Model Development Phase Template

Date	July 7 2024
Team ID	SWTID1719935963
Project Title	Automated Weather Classification using Transfer Learning
Maximum Marks	10 Marks

Initial Model Training Code, Model Validation and Evaluation Report

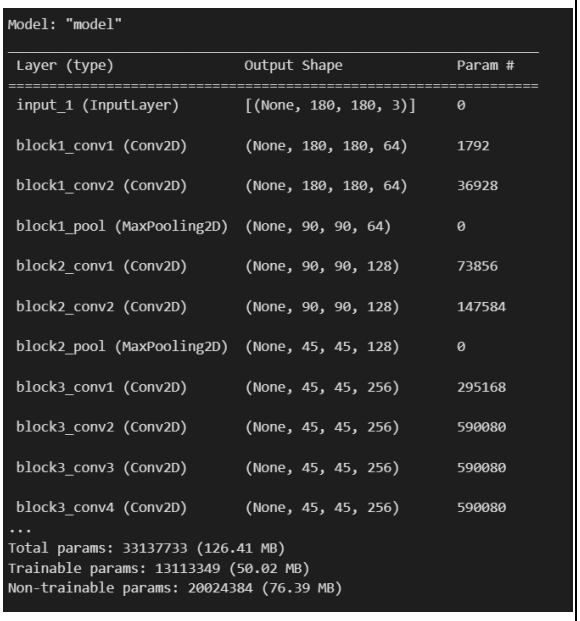
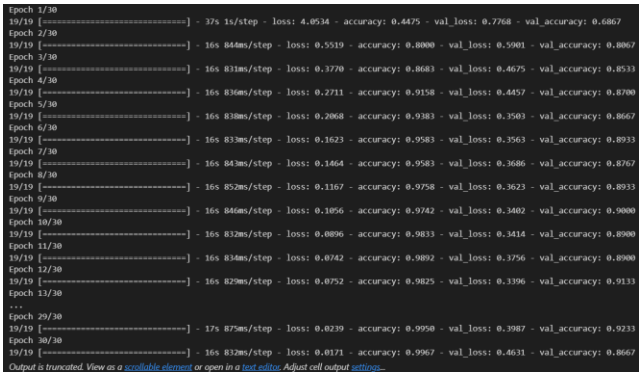
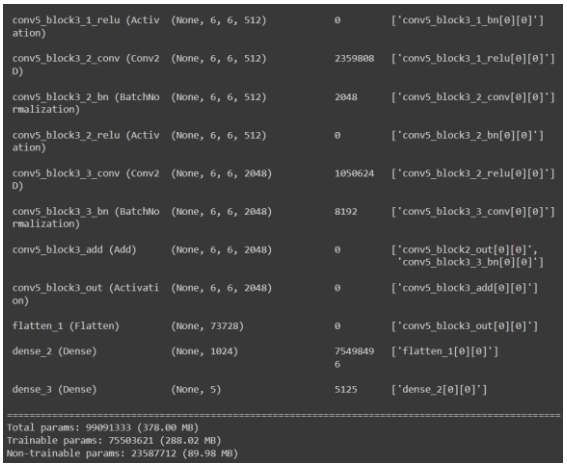
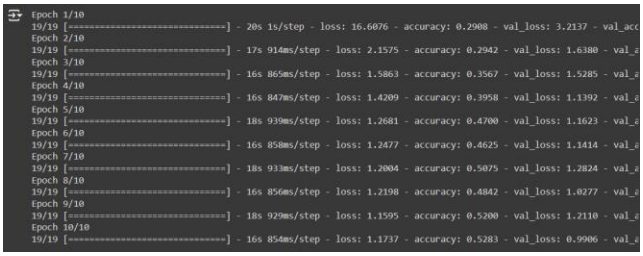
The initial model training code will be showcased in the future through a screenshot. The model validation and evaluation report will include a summary and training and validation performance metrics for multiple models, presented through respective screenshots.

Initial Model Training Code (5 marks):

```
model.compile(
    loss='categorical_crossentropy',
    optimizer='adam',
    metrics=['accuracy']
)
```

```
history = model.fit(
    training_set,
    validation_data=test_set,
    epochs=20,
    steps_per_epoch=len(training_set),
    validation_steps=len(test_set)
)
```

Model Validation and Evaluation Report (5 marks):

