Find the Summary of the experiments:

* Have used batch size of 10 as it was not giving memory issues and model was training well.
* Have used 20 images and 30 images per video.
* Have used image size of 120 by 120 and 160 by 160.

|  |  |  |  |
| --- | --- | --- | --- |
| **Experiment Number** | **Model** | **Result** | **Decision + Explanation** |
| **1** | **Conv 3D Model using 30 frames per video**  **+ 16, 32, 64, 128 filters each followed by max pool 3D**  **+ 256 dense nodes**  **+ 128 dense nodes**  **+ image size 120 by 120 + Batch Size 10** | **Training Accuracy: 91%**  **Validation Accuracy: 83%** | **Low validation accuracy as compared to training accuracy.**  **Parameters ~1.9M** |
| **2** | **Conv 3D Model using 20 frames per video**  **+ 16, 32, 64, 128 filters + 256 dense nodes+ 128 dense nodes + image size 120 by 120** | **Training Accuracy: 87%**  **Validation Accuracy: 82%** | **Parameters are on higher side and even the model accuracy is not good enough.**  **Parameters-~3M** |
| **3** | **Conv 3D Model with 30 frames per video**  **+ 16, 32, 64, 128 filters + 256 dense nodes+ 128 dense nodes + image size 160 by 160** | **Training Accuracy: 96%**  **Validation Accuracy: 81%** | **Model is overfitting.Training accuracy is high.**  **Parameters-~3M** |
| **4** | **Conv 3D Model with 20 frames per video**  **+ 16, 32, 64, 128 filters conv 3D layers**  **+ 256 dense nodes**  **+ 128 dense nodes**  **+ image size 160 by 160** | **Training Accuracy: 94%**  **Validation Accuracy: 86%** | **Model is overfitting also 120 by 120 image size is better for training than 160 by 160 image size.** |
| **5** | **Conv 3D Model with 30 frames per video**  **+ 16, 32, 64, 128 filters conv 3D layers**  **+ 256 dense nodes**  **+ 128 dense nodes**  **+ Random data transformations on training data set +image size 120 by 120 + Batch size 10** | **Training Accuracy: 77%**  **Validation Accuracy:71%** | **With addition of random data transformation accuracy dropped significantly.** |
| **6** | **Conv 3D Model with 20 frames per video**  **+ 16, 32, 64, 128 filters + 128 dense nodes + 64 dense nodes + image size 120 by 120** | **Training Accuracy: 95%**  **Validation Accuracy:81%** | **Though the no of parameters were less ~1M the accuracy was not to the mark.** |
| **7** | **Mobilenet (retrain all weights)**  **+ GRU (128 cells)**  **+ Dense (128 nodes)**  **+ image size 120 by 120 + 20 images per video** | **Training Accuracy: 99%**  **Validation Accuracy: 96%** | **Retrained all the weights of Mobilenet.**  **Batch size = 10**  **Epochs = 20** |
| **10** | **Mobilenet (retrain all weights)**  **+ GRU (128 cells)**  **+ Dense (128 nodes)**  **+ image size 120 by 120**  **+ 30 images per video**  **+ random data transformations on the images** | **Training Accuracy: 98.8**  **Validation Accuracy: 95%** | **Retrained all the weights of Mobilenet.**  **Batch size = 10**  **Epochs = 20** |
| **11** | **Mobilenet (fine tune after 50th layer)**  **+ GRU (128 cells)**  **+ Dense (128 nodes)**  **+ image size 120 by 120**  **+ 20 images per video** | **Training Accuracy: 99%**  **Validation Accuracy: 94%** | **Batch size = 10**  **Epochs = 20**  **Fine tuning not giving good validation accuracy.**  **Hence always opting to retrain the full network.** |
| **12** | **Mobilenet (retrain all weights)**  **+ LSTM (128 cells)**  **+ Dense (128 nodes)**  **+ image size 120 by 120**  **+ 20 images per video** | **Training Accuracy: 97%**  **Validation Accuracy: 96%** | **Retrained all weights.**  **Batch size = 10**  **Epochs = 20** |
| **14** | **Mobilenet (retrain all weights)**  **+ LSTM (128 cells)**  **+ Dense (64 nodes)**  **+ image size 120 by 120**  **+ 20 images per video**  **+ random data transformations on the images** | **Training Accuracy: 83%**  **Validation Accuracy: 86%** | **It reduced accuracy significantly**  **Batch size = 10**  **Epochs = 20** |
| **Final Models** | **Mobilenet (retrain all weights)**  **+ LSTM (128 cells)**  **+ Dense (128 nodes)**  **+ image size 120 by 120**  **+ 20 images per video** | **Training Accuracy: 97%**  **Training loss: 0.083**  **Validation Accuracy: 96%**  **Val loss: 0.125** | **High accuracy and low loss in both training and validation data sets.**  **Total params: ~3.8M** |