**­­­Model-1 [Cov3D model]:**

**Trainable Parameters**: 433,157

**Maximum Validation Accuracy**: 0.70 in Epoch: 26

This model is designed with 3D convolution layer**. 4 convolution layers** are added with dropouts and pooling layers.

**Funnel shape , (i**.e. next convolution layer would have more filters than earlier conv layer) is deliberately maintained to extract big/generic features in the starting and detailed features are extracted in the end.

**Fast Adam Optimizer** is used as it is most widely used with CNN.

**No Padding and stride** of 1 is used in each convolution layer. **“RELU” activation** is used in all the layer except the output layer.

**3 dense layers** including the last is used to for better categorization.

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| **Experiment Number** | **Model** | **Problems** | **Decision + Explanation** |
| **1** | **Conv3D(Model1)** | **Image size error. Multiple image sizes available** | **Resizing all images to 100x100.** |
| **2** | **Conv3D(Model1)** | **Throws Generator error in Last batch** | **Corrected the last batch size**  **And batch label size** |
| **3** | **Conv3D(Model1)** | **Throws Generator error in validation set** | **Corrected the error in calculating last batch size** |
| **4** | **Conv3D(Model1)** | **Low Accuracy: 0.21** | **Introduced multiple Convolution layer** |
| **5** | **Conv3D(Model1)** | **Overfitting Training accuracy:0.70 Validation Accuracy:0.31** | **Put dropout after every layer** |
| **6** | **Conv3D(Model1)** | **Low validation accuracy of 0.3** | **Introduced Batch Normalization. Accuracy reached 0.4** |
| **7** | **Conv3D(Model1)** | **Oscillating validation accuracy** | **Reduced Dropout to 0.25 from 0.5, thinking may be too much re-setting of**  **weights is causing this behavior** |

**Model-2 [CNN+RNN]:**

**Trainable Parameters**: 2,565,637

**Maximum Validation Accuracy**: 0.52 in Epoch: 30

This model is designed **with VGGnet-16 in front and LSTM at the back**.VGG-16 is used without top for feature extraction and then joined with LSTM model using **TimeDistributed**.

**VGG-16 is not trained**, and layers are marked non-trainable to use transfer learning.

**Two LSTM layer are** used, the first LSTM layer returning the sequence.

Fast **Adam Optimizer** is used.

**2 dense layers** including the output is used to for better categorization.

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| **Experiment Number** | **Model** | **Problems** | **Decision + Explanation** |
| **1** | **­­­Model-2 [CNN+RNN]:** | **Difficulty in using and selecting part of VGG** | **Last 2 layers of VGG are removed as we have to place our own categorization layers** |
| **2** | **­­­Model-2 [CNN+RNN]:** | **Large number of parameters** | **VGG-16 layers are marked non-trainable** |
| **3** | **­­­Model-2 [CNN+RNN]:** | **0.4 validation Accuracy** | **Introduced multiple LSTM layers, for better catching sequential information** |

**Model -3 (Conv3D)**

**Trainable Parameters**: 707,813

**Maximum Validation Accuracy**: 0.43 in Epoch: 23

This model is **similar version** of model-1.

**Changes :**

1. **One more convolution layers( Now Total 5 convolution layers)** are added with dropouts and pooling layers. Increased one convolution layer.
   1. **Reason:** As not getting high accuracy in model -1, so assumed features are not getting captured fully.
2. **Large Filters** in initial convolution layers.
   1. **Reason: filter depth** is increased to capture sequence information
3. **Reduced Dropout.**
   1. **Reason:**  To remove oscillating behavior of accuracies with epochs
4. **Removed few Pooling** layers:
   1. Back to back arranged convolution layer without pooling in between
5. **SGD** optimizer:
   1. **Reason: SGD** optimizer being more accurate, will help in good gradient decent without oscillation.

**No Padding and stride** of 1 is used in each convolution layer. **“RELU” activation** is used in all the layer except the output layer.

**3 dense layers** including the last is used to for better categorization.