Model	Summary	Training and Validation Performance Metrics
Model 1		
Model 2		

Model 3

```
model.summary()

Model: "model"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
input_1 (InputLayer)         [(None, 180, 180, 3)]     0

block1_conv1 (Conv2D)        (None, 180, 180, 64)      1792

block1_conv2 (Conv2D)        (None, 180, 180, 64)      36928

block1_pool (MaxPooling2D)   (None, 90, 90, 64)        0

block2_conv1 (Conv2D)        (None, 90, 90, 128)       73856

block2_conv2 (Conv2D)        (None, 90, 90, 128)       147584

block2_pool (MaxPooling2D)   (None, 45, 45, 128)       0

block3_conv1 (Conv2D)        (None, 45, 45, 256)       295168

block3_conv2 (Conv2D)        (None, 45, 45, 256)       590080

block3_conv3 (Conv2D)        (None, 45, 45, 256)       590080

block3_pool (MaxPooling2D)   (None, 22, 22, 256)       0

block4_conv1 (Conv2D)        (None, 22, 22, 512)       1180160

block4_conv2 (Conv2D)        (None, 22, 22, 512)       2359808

block4_conv3 (Conv2D)        (None, 22, 22, 512)       2359808

block4_pool (MaxPooling2D)   (None, 11, 11, 512)       0

block5_conv1 (Conv2D)        (None, 11, 11, 512)       2359808

block5_conv2 (Conv2D)        (None, 11, 11, 512)       2359808

block5_conv3 (Conv2D)        (None, 11, 11, 512)       2359808

block5_pool (MaxPooling2D)   (None, 5, 5, 512)         0

flatten (Flatten)            (None, 12800)             0

dense (Dense)                (None, 1024)              13108224

dense_1 (Dense)              (None, 5)                 5125

=================================================================
Total params: 27828037 (106.16 MB)
Trainable params: 13113349 (50.02 MB)
Non-trainable params: 14714688 (56.13 MB)
```

```
Epoch 1/20
19/19 [==============================] - 18s 892ms/step - loss: 0.0400 - accuracy: 0.9933 - val_loss: 0.2201 - val_accuracy: 0.9267
Epoch 2/20
19/19 [==============================] - 16s 853ms/step - loss: 0.0343 - accuracy: 0.9958 - val_loss: 0.2215 - val_accuracy: 0.9300
Epoch 3/20
19/19 [==============================] - 16s 864ms/step - loss: 0.0269 - accuracy: 0.9958 - val_loss: 0.2360 - val_accuracy: 0.9233
Epoch 4/20
19/19 [==============================] - 18s 952ms/step - loss: 0.0276 - accuracy: 0.9950 - val_loss: 0.2220 - val_accuracy: 0.9300
Epoch 5/20
19/19 [==============================] - 16s 860ms/step - loss: 0.0256 - accuracy: 0.9958 - val_loss: 0.2227 - val_accuracy: 0.9233
Epoch 6/20
19/19 [==============================] - 16s 856ms/step - loss: 0.0250 - accuracy: 0.9958 - val_loss: 0.2525 - val_accuracy: 0.9233
Epoch 7/20
19/19 [==============================] - 17s 872ms/step - loss: 0.0208 - accuracy: 0.9975 - val_loss: 0.2665 - val_accuracy: 0.9300
Epoch 8/20
19/19 [==============================] - 17s 879ms/step - loss: 0.0187 - accuracy: 0.9983 - val_loss: 0.2542 - val_accuracy: 0.9200
Epoch 9/20
19/19 [==============================] - 16s 852ms/step - loss: 0.0192 - accuracy: 0.9967 - val_loss: 0.2272 - val_accuracy: 0.9267
Epoch 10/20
19/19 [==============================] - 17s 914ms/step - loss: 0.0136 - accuracy: 0.9992 - val_loss: 0.2248 - val_accuracy: 0.9367
Epoch 11/20
19/19 [==============================] - 17s 936ms/step - loss: 0.0120 - accuracy: 0.9992 - val_loss: 0.2322 - val_accuracy: 0.9300
Epoch 12/20
19/19 [==============================] - 16s 849ms/step - loss: 0.0126 - accuracy: 0.9992 - val_loss: 0.2666 - val_accuracy: 0.9100
Epoch 13/20
19/19 [==============================] - 17s 895ms/step - loss: 0.0197 - accuracy: 0.9967 - val_loss: 0.2421 - val_accuracy: 0.9267
Epoch 14/20
19/19 [==============================] - 16s 861ms/step - loss: 0.0101 - accuracy: 1.0000 - val_loss: 0.2657 - val_accuracy: 0.9100
Epoch 15/20
19/19 [==============================] - 17s 922ms/step - loss: 0.0101 - accuracy: 0.9992 - val_loss: 0.2369 - val_accuracy: 0.9333
Epoch 16/20
19/19 [==============================] - 16s 845ms/step - loss: 0.0084 - accuracy: 0.9992 - val_loss: 0.2158 - val_accuracy: 0.9367
Epoch 17/20
19/19 [==============================] - 16s 826ms/step - loss: 0.0074 - accuracy: 0.9992 - val_loss: 0.2240 - val_accuracy: 0.9367
Epoch 18/20
19/19 [==============================] - 16s 838ms/step - loss: 0.0085 - accuracy: 0.9983 - val_loss: 0.2185 - val_accuracy: 0.9433
Epoch 19/20
19/19 [==============================] - 16s 861ms/step - loss: 0.0057 - accuracy: 1.0000 - val_loss: 0.2158 - val_accuracy: 0.9400
Epoch 20/20
19/19 [==============================] - 17s 923ms/step - loss: 0.0056 - accuracy: 1.0000 - val_loss: 0.2313 - val_accuracy: 0.9367
```