1.Experiment Number 1 : Base Conv3D

Approach

- Making complex model to overfit on small data

Result

- Able to overfit small data on a complex model

Decision + Explanation

- Model is free of `silent errors' and we can say that the model works.

Issues (if any)

- NO

2.Experiment Number 2 : model_1 : Conv3D

Approach

- Fed all the frames and more files

Result

- The Model was still overfitting

Decision + Explanation

- Model is more complex than it needs to be. Let's reduce the number of parameters.

Issues (if any)

- NO

3.Experiment Number 3 :model_2 : Conv3D with early stopping

Approach

- Abaltion appproach
- Using early stopping
- Feeding 20 frames
- Making model leaner and feeding more data (200 images each from the training and validation sets)
- Cropping the images

Result

- Overfitting was solved but the accuracies were in the lower range.

Decision + Explanation

- Let's fiddle with the frames size and try tweaking with the model a bit.

Issues (if any)

- NO

4.Experiment Number 4 :model_3 : Conv3D with early stopping

Approach

- Ablation approach.
- Reducing the number of frames.
- Increasing the number of fully connected layers.

Result

- Model looks promising with high accuracy and less overfitting.
- Even with full data model showed high accuracy.

Decision + Explanation

- Fed full data to the model to tackle overfitting and see it’s performance.

Issues (if any)

- NO

5.Experiment Number 5: model_4 : Conv3D with early stopping

Approach

- Abaltion appproach
- Using early stopping
- reducing model parameters
- reducing image size
- changing cropping

Result

- Accuracy dropped

Decision + Explanation

- This called for conducting further experiments

Issues (if any)

- NO

6.Experiment Number 6: model_5 : Conv3D with early stopping

Approach

- Abaltion appproach
- Using early stopping
- Increasing batch size
- leaner model dimensions

Result

- Accuracy dropped and the model was under-fitting

Decision + Explanation

- This called for increasing the model parameters and further experiments.

Issues (if any)

- NO

7.Experiment Number 7: model_6 : Conv3D with early stopping

Approach

- Abaltion appproach
- Using early stopping
- Increasing image size
- Changing cropping

Result

- Low accuracy of about 26%

Decision + Explanation

- Till now we have tested 7 models(including the base model).
- So far the best model has been model 3 with accuracy in the range of 80% and no overfitting.
- We also tried to experiment with different versions of this model by modifying the network configurations and also by toying around with image_frames, image size and image cropping.
- Now let's experiment with model 3 in terms of batch size, epochs and probably the optimizer

Issues (if any)

- NO

8.Experiment Number 8: model_7 : Conv3D with early stopping

Approach

- Ablation approach
- using model_3
- increasing batch size to 20
- changing the optimizer to SGD with a higher learning rate

Result

- Best accuracy was in the range of 45%

Decision + Explanation

- This called for further experiments to see if the accuracy could be improved.

Issues (if any)

- NO

9.Experiment Number 9: model_8 : Conv3D with early stopping

Approach

- Ablation approach
- using model_3
- increasing batch size to 30
- changing the optimizer to SGD with a higher learning rate

Result

- Model performed poorly with under-fitting

Decision + Explanation

- To see if there is a correlation between underfitting with increasing batch size, we will further increase the batch size in the next experiment.

Issues (if any)

- NO

10.Experiment Number 10: model_9 Conv3D with early stopping

Approach

- Ablation approach
- using model_3
- increasing batch size to 40
- Changing the optimizer to SGD with a higher learning rate

Result

- Still poor performance but this time it was overfitting.

Decision + Explanation

- We can say that there is no correlation between underfitting with increasing batch size.
- Perhaps the problem lies with the learning rate. As we are short on resources, we will now move to ConV2D plus RNN architecture

Issues (if any)

- NO

11.Experiment Number 11: model_10 Vanilla CNN LSTM with GRU

Approach

- Ablation approach
- Trying to overfit small data one a complex model.

Result

- Able to overfit small data on a complex model

Decision + Explanation

- Model is free of `silent errors' and we

can say that the model works.

