Project Development Phase
Model Performance Test

Date	20 November 2023
Team ID	Team-593126
Project Name	Lip Reading using Deep Learning
Maximum Marks	10 Marks

Model Performance Testing:

S.No	Parameter	Values	Screenshot
1.	Model Summary	**Total params: 84,75,522 Trainable params: 84,75,522 Non-trainable params: 0**	In [40]: model.summary() Model: "sequential" Layer (type) / Output Shape / Param # conv3d (Conv3D) — (None, 75, 46, 140, 128) — 3584 activation (Activation) — (None, 75, 46, 140, 128) — 0 max_pooling3d (MaxPooling3D) — (None, 75, 23, 70, 128) — 0 conv3d_1 (Conv3D) — (None, 75, 23, 70, 256) — 884992 activation_1 (Activation) — (None, 75, 23, 70, 256) — 0 max_pooling3d_1 (MaxPooling3D) — (None, 75, 11, 35, 256) — 0 conv3d_2 (Conv3D) — (None, 75, 11, 35, 75) — 518475 activation_2 (Activation) — (None, 75, 11, 35, 75) — 0 max_pooling3d_2 (MaxPooling3D) — (None, 75, 5, 17, 75) — 0 time_distributed (TimeDistributed) — (None, 75, 6375) — 0 bidirectional (Bidirectional) — (None, 75, 256) — 6660096 dropout (Dropout) — (None, 75, 256) — 0 bidirectional_1 (Bidirectional) — (None, 75, 256) — 394240 dropout_1 (Dropout) — (None, 75, 256) — 0 dense (Dense) — (None, 75, 55) — 14135 Total params: 8475522 (32.33 MB) Trainable params: 8475522 (32.33 MB) Non-trainable params: 0 (0.00 Byte)

2.	Accuracy	Training Accuracy – ~ 96 Validation Accuracy – ~97 Loss - ~ 1.3	

```
Epoch 1/100
1/1 [==============================] - 0s 118ms/step loss: 69.06
Original: place blue in b seven soon
Prediction: la e e e e eo
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Original: place blue by v eight please
Prediction: la e e e e eo
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
450/450 [==============================] - 460s 1s/step - loss: 69.0659 - val_loss: 64.3408 - lr: 1.0000e-04
Epoch 2/100
1/1 [==============================] - 0s 121ms/step loss: 65.58
Original: lay white with f nine again
Prediction: la e e e e eon
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Original: set white in u six please
Prediction: la e e e e eon
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
450/450 [==============================] - 462s 1s/step - loss: 65.5831 - val_loss: 61.2463 - lr: 1.0000e-04
Epoch 3/100
    9/450 [..............................] - ETA: 4:33 - loss: 63.1770
```

When it reaches around 50-60 epochs the accuracy starts to increases drastically and around 96 epochs the model gives correct output most of the time.

Model Summary

```
In [40]: model.summary()

Model: "sequential"

 Layer (type)                Output Shape              Param #
=================================================================
 conv3d (Conv3D)             (None, 75, 46, 140, 128   3584
                             )

 activation (Activation)     (None, 75, 46, 140, 128   0
                             )

 max_pooling3d (MaxPooling3   (None, 75, 23, 70, 128)   0
 D)

 conv3d_1 (Conv3D)           (None, 75, 23, 70, 256)   884992

 activation_1 (Activation)   (None, 75, 23, 70, 256)   0

 max_pooling3d_1 (MaxPoolin   (None, 75, 11, 35, 256)   0
 g3D)

 conv3d_2 (Conv3D)           (None, 75, 11, 35, 75)    518475

 activation_2 (Activation)   (None, 75, 11, 35, 75)    0

 max_pooling3d_2 (MaxPoolin   (None, 75, 5, 17, 75)     0
 g3D)

 time_distributed (TimeDist   (None, 75, 6375)          0
 ributed)

 bidirectional (Bidirection   (None, 75, 256)           6660096
 al)

 dropout (Dropout)           (None, 75, 256)           0

 bidirectional_1 (Bidirecti   (None, 75, 256)           394240
 onal)

 dropout_1 (Dropout)         (None, 75, 256)           0

 dense (Dense)               (None, 75, 55)            14135

=================================================================
Total params: 8475522 (32.33 MB)
Trainable params: 8475522 (32.33 MB)
Non-trainable params: 0 (0.00 Byte)
```

Accuracy

```
Epoch 1/100
1/1 [==============================] - 0s 118ms/step loss: 69.06
Original: place blue in b seven soon
Prediction: la e e e e eo
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Original: place blue by v eight please
Prediction: la e e e e eo
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
450/450 [==============================] - 460s 1s/step - loss: 69.0659 - val_loss: 64.3408 - lr: 1.0000e-04
Epoch 2/100
1/1 [==============================] - 0s 121ms/step loss: 65.58
Original: lay white with f nine again
Prediction: la e e e eon
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Original: set white in u six please
Prediction: la e e e eon
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
450/450 [==============================] - 462s 1s/step - loss: 65.5831 - val_loss: 61.2463 - lr: 1.0000e-04
Epoch 3/100
  9/450 [..............................] - ETA: 4:33 - loss: 63.1770
```

When it reaches around 90 epochs the loss is around ~1