Skill-6

2100030910

Sec-23

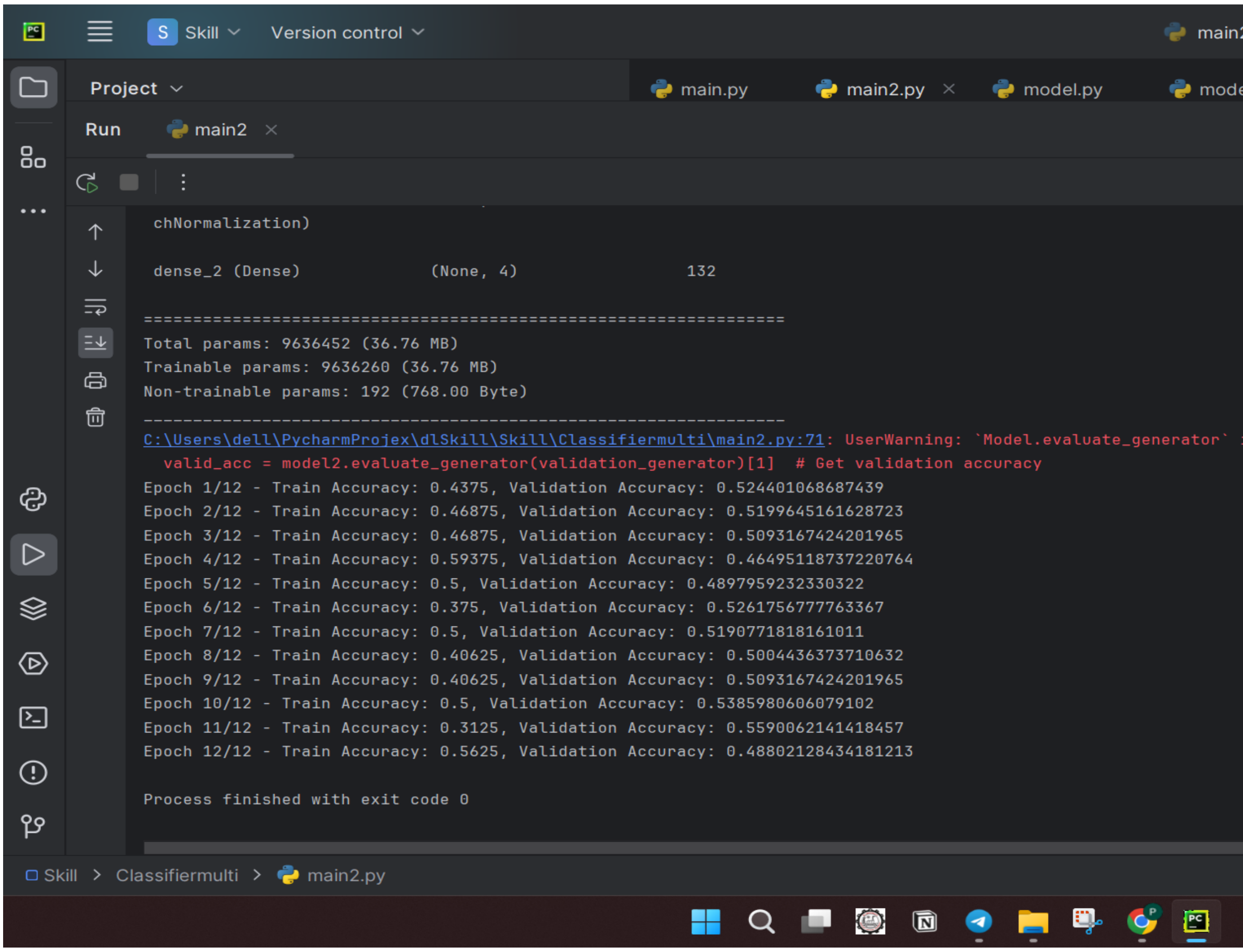
Main.py

```
import model2 as mc


from tensorflow.keras.preprocessing.image import ImageDataGenerator

# Directories
train_directory =
r'C:\Users\dell\PycharmProjex\dlSkill\Skill\genData\train'
valid_directory =
r'C:\Users\dell\PycharmProjex\dlSkill\Skill\genData\valid'

# Image data preprocessing
train_datagen = ImageDataGenerator(
    rescale=1.0 / 255,
)

validation_datagen = ImageDataGenerator(rescale=1.0 / 255)

batch_size = 32

train_generator = train_datagen.flow_from_directory(
    train_directory,
    target_size=(224, 224),
    batch_size=batch_size,
    class_mode='categorical',
    shuffle=True
)

validation_generator = validation_datagen.flow_from_directory(
    valid_directory,
    target_size=(224, 224),
    batch_size=batch_size,
    class_mode='categorical',
    shuffle=True
)

# Sample CNN model
mc2=mc.Modelsc()
model2=mc2.sgdx()

# Display model summary
model2.summary()
```

```python
# Random Mini-Batch Gradient Descent with evaluation
# Random Mini-Batch Gradient Descent with evaluation
num_epochs = 12
num_steps_train = len(train_generator)
num_steps_valid = len(validation_generator)

train_accs = []
valid_accs = []










import numpy as np

for epoch in range(num_epochs):
    train_generator.reset()
    validation_generator.reset()

    train_preds = []

    # Shuffle indices for training data
    Shuffle_indices = np.random.permutation(len(train_generator))

    # Training step
    for step in range(num_steps_train):
        # Get batch data with shuffled indices
        X_batch, y_batch = train_generator[Shuffle_indices[step]]

        train_loss, train_acc = model2.train_on_batch(X_batch, y_batch)

    # Validation step
    valid_acc = model2.evaluate_generator(validation_generator)[1]  # Get
validation accuracy
    valid_accs.append(valid_acc)

    train_accs.append(train_acc)

    print(f"Epoch {epoch + 1}/{num_epochs} - Train Accuracy: {train_acc},
Validation Accuracy: {valid_acc}")
```

