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| **Experiment Number** | **Model** | **Decision + Explanation** | **Result** |
| 1 | Conv3D | Using 1 epoch, 20 batch size, patience of 2, factor of .5, minimum learning rate of .001, 10 frames, image size cropped or resized to 120x120, 2 sets of hidden layers (2 3DConv, 2 BatchNormalization, 1 Maxpooling3D, Dropout; final Flatten and softmax), Adam optimizer | Training accuracy: 0.20  Validation accuracy: 0.21 |
| 2 | Conv3D | Using 50 epochs, 20 batch size, patience of 2, factor of .5, minimum learning rate of .001, 10 frames, image size cropped or resized to 120x120, 2 sets of hidden layers (2 3DConv, 2 BatchNormalization, 1 Maxpooling3D, Dropout; final Flatten and softmax), Adam optimizer | Training accuracy: 0.80  Validation accuracy: 0.61 |
| 3 | Conv3D | Using 1 epoch, 20 batch size, patience of 2, factor of .5, minimum learning rate of .001, 10 frames, image size cropped or resized to 120x120, 3 sets of hidden layers (2 3DConv, 2 BatchNormalization, 1 Maxpooling3D, Dropout; final Flatten and softmax), Adam optimizer | Training accuracy: 0.22  Validation accuracy: 0.20 |
| 4 | Conv3D | Using 50 epochs, 50 batch size, patience of 5, factor of .8, minimum learning rate of .001, 10 frames, image size cropped or resized to 120x120, 3 sets of hidden layers (2 3DConv, 2 BatchNormalization, 1 Maxpooling3D, Dropout; final Flatten and softmax), SGD optimizer | Training accuracy: 0.91  Validation accuracy: 0.61 |
| 5 | Conv3D | Using 50 epochs, 10 batch size, patience of 5, factor of .8, minimum learning rate of .001, 10 frames, image size cropped or resized to 120x120, 3 sets of hidden layers (2 3DConv, 2 BatchNormalization, 1 Maxpooling3D, Dropout; final Flatten and softmax), SGD optimizer | Training accuracy: 0.87  Validation accuracy: 0.57 |
| 6 | Conv3D | Using 10 epochs, 10 batch size, patience of 2, factor of .2, minimum learning rate of .000001, 5 frames, image size cropped or resized to 120x120, 3 sets of hidden layers (2 3DConv, 2 BatchNormalization, 1 Maxpooling3D, Dropout; final Flatten and softmax), Adam optimizer | Training accuracy: 0.70  Validation accuracy: 0.56 |
| 7 | Conv3D | Using 100 epochs, 60 batch size, patience of 5, factor of .2, minimum learning rate of .001, 15 frames, image size cropped or resized to 120x120, 3 sets of hidden layers (2 3DConv with filter size (3,3,3), 2 BatchNormalization, 1 Maxpooling3D, Dropout; final Flatten and softmax), Adam optimizer | Resource Exhausted (OOM) Error |
| 8 | Conv2D+GRU | Using 10 epochs, 50 batch size, patience of 2, factor of .2, minimum learning rate of .000001, 15 frames, image size cropped or resized to 120x120, 3 sets of hidden layers (2 Conv, Maxpooling, Dropout; final Flatten and softmax), Adam optimizer | Resource Exhausted (OOM) Error |
| 9 | Conv3D | Using 100 epochs, 50 batch size, patience of 5, factor of .2, minimum learning rate of .001, 10 frames, image size cropped or resized to 120x120, 3 sets of hidden layers (2 3DConv with filter size (3,3,3), 2 BatchNormalization, 1 Maxpooling3D, Dropout(change from .25 to .5 in last set); final Flatten and softmax), SGD optimizer | Training Accuracy: 0.96  Validation Accuracy: 0.72 |
| 10 | ResNet50+transfer learning+GRU | Using 1 epoch, 50 batch size, patience of 5, factor of .2, minimum learning rate of .001, 15 frames, image size cropped or resized to 224x224, ResNet50 layers with training of first 140 layers frozen, GlobalAveragePooling2D layer, fully connected Dense layer, wrapping the layers in TimeDistributed function, TimeDistributed Flatten layer, GRU layer, Dense layer with softmax activation, SGD optimizer | Resource Exhausted (OOM) Error |
| 11 | ResNet50+transfer learning+GRU | Using 1 epoch, 40 batch size, patience of 5, factor of .2, minimum learning rate of .001, 10 frames, image size cropped or resized to 224x224, ResNet50 layers with training of first 140 layers frozen, GlobalAveragePooling2D layer, fully connected Dense layer, wrapping the layers in TimeDistributed function, TimeDistributed Flatten layer, GRU layer, Dense layer with softmax activation, SGD optimizer | Training Accuracy: 0.40  Validation Accuracy: 0.30 |
| 12 | ResNet50+transfer learning+GRU | Using 50 epochs, 40 batch size, patience of 5, factor of .2, minimum learning rate of .001, 10 frames, image size cropped or resized to 224x224, ResNet50 layers with training of first 140 layers frozen, GlobalAveragePooling2D layer, fully connected Dense layer, wrapping the layers in TimeDistributed function, TimeDistributed Flatten layer, GRU layer, Dense layer with softmax activation, SGD optimizer | Training Accuracy: 0.94  Validation Accuracy: 0.70 |
| **Final Model (13th Model)** | **ResNet50+transfer learning+GRU** | **Using 100 epochs, 40 batch size, patience of 5, factor of .2, minimum learning rate of .001, 10 frames, image size cropped or resized to 224x224, ResNet50 layers with training of first 140 layers frozen, GlobalAveragePooling2D layer, fully connected Dense layer, wrapping the layers in TimeDistributed function, TimeDistributed Flatten layer, GRU layer, Dense layer with softmax activation, SGD optimizer** | **Training Accuracy: 0.98**  **Validation Accuracy: 0.75** |

As can be seen from our analysis, using Resnet50 and leveraging transfer learning along with GRU serves as the best model of what we have attempted. The ideal number of epochs comes to 100 and the batch size is 40. Smaller epoch sizes did not allow enough learning to take place to increase validation accuracy. Also, in comparison to previous attempts, 10 frames per video seemed to produce better results compared to too many or too less frames which have contributed to either overfitting or not enough training data respectively. This model has produced the highest training and validation accuracies, but computationally it took some more time than the others.