```
In [ ]:  ! pip install tensorflow
         ! pip install keras
```

```
In [ ]:  import tensorflow as tf
         import keras

         print(tf.version.VERSION)
         print(keras.__version__)
```

```
In [ ]:  from keras.models import Sequential
         from keras.layers import Conv2D, MaxPooling2D, GlobalAveragePooling2D, Dense
         from tensorflow.keras.preprocessing.image import ImageDataGenerator
         from keras.callbacks import EarlyStopping, ModelCheckpoint
         import matplotlib.pyplot as plt
```

```
In [ ]:  # Data Preprocessing and Augmentation
         train_datagen = ImageDataGenerator(
             # Scales each pixel value in the image from a range of 0-255 to 0-1 for
             rescale=1./255,
             # Split the data into training (70%) and validation (30%)
             validation_split=0.3,
         )

         # Validation Data
         validation_datagen = ImageDataGenerator(
             rescale=1./255,
             validation_split=0.3
         )

         # Flow training images in batches of 32 using train_datagen generator
         train_generator = train_datagen.flow_from_directory(
             'animal_database/',
             target_size=(150, 150),   # All images will be resized to 150x150
             batch_size=32,
             class_mode='categorical',
             subset='training',  # Set as training data
             color_mode="grayscale",
         )

         # Flow validation images in batches of 32 using validation_datagen generator
         validation_generator = validation_datagen.flow_from_directory(
             'animal_database/',
             target_size=(150, 150),
             batch_size=32,
             class_mode='categorical',
             subset='validation',  # Set as validation data
             color_mode="grayscale",
```

```
    )

    class_indices = train_generator.class_indices
    print(class_indices)
```

```
Found 5782 images belonging to 6 classes.
Found 2473 images belonging to 6 classes.
{'bear': 0, 'cat': 1, 'cow': 2, 'dog': 3, 'eagle': 4, 'gorilla': 5}
```

In [ ]:
```python
# Model Architecture
model = Sequential([
    # First convolutional block
    Conv2D(32, (3, 3), activation='relu', input_shape=(150, 150, 1)),
    BatchNormalization(),
    MaxPooling2D(2, 2),
    Dropout(0.25),

    # Second convolutional block
    Conv2D(64, (3, 3), activation='relu'),
    BatchNormalization(),
    Conv2D(64, (3, 3), activation='relu'),
    BatchNormalization(),
    MaxPooling2D(2, 2),
    Dropout(0.25),

    # Third convolutional block
    Conv2D(128, (3, 3), activation='relu'),
    BatchNormalization(),
    Conv2D(128, (3, 3), activation='relu'),
    BatchNormalization(),
    MaxPooling2D(2, 2),
    Dropout(0.25),

    # Fourth convolutional block
    Conv2D(256, (3, 3), activation='relu'),
    BatchNormalization(),
    Conv2D(256, (3, 3), activation='relu'),
    BatchNormalization(),
    GlobalAveragePooling2D(),
    Dropout(0.5),

    # Fully connected layers
    Dense(512, activation='relu'),
    BatchNormalization(),
    Dropout(0.5),
    Dense(train_generator.num_classes, activation='softmax')
])
```

```
/Library/Frameworks/Python.framework/Versions/3.12/lib/python3.12/site-packa
ges/keras/src/layers/convolutional/base_conv.py:99: UserWarning: Do not pass
an `input_shape`/`input_dim` argument to a layer. When using Sequential mode
ls, prefer using an `Input(shape)` object as the first layer in the model in
stead.
  super().__init__(
```

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

# Define early stopping callback
# If the validation accuracy does not improve (increase, since mode='max') 1
early_stopping = EarlyStopping(
    monitor='val_accuracy',
    patience=20,
    mode='max',
    restore_best_weights=True,
    verbose=1
)

# Train your model
history = model.fit(
    train_generator,
    steps_per_epoch=train_generator.samples // train_generator.batch_size,
    epochs=50,
    validation_data=validation_generator,
    validation_steps=validation_generator.samples // validation_generator.ba
    callbacks=[early_stopping]
)
```

Epoch 1/200

