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Code

JupyterLab | Python 3 (ipykernel)

[5]:
```
import numpy as np
from tensorflow.keras.preprocessing.image import ImageDataGenerator
from keras.models import Sequential
from keras.layers import Conv2D, MaxPooling2D, Flatten, Dense
```

*[29]:
```
# Define the image width and height
img_width = 224
img_height = 224
num_classes = 2

# Define your CNN model
model = Sequential()
model.add(Conv2D(32, (3, 3), activation='relu', input_shape=(img_width, img_height, 3)))
model.add(MaxPooling2D((2, 2)))
model.add(Conv2D(64, (3, 3), activation='relu'))
model.add(MaxPooling2D((2, 2)))
model.add(Conv2D(128, (3, 3), activation='relu'))
model.add(MaxPooling2D((2, 2)))
model.add(Flatten())
model.add(Dense(256, activation='relu'))
model.add(Dense(num_classes, activation='softmax'))
```

```
C:\Users\ds\anaconda3\Lib\site-packages\keras\src\layers\convolutional\base_conv.py:99: UserWarning: Do not pass an `input_shape`/`input_dim` argument t
o a layer. When using Sequential models, prefer using an `Input(shape)` object as the first layer in the model instead.
  super().__init__(
```

[30]:
```
# Compile the model
model.compile(optimizer='adam', loss='categorical_crossentropy', metrics=['accuracy'])

# Define data augmentation parameters
datagen = ImageDataGenerator(
    rotation_range=20,  # randomly rotate images in the range (degrees, 0 to 180)
    horizontal_flip=True,  # randomly flip images horizontally
    fill_mode='nearest'  # strategy for filling in newly created pixels
)
```

[31]:
```
# Load and augment training data
```


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Code

JupyterLab | Python 3 (ipykernel)

[31]:
```
# Load and augment training data
train_data_dir = 'C:/Users\ds/Downloads/archive/PetImages'
batch_size = 32

train_generator = datagen.flow_from_directory(train_data_dir, target_size=(img_width, img_height), batch_size=batch_size, class_mode='categorical')
```

```
Found 25000 images belonging to 2 classes.
```

*[32]:
```
# Load validation data without augmentation

validation_data_dir = 'C:/Users\ds/Downloads/archive/PetImages'

validation_generator = datagen.flow_from_directory(validation_data_dir,target_size=(img_width, img_height),
                                                   batch_size=batch_size,class_mode='categorical')
```

```
Found 25000 images belonging to 2 classes.
```

*[33]:
```
# Train the model with augmented data

train_samples = 1000
epochs = 10
validation_samples = 200
model.fit(train_generator,steps_per_epoch=train_samples // batch_size,epochs=epochs,validation_data=validation_generator,
          validation_steps=validation_samples // batch_size)
```

```
Epoch 1/10
C:\Users\ds\anaconda3\Lib\site-packages\keras\src\trainers\data_adapters\py_dataset_adapter.py:120: UserWarning: Your `PyDataset` class should call `super().__init__(**kwargs)` in its constructor. `**kwargs` can include `workers`, `use_multiprocessing`, `max_queue_size`. Do not pass these arguments to `fit()`, as they will be ignored.
  self._warn_if_super_not_called()
31/31 ━━━━━━━━━━━━━━━━━━━━ 32s 933ms/step - accuracy: 0.5096 - loss: 548.1473 - val_accuracy: 0.5417 - val_loss: 0.7094
Epoch 2/10
31/31 ━━━━━━━━━━━━━━━━━━━━ 27s 860ms/step - accuracy: 0.4975 - loss: 0.7058 - val_accuracy: 0.5417 - val_loss: 0.6789
Epoch 3/10
31/31 ━━━━━━━━━━━━━━━━━━━━ 26s 840ms/step - accuracy: 0.5687 - loss: 0.7130 - val_accuracy: 0.5417 - val_loss: 0.6905
Epoch 4/10
31/31 ━━━━━━━━━━━━━━━━━━━━ 27s 855ms/step - accuracy: 0.4960 - loss: 0.6868 - val_accuracy: 0.4948 - val_loss: 0.6841
Epoch 5/10
31/31 ━━━━━━━━━━━━━━━━━━━━ 27s 856ms/step - accuracy: 0.5378 - loss: 0.6876 - val_accuracy: 0.5885 - val_loss: 0.6926
```