Issues (if any)

- NO

12.Experiment Number 12: model_11: Vanilla CNN LSTM with GRU

Approach

- Ablation approach
- Reducing the model parameters by one-fourth
- Reducing the number of frames to 16
- Reducing batch size to 9

Result

- The model gave best accuracy in the region of about 58%

Decision + Explanation

- Further conducting the experiments by tweaking with the model

Issues (if any)

- Issue of logits not matching the labels. Forced to choose batch size of 9.

13.Experiment Number 13: model_12: Vanilla CNN LSTM with GRU

Approach

- Ablation approach
- increasing model parameters
- reducing the frames to 16
- increasing batch size to 15

Result

- Model was performing ok with the accuracy of about 62% and low over-fitting

Decision + Explanation

- Now we move on to some experiments with transfer learning .

Issues (if any)

- Could not conduct further experiments with this on chaining batch size as the problem of logits not matching the labels came up again.

Transfer Learning

14.Experiment Number 14: model_13: VGG16 with GRU

Approach

- Ablation approach
- small batch size

Result

- Poor model performance with accuracy of about 21% and issue of underfitting

Decision + Explanation

- Let’s try feeding more frames in the next experiment

Issues (if any)

- Issue of logits not matching the labels.
- Forced to choose batch size of 9.

15.Experiment Number 15: model_14: VGG16 with GRU

Approach

- Ablation approach
- increasing model parameters
- Feeding Full frames

Result

- Poor model performance with accuracy of about 21% and issue of underfitting

Decision + Explanation

- Trying MobileNet next as could not perform much experiments with this.

Issues (if any)

- Every time a new problem, either logits or problems with tensor shapes

16.Experiment Number 16: model_16: MobileNet with GRU

Approach

- Ablation approach
- image size = 128 X 128
- using cropping

Result

- Poor model performance with accuracy of about 30% and issue of underfitting

Decision + Explanation

- Try changing the architecture and

feeding different inputs

Issues (if any)

- Whenever tried to fiddle with the model architecture there was a new problem every time, either logits or problems with tensor shapes or the the fit_generator would stop randomly

17.Experiment Number 17: model_17: MobileNet with GRU

Approach

- Ablation approach
- reducing the frames to 10
- increasing batch size to 15

Result

- We witnessed severe underfitting

Decision + Explanation

- Try changing the architecture and feeding different inputs

Issues (if any)

- Whenever tried to fiddle with the model architecture there was a new

problem every time, either logits or problems with tensor shapes or the the fit_generator would stop randomly

18.Experiment Number 18: model_18: MobileNet with GRU

Approach

- Ablation approach
- keeping the number of frames to 10
- changing the image size
- reducing the batch size

Result

- Poor model performance with accuracy of about 30% and issue of underfitting

Decision + Explanation

- Try different architecture

Issues (if any)

- Whenever tried to fiddle with the model architecture there was a new problem every time, either logits or problems with tensor shapes or the

the fit_generator would stop randomly

19.Experiment Number 19: model_19: ResNet with GRU

Approach

- Ablation approach
- Logists issue forced to choose a batch size of 2

Result

- Severe underfitting

Decision + Explanation

- Try changing the architecture and feeding different inputs

Issues (if any)

- Whenever tried to fiddle with the model architecture there was a new problem every time, either logits or problems with tensor shapes or the the fit_generator would stop randomly

20.Experiment Number 20: model_20: ResNet with GRU

Approach

- changing batch_size
- changing the frames Severe underfitting

Result

- Poor performance with underfitting

Decision + Explanation

- This is peculiar as a using complex models with transfer learning should not have resulted in underfitting models.

Issues (if any)

- Tried reading from stackoverflow, GitHub and other resources but could not find a solution.
- Also there were issues like choosing low batch size to run a model and then the model could run with the same generator and model parameters after running through a low batch size.
- Also the performance of the modelling process was random.
- Lots of models ran with high batch sizes for one epoch while tuning using the CPU but the behaviour changed

when we deployed the GPU.

- Would be grateful to IIIT and upgrade if I could get some guidance on this

Final Model: Model_3 : Conv3D with early stopping

Gave the highest accuracy of about 80% in my experiments.