```
/Library/Frameworks/Python.framework/Versions/3.12/lib/python3.12/site-packa
ges/keras/src/trainers/data_adapters/py_dataset_adapter.py:122: UserWarning:
Your `PyDataset` class should call `super().__init__(**kwargs)` in its const
ructor. `**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()
```
180/180 ———————————— **135s** 737ms/step – accuracy: 0.3251 – loss: 2.19
60 – val_accuracy: 0.1944 – val_loss: 7.1372
Epoch 2/200
180/180 ———————————— **1s** 394us/step – accuracy: 0.4375 – loss: 0.7838
– val_accuracy: 0.1111 – val_loss: 4.4725
Epoch 3/200

```
2024-03-18 02:11:25.665143: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
         [[{{node IteratorGetNext}}]]
/Library/Frameworks/Python.framework/Versions/3.12/lib/python3.12/contextli
b.py:158: UserWarning: Your input ran out of data; interrupting training. Ma
ke sure that your dataset or generator can generate at least `steps_per_epoc
h * epochs` batches. You may need to use the `.repeat()` function when build
ing your dataset.
  self.gen.throw(value)
2024-03-18 02:11:25.719092: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
         [[{{node IteratorGetNext}}]]
```

180/180 ━━━━━━━━━━━━━━━━━━━━ **129s** 715ms/step - accuracy: 0.5517 - loss: 1.34
13 - val_accuracy: 0.1786 - val_loss: 3.9029
Epoch 4/200
180/180 ━━━━━━━━━━━━━━━━━━━━ **1s** 323us/step - accuracy: 0.5938 - loss: 0.6211
- val_accuracy: 0.0000e+00 - val_loss: 2.5858
Epoch 5/200

```
2024-03-18 02:13:35.533933: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
         [[{{node IteratorGetNext}}]]
2024-03-18 02:13:35.585621: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
         [[{{node IteratorGetNext}}]]
```

180/180 ━━━━━━━━━━━━━━━━━━━━ **126s** 699ms/step - accuracy: 0.6554 - loss: 1.00
01 - val_accuracy: 0.3003 - val_loss: 2.0703
Epoch 6/200
180/180 ━━━━━━━━━━━━━━━━━━━━ **1s** 344us/step - accuracy: 0.7812 - loss: 0.3741
- val_accuracy: 0.3333 - val_loss: 1.2028
Epoch 7/200

```
2024-03-18 02:15:42.387061: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
         [[{{node IteratorGetNext}}]]
2024-03-18 02:15:42.439351: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
         [[{{node IteratorGetNext}}]]
```

180/180 ━━━━━━━━━━━━━━━━━━━━ **128s** 710ms/step - accuracy: 0.7120 - loss: 0.82
68 - val_accuracy: 0.5929 - val_loss: 1.2634
Epoch 8/200
180/180 ━━━━━━━━━━━━━━━━━━━━ **1s** 323us/step - accuracy: 0.8125 - loss: 0.3081
- val_accuracy: 0.4444 - val_loss: 0.8002
Epoch 9/200

