**Gesture Recognition**

**Problem Statement:**

We want 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

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| **SNO** | **MODEL** | **HyperParameters** | **Result** | **Model Params** | **Comments** |
| 1 | MODEL1 | batch\_size=32, Epoch = 20, Dim = 100x100, optimiser = 'sgd' | Train Accuracy: 0.81, Validation Accuracy: 0.33 | Total params: 2,454,405 Trainable params: 2,453,573 Non-trainable params: 832 | Used Conv3D layer. |
| 2 | MODEL2 | batch\_size=64, Epoch = 30, Dim = 100x100, optimiser =Adam learning\_rate=0.00001 | Train Accuracy: 0.55, Validation Accuracy: 0.34 | Total params: 2,454,405 Trainable params: 2,453,573 Non-trainable params: 832 | Used Conv3D layer. |
| 3 | MODEL3 | batch\_size=32, Epoch = 20, Dim = 100x100, optimiser =Adam learning\_rate=0.00001 | Train Accuracy: 0.59, Validation Accuracy: 0.25 | Total params: 9,597,701 Trainable params: 9,597,125 Non-trainable params: 576 | Used LSTM Layer. Not much improvement both train and validation data |
| 4 | MODEL4 | batch\_size=32, Epoch = 30, Dim = 120x120, optimiser =Adam learning\_rate=0.00001 | Train Accuracy: 0.51, Validation Accuracy: 0.21 | Total params: 178,309 Trainable params: 177,477 Non-trainable params: 832 | Used TimeDistributed Conv2D and GRU. Not much improvement both train and validation data |
| 5 | MODEL5 | batch\_size=32, Epoch = 30, Dim = 120x120, optimiser =Adam learning\_rate=0.00001 | Train Accuracy: 0.58, Validation Accuracy: 0.23 | Total params: 178,309 Trainable params: 177,477 Non-trainable params: 832 | Change the input image to grayscale. Used TimeDistributed Conv2D and GRU. |
| 6 | MODEL6 | batch\_size=32, Epoch = 520, Dim = 120x120, optimiser =Adam learning\_rate=0.00001 | Train Accuracy: 0.71, Validation Accuracy:0.73 | Total params: 15,911,557 Trainable params: 1,196,869 Non-trainable params: 14,714,688 | Used VGG 16 Net as a base model. Used Checkpoint and Early Stopping callbacks. |

**Conclusion:**

The Model by using VGG16 model as a base gave better results compared to all the other models which we have done.