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| **Experiment**  **Number** | **Model** | **Result** | **Decision + Explanation** |
| **1** | **Conv3D**  Frames to sample: 30  Image size: (160,160)  Batch Size: 51  Epochs: 20  Total params: 27,570,245 | OOM Error | * This is base model * OOM error occurred so reduce the batch size, image size and the number of neurons in Dense layers |
| **2** | **Conv3D-1**  Frames to sample: 20  Image size: (60,60)  Batch Size: 40  Epochs: 30  Total params: 5,097,733 | Training Accuracy: 94%  Validation Accuracy: 81% | * Model is overfitting and slight fluctuation in accuracy and loss. * Let’s reduce the batch size and number of epochs. |
| **3** | **Conv3D-2**  Frames to sample: 20  Image size: (60,60)  Batch Size: 25  Epochs: 25  Total params: 3,492,101 | Training Accuracy: 98%  Validation Accuracy: 88% | * Fluctuation has reduced but the model is still slightly overfitting. * Model gets stable around 20th epoch * Let’s add some dropouts. |
| **4** | **Conv3D-3**  Frames to sample: 20  Image size: (60,60)  Batch Size: 25  Epochs: 20  Total params: 3,492,101 | Training Accuracy: 82%  Validation Accuracy: 76% | * Adding dropouts to the model reduced overfitting. It also made it unstable. * Let’s increase the image size and dropout percentage value. (from 0.25 to 0.50) |
| **5** | **Conv3D-4**  Frames to sample: 20  Image size: (100,100)  Batch Size: 25  Epochs: 20  Total params: 9,718,021 | Training Accuracy: 98%  Validation Accuracy: 82% | * Model was stable until the second last epoch (train\_acc: 94% & val\_acc: 87%). * Model parameters also increased by 3 times. * Let’s reduce image size. |
| **6** | **Conv3D-5**  Frames to sample: 20  Image size: (80,80)  Batch Size: 20  Epochs: 18  Total params: 6,834,437 | Training Accuracy: 86%  Validation Accuracy: 82% | * Model is no longer overfitting, but it has lower accuracy than the previous model. * Let’s use a different model with lower training parameters. |
| **7** | **Conv3D-6**  (New architecture)  Frames to sample: 20  Image size: (80,80)  Batch Size: 25  Epochs: 20  Total params: 4,179,173 | Training Accuracy: 92%  Validation Accuracy: 83% | * Models were stable until the 19th epoch (train\_acc:87% & val\_acc:88%). * At the last epoch there was a large gap in train and validation accuracy. * Let’s reduce the image size to 60 X 60. |
| **8** | **Conv3D-7**  Frames to sample: 24  Image size: (60,60)  Batch Size: 25  Epochs: 20  Total params: 2,606,309 | Training Accuracy: 96%  Validation Accuracy: 91% | * The model is no longer overfitting. * There was a steady growth in training and validation accuracy and steady reduction in training and validation loss * Let’s reduce filter size and check results. |
| **9** | **Conv3D-8**  Frames to sample: 24  Image size: (80,80)  Batch Size: 25  Epochs: 20  Total params: 4,041,157 | Training Accuracy: 93%  Validation Accuracy: 86% | * This model has good performance * Validation accuracy has reduced, and model parameters also increased because of the increase in image size. * Reducing kernel size of each layer didn't account for any major changes in the model |
| **10** | **CNN + GRU-9**  (New architecture)  Frames to sample: 20  Image size: (100,100)  Batch Size: 25  Epochs: 20  Total params: 602,693 | Training Accuracy: 76%  Validation Accuracy: 63% | * Accuracy is below 80. * Model requires more epochs to reach higher accuracy. |
| **11** | **CNN + LSTM - 10.1**  (New architecture)  Frames to sample: 20  Image size: (100,100)  Batch Size: 25  Epochs: 20  Total params: 3,535,301 | Training Accuracy: 90%  Validation Accuracy: 67% | * Model is overfitting. We will reduce image size. * Let’s add more dense neurons and increase the batch size |
| **12** | **CNN + LSTM - 10.2**  Frames to sample: 24  Image size: (80,80)  Batch Size: 25  Epochs: 25  Total params: 3,703,685 | Training Accuracy: 92%  Validation Accuracy: 72 % | * Model accuracy has increased than model 10.1 but the model is still overfitting. |
| **13** | **Transfer Learning-11**  (New architecture)  Frames to sample: 20  Image size: (100,100)  Batch Size: 10  Epochs: 20  Total params: 3,693,253 | Training Accuracy: 97%  Validation Accuracy: 91 % | * The transfer learning model gives a very good accuracy. |
| **Final Model** | **Conv3D-7**  **Frames to sample: 24**  **Image size: (60,60)**  **Batch Size: 25**  **Epochs: 20**  **Total params: 2,606,309** | **Training Accuracy: 96%**  **Validation Accuracy: 91%** | **We choose this model, since the model size is significantly less compared to other models and the accuracy is very good.** |