```
2024-03-18 02:17:51.432496: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
         [[{{node IteratorGetNext}}]]
2024-03-18 02:17:51.484522: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
         [[{{node IteratorGetNext}}]]
```

180/180 ──────────────────── **129s** 713ms/step – accuracy: 0.7571 – loss: 0.71
90 – val_accuracy: 0.5146 – val_loss: 1.9126
Epoch 10/200
180/180 ──────────────────── **1s** 334us/step – accuracy: 0.6875 – loss: 0.5074
– val_accuracy: 0.5556 – val_loss: 0.6622
Epoch 11/200

2024-03-18 02:20:01.150149: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
        [[{{node IteratorGetNext}}]]
2024-03-18 02:20:01.203733: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
        [[{{node IteratorGetNext}}]]

180/180 ──────────────────── **129s** 713ms/step – accuracy: 0.7906 – loss: 0.61
41 – val_accuracy: 0.6307 – val_loss: 1.3296
Epoch 12/200
180/180 ──────────────────── **1s** 316us/step – accuracy: 0.6875 – loss: 0.3213
– val_accuracy: 0.6667 – val_loss: 0.5673
Epoch 13/200

2024-03-18 02:22:10.570116: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
        [[{{node IteratorGetNext}}]]
2024-03-18 02:22:10.617608: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
        [[{{node IteratorGetNext}}]]

180/180 ──────────────────── **132s** 731ms/step – accuracy: 0.7963 – loss: 0.58
12 – val_accuracy: 0.4850 – val_loss: 2.2113
Epoch 14/200
180/180 ──────────────────── **1s** 377us/step – accuracy: 0.7188 – loss: 0.3140
– val_accuracy: 0.3333 – val_loss: 2.4738
Epoch 15/200

2024-03-18 02:24:23.250516: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
        [[{{node IteratorGetNext}}]]
2024-03-18 02:24:23.311156: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
        [[{{node IteratorGetNext}}]]

180/180 ──────────────────── **133s** 735ms/step – accuracy: 0.8228 – loss: 0.51
89 – val_accuracy: 0.7171 – val_loss: 0.9988
Epoch 16/200
180/180 ──────────────────── **1s** 324us/step – accuracy: 0.9375 – loss: 0.1295
– val_accuracy: 0.7778 – val_loss: 0.3187
Epoch 17/200

2024-03-18 02:26:36.817354: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
        [[{{node IteratorGetNext}}]]
2024-03-18 02:26:36.866909: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
        [[{{node IteratorGetNext}}]]

180/180 ———————————————— **130s** 723ms/step – accuracy: 0.8520 – loss: 0.42
35 – val_accuracy: 0.6830 – val_loss: 1.4923
Epoch 18/200
180/180 ———————————————— **1s** 371us/step – accuracy: 0.8125 – loss: 0.2867
– val_accuracy: 0.5556 – val_loss: 0.8052
Epoch 19/200

2024-03-18 02:28:48.027205: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
        [[{{node IteratorGetNext}}]]
2024-03-18 02:28:48.085873: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
        [[{{node IteratorGetNext}}]]

180/180 ———————————————— **134s** 742ms/step – accuracy: 0.8540 – loss: 0.40
54 – val_accuracy: 0.4501 – val_loss: 2.5939
Epoch 20/200
