## **Deep Learning Project- Gesture Recognition**

Team members:

* Kazi Mohiuddin Zoheb
* Niranjan Kunda

**Problem Statement**

As a data scientist at a home electronics company which manufactures state of the art smart televisions, we had to develop a cool feature in the smart-TV that can recognise 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

**Architectures:**

There are two ways in which this projected can be implemented:

1. 3D Convs
2. CNN-RNN Stack

|  |  |  |  |
| --- | --- | --- | --- |
| **Experiment Number** | **Model** | **Result** | **Decision + Explanation** |
| **1** | **Conv3D** | **Throws OOM error** | **Tried with image size 128x128 and bath size 32 on colab** |
| **2** | **Conv3D** | **Throws OOM error** | **Reduce the size of the image to 120x120 and reduce the batch size to 16 on colab** |
| **3** | **Conv3D** | **Throws OOM error** | **Reduced the batch size to 16, image\_idx to 17** |
| **4** | **Conv3D** | **Stop throwing OOM error** | **Reduced the size to 100x100, batch size to 8 , reduce the number of layers** |
| **5** | **Conv3D** | **Overfitting** | **Decided to Reduce size to 100x100**  **Add dropout layers in each connection and apply batch normalization** |
| **6** | **Conv3D** | **Not overfitting but accuracy low** | **Keep dropout layers only in last layers.** |
| **7** | **Conv3D** | **Accuracy: above 80% and no overfitting** | **With number of imd\_idx as 20, batch size=16 in Jarvislabs platform** |
|  |  |  |  |
| **8** | **Conv2D + GRU** | **Low accuracy** | **With 16,32,64,128 conv2d layers and 128 GRU layers** |
| **9** | **Conv2D + GRU** | **Increased the accuracy** | **Increase the layers and added batch normalization** |
| **10** | **Conv2D + GRU** | **Finally achieved optimum accuracy** | **61% validation accuracy achieved.** |
| **Final Model** | **Selected Conv3D model because of its better performance** | **Optimum accuracy, faster training, no overfitting** | **We got 78% Validation accuracy.** |