

# Project Development Phase

## Model Performance Test

Date	22 November 2023
Team ID	591848
Project Name	Image Caption Generation
Maximum Marks	10 Marks

### Model Performance Testing:

Project team shall fill the following information in model performance testing template.

S.No.	Parameter	Values	Screenshot
1.	Metrics	<b>Regression Model:</b> BLUE score, Accuracy and Loss.	<pre>In [ ]: # train the model epochs = 40 batch_size = 32 steps = len(train) // batch_size  for i in range(epochs):     # create data generator     generator = data_generator(train, mapping, features, tokenizer, max_length, vocab_size, batch_size)     # fit for one epoch     model.fit(generator, epochs=1, steps_per_epoch=steps, verbose=1.)  227/227 [#####] - 64s 325m/step - loss: 5.2240 - accuracy: 0.1409 227/227 [#####] - 64s 283m/step - loss: 3.9240 - accuracy: 0.2573 227/227 [#####] - 64s 280m/step - loss: 5.4750 - accuracy: 0.2355 227/227 [#####] - 64s 282m/step - loss: 3.3852 - accuracy: 0.3140 227/227 [#####] - 64s 283m/step - loss: 3.9115 - accuracy: 0.3300 227/227 [#####] - 63s 277m/step - loss: 2.8616 - accuracy: 0.3461 227/227 [#####] - 63s 277m/step - loss: 2.7420 - accuracy: 0.3901 227/227 [#####] - 64s 280m/step - loss: 2.5675 - accuracy: 0.3724 227/227 [#####] - 64s 279m/step - loss: 2.5668 - accuracy: 0.3827 227/227 [#####] - 64s 280m/step - loss: 2.4900 - accuracy: 0.3930 227/227 [#####] - 63s 277m/step - loss: 2.4405 - accuracy: 0.4004 227/227 [#####] - 65s 285m/step - loss: 2.3974 - accuracy: 0.4053 227/227 [#####] - 65s 284m/step - loss: 2.3407 - accuracy: 0.4141 227/227 [#####] - 61s 270m/step - loss: 2.2990 - accuracy: 0.4211 227/227 [#####] - 64s 283m/step - loss: 2.1600 - accuracy: 0.4273 227/227 [#####] - 64s 279m/step - loss: 2.2323 - accuracy: 0.4326 227/227 [#####] - 64s 279m/step - loss: 2.1804 - accuracy: 0.4351 227/227 [#####] - 64s 280m/step - loss: 2.1400 - accuracy: 0.4440 227/227 [#####] - 64s 283m/step - loss: 2.1304 - accuracy: 0.4482 227/227 [#####] - 63s 275m/step - loss: 2.1828 - accuracy: 0.4530 227/227 [#####] - 63s 277m/step - loss: 2.0740 - accuracy: 0.4578 227/227 [#####] - 62s 270m/step - loss: 2.0533 - accuracy: 0.4610 227/227 [#####] - 65s 285m/step - loss: 2.0315 - accuracy: 0.4651 227/227 [#####] - 65s 285m/step - loss: 2.0089 - accuracy: 0.4683 227/227 [#####] - 63s 275m/step - loss: 1.9887 - accuracy: 0.4725 227/227 [#####] - 64s 283m/step - loss: 1.9713 - accuracy: 0.4754 227/227 [#####] - 67s 293m/step - loss: 1.9512 - accuracy: 0.4797 227/227 [#####] - 65s 287m/step - loss: 1.9356 - accuracy: 0.4827 227/227 [#####] - 64s 281m/step - loss: 1.9187 - accuracy: 0.4859 227/227 [#####] - 63s 277m/step - loss: 1.9030 - accuracy: 0.4881 227/227 [#####] - 65s 285m/step - loss: 1.8895 - accuracy: 0.4896 227/227 [#####] - 66s 292m/step - loss: 1.8732 - accuracy: 0.4935 227/227 [#####] - 64s 283m/step - loss: 1.8610 - accuracy: 0.4956 227/227 [#####] - 65s 285m/step - loss: 1.8462 - accuracy: 0.4990 227/227 [#####] - 65s 286m/step - loss: 1.8327 - accuracy: 0.5010 227/227 [#####] - 66s 291m/step - loss: 1.8180 - accuracy: 0.5041 227/227 [#####] - 64s 283m/step - loss: 1.8052 - accuracy: 0.5071 227/227 [#####] - 63s 277m/step - loss: 1.7938 - accuracy: 0.5087 227/227 [#####] - 63s 275m/step - loss: 1.7793 - accuracy: 0.5121 227/227 [#####] - 63s 277m/step - loss: 1.7665 - accuracy: 0.5145</pre> <p><b>BLUE SCORE-</b></p> <pre>In [ ]: from sklearn.metrics import corpus_bleu  # calculate with test data actual, predicted = list(), list()  for key in tqdm(test):     # get actual caption     captions = mapping[key]     # predict the caption for image     y_pred = predict_caption(model, features[key], tokenizer, max_length)     # split into words     actual_captions = [caption.split() for caption in captions]     y_pred = y_pred.split()     # append to the list     actual.append(actual_captions)     predicted.append(y_pred)  # calculate BLEU score print('BLEU-1: %f' % corpus_bleu(actual, predicted, weights=(0.5, 0, 0, 0))) print('BLEU-2: %f' % corpus_bleu(actual, predicted, weights=(0.5, 0.5, 0, 0)))  BLEU-1: 0.312290 BLEU-1: 0.517468 BLEU-1: 0.312118 BLEU-1: 0.517433 BLEU-1: 0.312186 BLEU-1: 0.517506 BLEU-1: 0.312168 BLEU-1: 0.517993 BLEU-1: 0.312178 BLEU-1: 0.516933 BLEU-1: 0.312682 BLEU-1: 0.516907 BLEU-1: 0.312154 BLEU-1: 0.517064 BLEU-1: 0.312544 BLEU-1: 0.517046 BLEU-1: 0.312559 BLEU-1: 0.517772 BLEU-1: 0.312196</pre>

