Gesture Recognition

Problem statement:

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.

Below are the details of the experiments conducted on the data….

Experiment No.	Model	Result	Decision + Explanation
1	Conv3D	Train Accuracy: 0.21 Validation Accuracy: 0.20	Batch size = 128 Ablation = 20 Epoch = 20 Model did not learn anything, no loss reduction observed, lets add more layers to the model so that it can learn from data. Total params: 12,904,581 Trainable params: 12,904,581 Non-trainable params: 0
2	Conv3D	Train Accuracy: 0.23 Validation Accuracy: 0.20	Batch size = 35 No improvement in the model, after making some changes to kernel size and adding more layers, will add batch normalization layer after CNN and dense layers Total params: 8,311,813 Trainable params: 8,311,813 Non-trainable params: 0
3	Conv3D	Train Accuracy: 0.90 Validation Accuracy: 0.71	Ablation = None Epoch = 50 Model is over fitting, will add few dropouts in the next experiment so that the model can be generalized Total params: 8,317,701 Trainable params: 8,314,757 Non-trainable params: 2,944
4	Conv3D	Train Accuracy: 0.97 Validation Accuracy: 0.77	Dropout=0.2 There is slight increase in validation accuracy, but still model is over fitting. Let's increase dropout in the next experiment Total params: 22,732,549 Trainable params: 22,730,629 Non-trainable params: 1,920
5	Conv3D	Train Accuracy: 0.95 Validation Accuracy: 0.55	Dropout=0.5 After increase dropout, the validation accuracy is reduced further and

			model is still over fitting, will try a new architecture – GRU in the next experiment Total params: 712,453 Trainable params: 710,533 Non-trainable params: 1,920
6	Time Distributed + GRU	Train Accuracy: 0.88 Validation Accuracy: 0.83	The model is working quite well on validation with less number total trainable parameters. Now, will replace GRU with a plain Dense Layer Network and add global average pooling Total params: 99,845 Trainable params: 99,269 Non-trainable params: 576
7	Time Distributed + Dense	Train Accuracy: 0.94 Validation Accuracy: 0.90	This is good model so far; training and validation accuracy are close. Let's use different architecture of model with time distributed and ConvLSTM2D Total params: 129,477 Trainable params: 128,517 Non-trainable params: 960
8	Time Distributed + ConvLSTM 2D	Train Accuracy: 0.66 Validation Accuracy: 0.55	Trainable parameters are less, but accuracy is not satisfactory Total params: 13,781 Trainable params: 13,589 Non-trainable params: 192
Final Model	**Time Distributed + Dense**	**Train Accuracy: 0.94 Validation Accuracy: 0.90**	**This is the best model so far, the train and validation accuracy look good and total parameters are of moderate number.**