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Code

JupyterLab | Python 3 (ipykernel)

```
validation_samples = 200
model.fit(train_generator,steps_per_epoch=train_samples // batch_size,epochs=epochs,validation_data=validation_generator,
          validation_steps=validation_samples // batch_size)
```

```
Epoch 1/10
C:\Users\ds\anaconda3\Lib\site-packages\keras\src\trainers\data_adapters\py_dataset_adapter.py:120: UserWarning: Your `PyDataset` class should call `super().__init__(**kwargs)` in its constructor. `**kwargs` can include `workers`, `use_multiprocessing`, `max_queue_size`. Do not pass these arguments to `fit()`, as they will be ignored.
  self._warn_if_super_not_called()
31/31 ━━━━━━━━━━━━━━━━━━━━ 32s 933ms/step - accuracy: 0.5096 - loss: 548.1473 - val_accuracy: 0.5417 - val_loss: 0.7094
Epoch 2/10
31/31 ━━━━━━━━━━━━━━━━━━━━ 27s 860ms/step - accuracy: 0.4975 - loss: 0.7058 - val_accuracy: 0.5417 - val_loss: 0.6789
Epoch 3/10
31/31 ━━━━━━━━━━━━━━━━━━━━ 26s 840ms/step - accuracy: 0.5687 - loss: 0.7130 - val_accuracy: 0.5417 - val_loss: 0.6905
Epoch 4/10
31/31 ━━━━━━━━━━━━━━━━━━━━ 27s 855ms/step - accuracy: 0.4960 - loss: 0.6868 - val_accuracy: 0.4948 - val_loss: 0.6841
Epoch 5/10
31/31 ━━━━━━━━━━━━━━━━━━━━ 27s 856ms/step - accuracy: 0.5378 - loss: 0.6876 - val_accuracy: 0.5885 - val_loss: 0.6926
Epoch 6/10
31/31 ━━━━━━━━━━━━━━━━━━━━ 27s 858ms/step - accuracy: 0.5513 - loss: 0.6907 - val_accuracy: 0.5885 - val_loss: 0.6797
Epoch 7/10
31/31 ━━━━━━━━━━━━━━━━━━━━ 27s 870ms/step - accuracy: 0.5297 - loss: 0.6905 - val_accuracy: 0.5677 - val_loss: 0.6739
Epoch 8/10
31/31 ━━━━━━━━━━━━━━━━━━━━ 27s 866ms/step - accuracy: 0.5464 - loss: 0.6819 - val_accuracy: 0.5781 - val_loss: 0.6793
Epoch 9/10
31/31 ━━━━━━━━━━━━━━━━━━━━ 26s 854ms/step - accuracy: 0.5923 - loss: 0.6580 - val_accuracy: 0.5781 - val_loss: 0.6613
Epoch 10/10
31/31 ━━━━━━━━━━━━━━━━━━━━ 26s 846ms/step - accuracy: 0.6279 - loss: 0.6642 - val_accuracy: 0.5573 - val_loss: 0.6819
```

[33]: `<keras.src.callbacks.history.History at 0x1da6c362cd0>`

[34]:
```
# Evaluate the model
scores = model.evaluate(validation_generator, steps=validation_samples // batch_size)
print("Validation Accuracy: %.2f%%" % (scores[1] * 100))
```

```
6/6 ━━━━━━━━━━━━━━━━━━━━ 2s 324ms/step - accuracy: 0.5765 - loss: 0.6637
Validation Accuracy: 58.33%
```

[ ]:

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