# Gesture Recognition Model Write Up

| Experiment Number | Model | Model Name | Number of Parameter | Augmented Data | Training Accuracy | Validation Accuracy | Decision + Explanation |
|---|---|---|---|---|---|---|---|
| 1 | Conv3D | ModelConv3D1 | 1,736,389 | No | 96% | 22% | The model is over-fitting. Augment data using cropping. |
| 2 | Conv3D | ModelConv3D2 | 3,638,981 | Yes | 74% | 73% | The model is stable but accuracy is not very high. Next, we will try to reduce the parameter size., let's try lowering the learning rate to 0.0002. |
| 3 | Conv3D | ModelConv3D3 | 1,762,613 | Yes | 74% | 20% | Model has unstable results. Let's trying to add more layers at the same level of abstractions. |
| 4 | Conv3D | ModelConv3D4 | 2,556,533 | Yes | 83% | 85% | The model has stable results. Also, we were able to reduce the parameter size by 1 million. |
| 5 | Conv3D | ModelConv3D5 | 2,556,533 | Yes | 89% | 22% | Model Overfits. Let's try adding dropouts at the convolution layers. |
| 6 | Conv3D | ModelConv3D6 | 696,645 | Yes | 82% | 78% | The model has stable results. Also, we were able to reduce the parameter size by ¼. Let Try to remove some more parameters. |
| 7 | Conv3D | ModelConv3D7 | 504,709 | Yes | 84% | 64% | Model overfits. Let try to remove some more parameters. |
| 8 | Conv3D | ModelConv3D8 | 230,949 | Yes | 69% | 68% | The model has stable results but look like little bit underfitting. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 9 | CNN-LSTM | RNNCNN1 | 1,657,445 | Yes | 95% | 44% | Model Overfits. Let's try to augment the data with slight rotation. |

**Model with More Data Augment**

| Experiment Number | Model | Model Name | Number of Parameter | Augmented Data | Training Accuracy | Validation Accuracy |
|---|---|---|---|---|---|---|
| 1 | Conv3D | ModelConv3D10 | 3,638,981 | Yes | 79% | 77% |
| 2 | Conv3D | ModelConv3D11 | 1,762,613 | Yes | 70% | 30% |
| 3 | Conv3D | ModelConv3D12 | 2,556,533 | Yes | 78% | 85% |
| 4 | Conv3D | ModelConv3D13 | 2,556,533 | Yes | 72% | 31% |
| 5 | Conv3D | ModelConv3D14 | 696,645 | Yes | 80% | 75% |
| 6 | Conv3D | ModelConv3D15 | 504,709 | Yes | 78% | 68% |
| 7 | Conv3D | ModelConv3D16 | 230,949 | Yes | 71% | 66% |
| 8 | CNN-LSTM | RNNCNN2 | 2,573,925 | Yes | 93% | 30% |

**Transfer Learning Models (CNN + RNN)**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | CNN-LSTM+TL | RNNCNN_TL | 3,840,453 | Yes | 44% | 46% | For this experiment, Mobilenet layer weights are not trained. Training and Validation accuracy is very poor. So, let's train mobilenet layer's weights as well |
| 2 | CNN-LSTM+TL | RNNCNN_TL2 | 3,693,253 | Yes | 99% | 100% | We get a better accuracy on training Mobilenet layer's weights as well. |