180/180 ———————————————— **1s** 304us/step – accuracy: 0.7812 – loss: 0.2522
– val_accuracy: 0.2222 – val_loss: 2.6215
Epoch 21/200

2024-03-18 02:31:02.845360: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
        [[{{node IteratorGetNext}}]]
2024-03-18 02:31:02.893033: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
        [[{{node IteratorGetNext}}]]

180/180 ———————————————— **131s** 726ms/step – accuracy: 0.8703 – loss: 0.38
67 – val_accuracy: 0.5081 – val_loss: 2.3394
Epoch 22/200
180/180 ———————————————— **1s** 313us/step – accuracy: 0.8750 – loss: 0.1956
– val_accuracy: 0.4444 – val_loss: 1.2291
Epoch 23/200

2024-03-18 02:33:14.583222: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
        [[{{node IteratorGetNext}}]]
2024-03-18 02:33:14.632655: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
        [[{{node IteratorGetNext}}]]

180/180 ———————————————— **133s** 737ms/step – accuracy: 0.8819 – loss: 0.33
59 – val_accuracy: 0.7058 – val_loss: 1.0980
Epoch 24/200
180/180 ———————————————— **1s** 350us/step – accuracy: 0.9062 – loss: 0.1494
– val_accuracy: 0.4444 – val_loss: 1.0845
Epoch 25/200

2024-03-18 02:35:28.587950: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
        [[{{node IteratorGetNext}}]]
2024-03-18 02:35:28.643398: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
        [[{{node IteratorGetNext}}]]

180/180 ━━━━━━━━━━━━━━━━━━━━━ **132s** 731ms/step — accuracy: 0.8892 — loss: 0.33
31 — val_accuracy: 0.7500 — val_loss: 0.9034
Epoch 26/200
180/180 ━━━━━━━━━━━━━━━━━━━━━ **1s** 325us/step — accuracy: 0.8125 — loss: 0.3478
— val_accuracy: 0.5556 — val_loss: 0.5845
Epoch 27/200

2024-03-18 02:37:41.312247: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
          [[{{node IteratorGetNext}}]]
2024-03-18 02:37:41.363552: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
          [[{{node IteratorGetNext}}]]

180/180 ━━━━━━━━━━━━━━━━━━━━━ **133s** 737ms/step — accuracy: 0.9103 — loss: 0.26
65 — val_accuracy: 0.7370 — val_loss: 0.8896
Epoch 28/200
180/180 ━━━━━━━━━━━━━━━━━━━━━ **1s** 323us/step — accuracy: 0.8750 — loss: 0.1839
— val_accuracy: 0.7778 — val_loss: 0.2158
Epoch 29/200

2024-03-18 02:39:55.114527: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
          [[{{node IteratorGetNext}}]]
2024-03-18 02:39:55.166098: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
          [[{{node IteratorGetNext}}]]

180/180 ━━━━━━━━━━━━━━━━━━━━━ **135s** 747ms/step — accuracy: 0.9010 — loss: 0.30
56 — val_accuracy: 0.7833 — val_loss: 0.7796
Epoch 30/200
180/180 ━━━━━━━━━━━━━━━━━━━━━ **1s** 375us/step — accuracy: 0.8438 — loss: 0.2471
— val_accuracy: 0.8889 — val_loss: 0.0799
Epoch 31/200

2024-03-18 02:42:10.923368: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
          [[{{node IteratorGetNext}}]]
2024-03-18 02:42:10.980988: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
          [[{{node IteratorGetNext}}]]

180/180 ━━━━━━━━━━━━━━━━━━━━━ **134s** 740ms/step — accuracy: 0.9130 — loss: 0.24
