**Hand Gesture Recognition**

Project to use neural networks to recognize hand gestures.

Team

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Project

This project is related to data scientist topic. Let’s consider the we have to build cool feature for device to develop a product. So here we choose the human gesture to recognize the operations of device.

The gestures are captured by cameras and updated the device setting(operations) as mentioned below

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

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

Model Evolution

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| --- | --- | --- | --- |
| **Experiment Number** | **Model** | **Result** | **Decision + Explanation** |
| **1** | **Conv3D** | **Training Accuracy : 0.67**  **Validation accuracy: 0.64**  **Epoch :10**  **Batch size: 10 optimizer: SGD** | **Model has stable result. We have changed parameters with respect to module and checked the results.**  **To improve the results**  **Other models have to tried.** |
| **2** | **Conv3D** | **Training Accuracy : 0.7470**  **Validation accuracy: 0.4062**  **Epoch :25**  **Batch size: 32**  **optimizer: SGD** | **Even though training accuracy is improved validation accuracy is poor. Hence, other model architecture like Conv2D+ConvLSTM is taken into consideration.** |
| **3** | **Conv2D+ConvLSTM2D** | **Training Accuracy: 0.833**  **Validation Accuracy: 0.5078**  **Epoch: 20**  **Batch size: 32**  **Optimizer: Adam** | **Increased batch size to 32 and epochs to 20**  **Training accuracy is better than validation accuracy.**  **Number of epochs have to increased to get better outcome** |
| **4** | **Conv2D+ConvLSTM2D** | **Training Accuracy: 0.833**  **Validation Accuracy: 0.5078**  **Epoch: 50**  **Batch size: 64**  **Optimizer: Adam** | **Hyperparameter tuning of batch size and learning rate and optimizer has to be done** |
| **5** | **Conv2D+ConvLSTM2D** | **Training Accuracy: 0.94**  **Validation Accuracy: 0.84**  **Epoch: 50**  **Batch size: 32**  **Learning rate: 0.01**  **Optimizer: Adam** | **This model has good stability with good training and validation accuracy.** |

**Conclusions:**

After iterations with trail and error, two models are considered Conv3D and combination of Conv2D and ConvLSTM. various Iterations of batch\_size , Epochs, learning rate are considered to get the best outcome

It is observed that, Conv2D + ConvLSTM gives the best results with maximum training accuracy of 94% and validation accuracy of 84%.

Hence, Conv2D + ConvLSTM model with batch\_size of 32, number of epochs as 50, learning rate of 0.01 with Adam as optimizer is best choice for the problem statement