2.

## Tune the Model

## Hyperparameter Tuning - Validation Method -

## Hyperparamter tuning

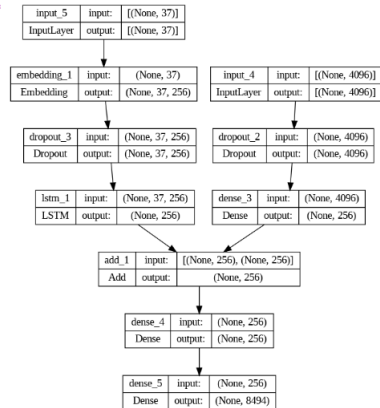
```
In [ ]: # encoder model
# Image feature Layers
inputs1 = Input(shape=(256,))
fcl1 = Dropout(0.5)(inputs1)
fcl2 = Dense(256, activation='relu')(fcl1)
# sequence feature Layers
inputs2 = Input(shape=(seq_length,))
scl1 = Embedding(vocab_size, 256, mask_zero=True)(inputs2)
scl2 = Dropout(0.5)(scl1)
scl3 = LSTM(256)(scl2)

# decoder model
decoder1 = add([fcl2, scl3])
decoder2 = Dense(256, activation='relu')(decoder1)
outputs = Dense(vocab_size, activation='softmax')(decoder2)

model = Model(inputs=[inputs1, inputs2], outputs=outputs)
model.compile(loss='categorical_crossentropy', optimizer='adam', metrics=['accuracy'])

# plot the model
plot_model(model, show_shapes=True)
```

out[24]:



## Validation-

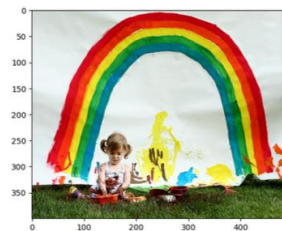
```
In [ ]: generate_caption("1808773457_877c387d7b.jpg")
```


-----Actual-----  
start black dog and spotted dog are fighting end  
start black dog and tri-colored dog playing with each other on the road end  
start black dog and white dog with brown spots are staring at each other in the street end  
start two dogs of different breeds looking at each other on the road end  
start two dogs on pavement moving toward each other end  
-----Predicted-----  
start black dog and spotted dog playing on pavement end



```
In [ ]: generate_caption("18802674343_b742ab4b8.jpg")
```

-----Actual-----  
start little girl covered in paint sits in front of painted rainbow with her hands in bowl end  
start little girl is sitting in front of large painted rainbow end  
start small girl in the grass plays with fingerpaints in front of white canvas with rainbow on it end  
start there is girl with pigtales sitting in front of rainbow painting end  
start young girl with pigtales painting outside in the grass end  
-----Predicted-----  
start two children playing in plastic colored plastic structure end



			<div><div>In [ ]:</div><div><div>generate_caption("2018080208_b2d5e7f370.jpg")</div><div>-----Actual----- start man in hat is displaying pictures next to skier in blue hat end start man skis past another man displaying paintings in the snow end start person wearing skis looking at framed pictures set up in the snow end start skier looks at framed pictures in the snow next to trees end start man on skis looking at artwork for sale in the snow end -----Predicted----- start man in skis is displaying paintings in the snow end</div></div><div></div></div>
--	--	--	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------