87 — val_accuracy: 0.8166 — val_loss: 0.7391
Epoch 32/200
180/180 ━━━━━━━━━━━━━━━━━━━━━ **1s** 328us/step — accuracy: 0.9375 — loss: 0.0778
— val_accuracy: 0.6667 — val_loss: 0.7172
Epoch 33/200

2024-03-18 02:44:25.319322: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
          [[{{node IteratorGetNext}}]]
2024-03-18 02:44:25.371254: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
          [[{{node IteratorGetNext}}]]

180/180 ───────────────────── 134s 743ms/step – accuracy: 0.9142 – loss: 0.25
01 – val_accuracy: 0.7541 – val_loss: 1.0047
Epoch 34/200
180/180 ───────────────────── 1s 306us/step – accuracy: 0.9375 – loss: 0.0951
– val_accuracy: 0.7778 – val_loss: 1.2329
Epoch 35/200

2024–03–18 02:46:40.234739: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
          [[{{node IteratorGetNext}}]]
2024–03–18 02:46:40.282381: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
          [[{{node IteratorGetNext}}]]
180/180 ───────────────────── 134s 745ms/step – accuracy: 0.9220 – loss: 0.23
11 – val_accuracy: 0.8348 – val_loss: 0.6111
Epoch 36/200
180/180 ───────────────────── 1s 387us/step – accuracy: 0.9375 – loss: 0.1630
– val_accuracy: 0.8889 – val_loss: 0.1702
Epoch 37/200

2024–03–18 02:48:55.694212: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
          [[{{node IteratorGetNext}}]]
2024–03–18 02:48:55.753963: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
          [[{{node IteratorGetNext}}]]
180/180 ───────────────────── 133s 735ms/step – accuracy: 0.9232 – loss: 0.20
51 – val_accuracy: 0.8145 – val_loss: 0.7253
Epoch 38/200
180/180 ───────────────────── 1s 317us/step – accuracy: 0.8750 – loss: 0.1261
– val_accuracy: 0.7778 – val_loss: 0.2071
Epoch 39/200

2024–03–18 02:51:09.108576: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
          [[{{node IteratorGetNext}}]]
2024–03–18 02:51:09.158657: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
          [[{{node IteratorGetNext}}]]
180/180 ───────────────────── 133s 734ms/step – accuracy: 0.9401 – loss: 0.18
06 – val_accuracy: 0.8287 – val_loss: 0.6662
Epoch 40/200
180/180 ───────────────────── 1s 325us/step – accuracy: 1.0000 – loss: 0.0285
– val_accuracy: 0.8889 – val_loss: 0.1946
Epoch 41/200

2024–03–18 02:53:22.484987: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
          [[{{node IteratorGetNext}}]]
2024–03–18 02:53:22.535839: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
          [[{{node IteratorGetNext}}]]

180/180 ──────────────────────── **134s** 742ms/step — accuracy: 0.9388 — loss: 0.17
00 — val_accuracy: 0.7691 — val_loss: 1.1556
Epoch 42/200
180/180 ──────────────────────── **1s** 332us/step — accuracy: 0.9688 — loss: 0.0285
— val_accuracy: 0.5556 — val_loss: 1.2106
Epoch 43/200

2024-03-18 02:55:37.212744: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
         [[{{node IteratorGetNext}}]]
2024-03-18 02:55:37.263995: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