Model.py

```
import tensorflow as tf
from tensorflow.keras import layers


class Modelsc:
    def sgdx(self):
        model = tf.keras.Sequential()
        model.add(layers.Flatten(input_shape=(224, 224, 3)))  # Flatten
layer to convert input to 1D

        model.add(layers.Dense(64, activation='relu'))
        model.add(layers.Dropout(0.5))
        model.add(layers.BatchNormalization())

        model.add(layers.Dense(32, activation='relu'))  # Additional dense
layer for complexity
        model.add(layers.Dropout(0.5))
        model.add(layers.BatchNormalization())

        model.add(
            layers.Dense(4, activation='softmax'))  # Output layer with
softmax activation for multiclass classification

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

        return model
```



```
 chNormalization)

 dense_2 (Dense)             (None, 4)                 132

=================================================================
Total params: 9636452 (36.76 MB)
Trainable params: 9636260 (36.76 MB)
Non-trainable params: 192 (768.00 Byte)
_________________________________________________________________
C:\Users\dell\PycharmProjex\dlSkill\Skill\Classifiermulti\main2.py:71: UserWarning: `Model.evaluate_generator`
  valid_acc = model2.evaluate_generator(validation_generator)[1]  # Get validation accuracy
Epoch 1/12 - Train Accuracy: 0.4375, Validation Accuracy: 0.524401068687439
Epoch 2/12 - Train Accuracy: 0.46875, Validation Accuracy: 0.5199645161628723
Epoch 3/12 - Train Accuracy: 0.46875, Validation Accuracy: 0.5093167424201965
Epoch 4/12 - Train Accuracy: 0.59375, Validation Accuracy: 0.46495118737220764
Epoch 5/12 - Train Accuracy: 0.5, Validation Accuracy: 0.4897959232330322
Epoch 6/12 - Train Accuracy: 0.375, Validation Accuracy: 0.5261756777763367
Epoch 7/12 - Train Accuracy: 0.5, Validation Accuracy: 0.5190771818161011
Epoch 8/12 - Train Accuracy: 0.40625, Validation Accuracy: 0.5004436373710632
Epoch 9/12 - Train Accuracy: 0.40625, Validation Accuracy: 0.5093167424201965
Epoch 10/12 - Train Accuracy: 0.5, Validation Accuracy: 0.5385980606079102
Epoch 11/12 - Train Accuracy: 0.3125, Validation Accuracy: 0.5590062141418457
Epoch 12/12 - Train Accuracy: 0.5625, Validation Accuracy: 0.48802128434181213

Process finished with exit code 0
```