seen improvement but sill the accuracy can improve with good fit. So increasing the resolution & reducing the batch size resp |
| 4 | Conv3D | Train. Acc: 0.77  Val. Acc : 0.50 | Not much improvement so adding some drop outs to the model & Max-pooling |
| 5 | Conv3D | Train. Acc: 0.75  Val. Acc : 0.72 | Accuracy increased significantly just need to handle the over fitting so adding drop outs |
| 6 | Conv3D | Train. Acc: 0.94  Val. Acc : 0.73 | Clear over fitting no improvement |
| 7 | Conv3D | Train. Acc: 0.97  Val. Acc : 0.67 | Next trying ConvLSTM to see if we get better results |
| 8 | ConvLSTM | Train. Acc: 0.39  Val. Acc : 0.39 | Increasing batch size & Image resolution may give better accuracy |
| 9 | ConvLSTM | Train. Acc: 0.74  Val. Acc : 0.31 | As we see no good performance in validation accuracy switching to GRU+MobileNet |
| 10 | GRUMobNet | Train. Acc: 0.74  Val. Acc : 0.81 | We can improve the accuracy by tweaking the parameters like batch size & Epochs |
| 11 | GRUMobNet | Train. Acc: 89  Val. Acc : 84 | This seems to be the best fit accuracy so far. |
| Final Model | GRU MobNet | Train. Acc: 89  Val. Acc: 84 | So far after experimenting across different models this model seems the best model with a good accuracy and fit.  And there is always scope for improvement so by using other combination of other hyper-parameters we can further develop more accurate model |

Observation:

Post running all the experiments we see that Conv3D can be further improved as last model 7 has 0.92 & 0.72 accuracy which is a clear over fitting case . But on using GRU + MobileNet we could handle such over-fitting and get more stable model.