         [[{{node IteratorGetNext}}]]
180/180 ──────────────────────── **126s** 697ms/step — accuracy: 0.9516 — loss: 0.14
36 — val_accuracy: 0.6778 — val_loss: 1.4656
Epoch 44/200
180/180 ──────────────────────── **1s** 330us/step — accuracy: 0.9375 — loss: 0.1109
— val_accuracy: 0.7778 — val_loss: 0.4850
Epoch 45/200

2024-03-18 02:57:43.903062: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
         [[{{node IteratorGetNext}}]]
2024-03-18 02:57:43.955257: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
         [[{{node IteratorGetNext}}]]
180/180 ──────────────────────── **126s** 700ms/step — accuracy: 0.9450 — loss: 0.17
71 — val_accuracy: 0.8072 — val_loss: 0.7234
Epoch 46/200
180/180 ──────────────────────── **1s** 313us/step — accuracy: 0.9062 — loss: 0.1062
— val_accuracy: 0.8889 — val_loss: 0.4389
Epoch 47/200

2024-03-18 02:59:51.062758: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
         [[{{node IteratorGetNext}}]]
2024-03-18 02:59:51.112021: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
         [[{{node IteratorGetNext}}]]
180/180 ──────────────────────── **131s** 727ms/step — accuracy: 0.9500 — loss: 0.15
18 — val_accuracy: 0.8214 — val_loss: 0.6750
Epoch 48/200
180/180 ──────────────────────── **1s** 414us/step — accuracy: 0.9375 — loss: 0.1051
— val_accuracy: 0.7778 — val_loss: 0.4377
Epoch 49/200

2024-03-18 03:02:03.365429: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
         [[{{node IteratorGetNext}}]]
2024-03-18 03:02:03.433481: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
         [[{{node IteratorGetNext}}]]

180/180 ───────────────────── **128s** 710ms/step – accuracy: 0.9493 – loss: 0.15
26 – val_accuracy: 0.8377 – val_loss: 0.5922
Epoch 50/200
180/180 ───────────────────── **1s** 335us/step – accuracy: 0.9688 – loss: 0.0615
– val_accuracy: 0.8889 – val_loss: 0.2354
Epoch 50: early stopping
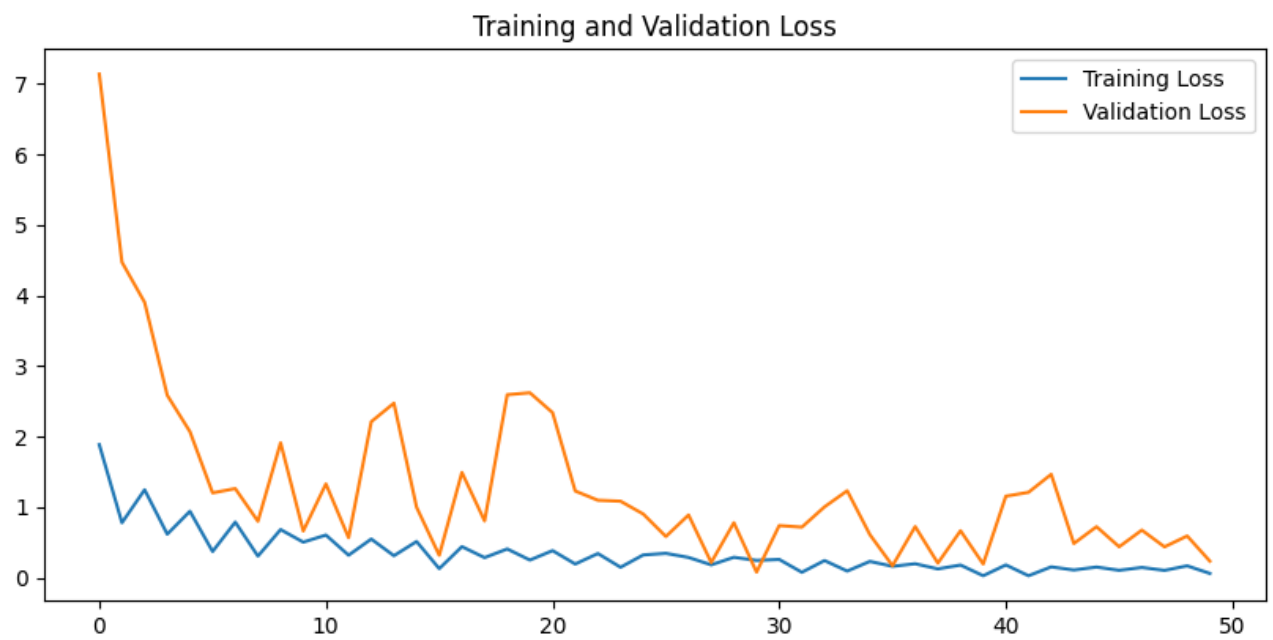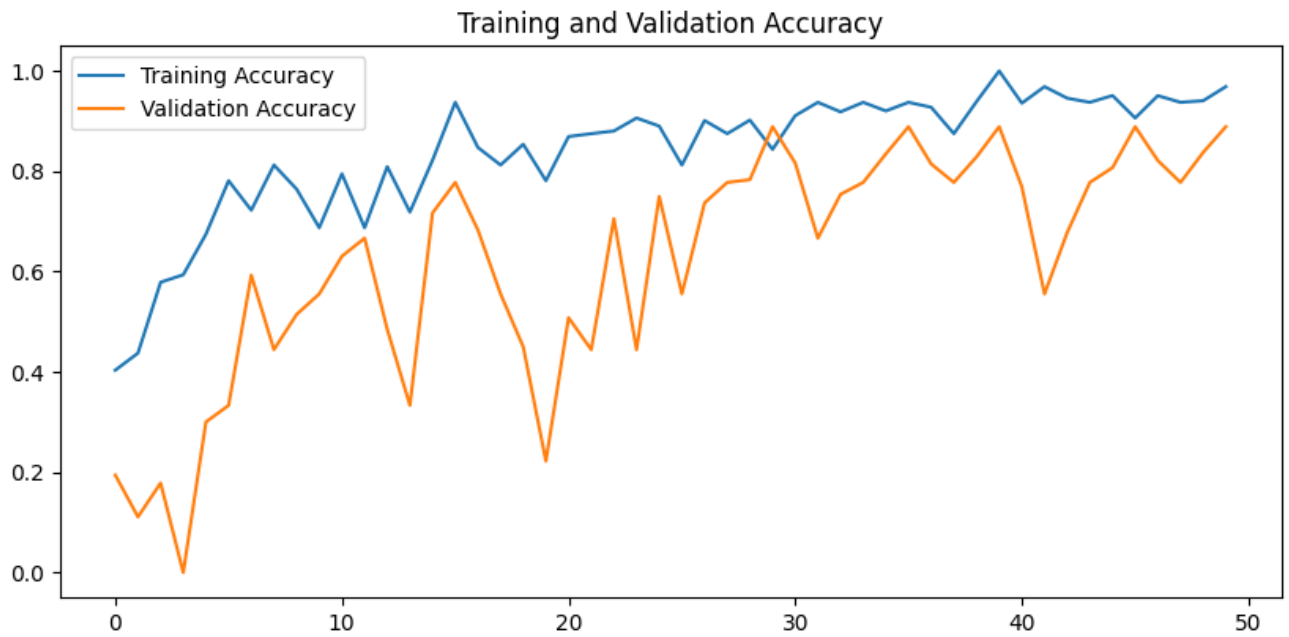Restoring model weights from the end of the best epoch: 30.

2024–03–18 03:04:12.528241: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
       [[{{node IteratorGetNext}}]]
2024–03–18 03:04:12.581489: W tensorflow/core/framework/local_rendezvous.cc:
404] Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
       [[{{node IteratorGetNext}}]]

In [ ]:
```python
# Plotting Training Results
acc = history.history['accuracy']
val_acc = history.history['val_accuracy']
loss = history.history['loss']
val_loss = history.history['val_loss']

plt.figure(figsize=(10, 10))
plt.subplot(211)
plt.plot(acc, label='Training Accuracy')
plt.plot(val_acc, label='Validation Accuracy')
plt.title('Training and Validation Accuracy')
plt.legend()

plt.subplot(212)
plt.plot(loss, label='Training Loss')
plt.plot(val_loss, label='Validation Loss')
plt.title('Training and Validation Loss')
plt.legend()

plt.show()
```

Training and Validation Accuracy

Training and Validation Loss


```
In [ ]: model.save('animals.keras')
```