**Gesture Recognition Case Study**

* Rahul Agnihotri

# Problem Statement

Imagine you are working 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 **recognise five different gestures** performed by the user which will help users control the TV without using a remote.

# Explanation & Observations

* We selected base model with least number of trainable parameters with total 4 layers(Conv2D+GRU).
* With above result we decided to increase number of layers and all other parameters were kept same.
* As the plot clearly shows overfitting , we came to a decision that model is unable to train and thus we decided to reduce the image size, but instead the accuracy dropped significantly.
* We then moved to build CNN+RNN with Conv3D, where shape was (15,120,120,3), we got the best accuracy till now.
* Now another structure of Conv3D is built with 3 layers and a batch size of 32, the model outputs poor accuracy as model was not getting tuned parameters.
* With above result ,increasing number of layers and frames helps training accuracy increase but failed to provide accuracy on validation, model overfits.
* Finally we tuned parameters and build model with (15,120,120,3) shape and batch size of 10
* ,the model gave accuracy of 0.96 but there was a slight gap between accuracies.
* So keeping all above tested models parameters and performance we selected Conv3D+RNN model as final model

.h5 File name

GR\_RNN\_2021-09-0719\_28\_52.701378/model-00049-0.03305-0.99548-0.19803-0.92000.h5

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Experiment** | **Model** | **Parameters** | **Result** | **Decision + Explanation** |
| **1** | **Conv2D+RNN** | **2 layers conv2D**  **2 layers GRU**  **(16,120,120,3) , 32** | **Model performed poorly** | **Base Model, Inc the number of layers** |
| **2** | **Conv2D+RNN** | **4 layers conv2D**  **2 layers GRU**  **(16,120,120,3) , 32** | **Model clearly overfits** | **Reduce the size of the image/Inc the number of layers & frames** |
| **3** | **Conv2D+RNN** | **4 layers conv2D**  **2 layers GRU**  **(18,100,100,3) , 20** | **Poor Accuracy** | **Decrease batch size/ increase the filter size/inc img size** |
| **4** | **Conv3D+RNN** | **4 layers conv3D**  **2 layers GRU**  **(15,120,120,3) , 10** | **Best Accuracy** | **Selected Model** |
|  |  |  |  |  |
| **5** | **Conv3D** | **3 layers Conv3D**  **(16,120,120,3), 32** | **Poor Accuracy** | **Inc batch size, inc frames, inc layers** |
| **6** | **Conv3D** | **4 layers Conv3D**  **(16,120,120,3), 32** | **Model Clearly Overfits** | **Reducing batch size,frames/inc model params** |
|  |  |  |  |  |
| **7** | **Conv3D** | **4 layers Conv3D**  **(15,120,120,3), 10** | **Accuracy: 0.96** | **Slight gap between accuracies** |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |