Gesture Recognition Neural Network Project

We did our modelling with CNN+RNN(Bidirectional GRU) architecture.

We have 30 fps train and validation videos means 30 images per each video dataset. At first we choose the batch_size as 32 and number of images as 16 in the img_idx list. In generator function, we defined how the model shall call the images in batches in memory and not all together. Also we cropped and resized all the images in 100x100x3 format and normalized it by dividing with 255.

Then we model conv2D network (cnn_model) to extract the feature vectors for each images and then these sequence of feature vectors fed to an RNN based bidirectional GRU network (model) to learn the temporal information.

Some of the things to keep in mind while training is the logits tensor size and labels tensor size should be appropriate for broadcasting operation, otherwise it will throw error. In cnn_model, BatchNormalization and Dropout used to control overfitting. 4 conv2D layer with 4 MaxPooling (16, 32, 64, 128 no. of filters respectively) and same padding has been used with one flatten and two dense final layers.

In sequential RNN based model, time distributed bidirectional GRU with 16 number of cells used and it connected with final dense layer after 20% dropout. Final activation function used softmax as it is a multiclass classification problem.

Experiment Number	Model	Result	Decision + Explanation
1	ConvGRU	Graph execution error	Graph execution error: logits and labels must be broadcastable: logits_size=[32,5] labels_size=[42,5] Broadcasting error came as we initially were taking 21 images in the img_idx list which bidirectionally became 42 which is not compatible with 32 for broadcasting. So we change the no. of images to 16 in img_idx list
2	ConvGRU	Failed to format this callback filepath: Reason: \'val_loss\'	Using save_freq argument instead of period in ModelCheckpoint command gave this error. Finally used period=1 argument

3	ConvGRU	Unable to find the h5 files (models)	In google colab, we were unable to save or locate the models saved per epoch
Final Model	**ConvGRU**	**Train Accuracy: 1.00** **Val Accuracy: 0.93**	**Final model run done in Jupyter and models saved in local drive. Epoch no. 51/100 will be used as the final model.**