**Gesture Recognition Assignment**

**1. Group Members (Cohort - MLC34):**

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**2. Problem Statement**

As a data scientist at a home electronics company which manufactures state of the art smart televisions. You want to develop a cool feature in the smart-TV that can recognize five different gestures performed by the user which will help users control the TV without using a remote.

The gestures are continuously monitored by the webcam mounted on the TV. Each gesture corresponds to a specific command:

* Thumbs up:  Increase the volume
* Thumbs down: Decrease the volume
* Left swipe: 'Jump' backwards 10 seconds
* Right swipe: 'Jump' forward 10 seconds
* Stop: Pause the movie

Each video is a sequence of 30 frames (or images).

**3. Model assessment writeup:**

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| Model Number | Model | Result | Decision + Explanation |
| 0 | Conv3D  Epoch: 15  Lr: 0.01  Batch size 100 | Throws OOM Error | Reduced the batch size and the number of layers |
| 1 | Conv3D  Epoch: 15  Lr: 0.01  Batch Size: 64 | Training Accuracy : 0.21  Validation Accuracy: 0.23 | Reduced batch size to 65 with fewer layers |
| 2 | Conv3D  Epoch: 20  Batch Size 64  Lr: 0.01  Early Stopping | Training Accuracy : 0.21  Validation Accuracy: 0.26 | Added Dropout and increased Dense Layers |
| 3 | Conv3D  Epoch: 50  Batch Size 64  Lr: 0.01  Early Stopping | Training Accuracy : 0.20  Validation Accuracy: 0.25 | Increased Epoch size |
| 4 | Conv3D  Epoch: 50  Batch Size 64  Lr: 0.01 | Training Accuracy : 0.54  Validation Accuracy: 0.57 | Model executed in Group partner’s notebook: Accuracy is not constant during model training. |
| 5 | Conv3D  Epoch: 50  Batch Size 64  Lr: 0.01 | Training Accuracy : 0.19  Validation Accuracy: 0.16 | Model executed in Group partner’s notebook: Added Dropouts |
| 6 | Conv2D + LSTM  Epoch: 50  Batch Size 64  Lr: 0.01 | Training Accuracy : 0.73  Validation Accuracy: 0.13 | Model executed in Group partner’s notebook: Added Augmentation in data generator. |
| 7 | Conv2D + LSTM  Epoch: 50  Batch Size 64  Lr: 0.01 | Training Accuracy : 0.85  Validation Accuracy: 0.49 | Model executed in Group partner’s notebook: Observed overfitting |
| Final Model | Mobilenet + GRU  Epoch: 50  Batch size: 32  Lr: 0.001  Early Stopping | Training Accuracy :  Validation Accuracy: | Reduced batch size further to 32.  As guided in Upgrad platform assignment module, used transfer learning (Mobile net) with GRU for faster training. |
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