

Gesture Recognition Project - Learning Experiences (Ravi Kumar Khandelwal & Shashikant Songirkar)

During this project, We followed the below steps

1. Built TensorFlow tf.dataset pipeline with FrameGenerator.

Reason to choose this tf.Dataset

- It is highly optimized, Its autotune feature automatically tune pipeline according to the underlying hardware. It internally parallelizes the data fetching process which makes it fast.
- Its prefetch method made available data immediately after and model training does not sit idle.
- As a developer, it is easy to migrate layers like the augmentation process along with the training pipeline.
- It also provides to generate data as a batch.:
- We have created FrameGenerator class to yield a single video frame generator and migration this frameGenerator with tf. Pipeline.

2. Performed the following experiment while building the model process. We trained only 30 epochs for each model.

- Choose randomly 8 images
 - a) trained with a simple CNN+RNN approach.
- Chosen randomly 15 images
 - b) Trained with simple CNN+RNN architecture
 - c) Trained with ResNet CNN with Transfer learning + RNN architecture
 - d) Trained with Simple Conv3D plus Dense Layer architecture
 - e) Trained with Custom Skip connection (ResNet Like Block in Conv3D) plus Dense Layer.
 - f) Used Augmentation with Custom Skip connection (ResNet Like Block in Conv3D) plus Dense Layer.
 - g) Used Gray Image with Channel 1 in Custom Skip connection (ResNet Like Block in Conv3D) plus Dense Layer.

3. Observations

Experiment Number	Train and validation accuracy	Comments
SimpleCnn_Plus_Rnn_wit	Train Accuracy: 68	Since the Model has been

h_8Frame	Validation Accuracy: 62	trained with 8 Frames, it must be skipping important sequence images during training, It did not perform well.
SimpleCnn_Plus_Rnn_wit h_15Frame	Train accuracy: 93.00 Validation accuracy: 98.49	Model showed overfit nature till 15 epochs. It may be the high number of weights. Although After 15 epochs, training accuracy and validation accuracy follow each other more and less. But the Zig Zag pattern is visible in the validation score.
TransferLearning_ResNet Cnn_Rnn_with_15Frame	Train Accuracy: 100.00 Validation Accuracy: 83	Faced overfit problem.
Basic_Conv3D_15_Fram es	TrainIng Accuracy: 99.49 Validation Accuracy: 96.00	Models were not stable during the entire training process. Validation accuracy was not steady or did not follow training accuracy. It is getting up and down.
ResNetBlock_Conv3D_1 5_Frames	Training Accuracy: 93.96 Validation Accuracy: 92	This Model looks more stable and promising than all models. The model follows steady validation accuracy and It did not get up and down.
ResNetBlock_Conv3D_1 5_Frames_with_Augment	Training Accuracy: 74.00 Validation Accuracy:71.00	Augmentation did not help here, In Fact, it reduced accuracy. It may be augmentation is being applied on each image in different ways of a single frame which resulting distortion of gif.