Model: "model"

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Layer (type) Output Shape Param #

=================================================================

input\_1 (InputLayer) [(None, 150, 150, 3)] 0

conv2d (Conv2D) (None, 150, 150, 32) 896

max\_pooling2d (MaxPooling2 (None, 75, 75, 32) 0

D)

conv2d\_1 (Conv2D) (None, 75, 75, 64) 18496

max\_pooling2d\_1 (MaxPoolin (None, 37, 37, 64) 0

g2D)

conv2d\_2 (Conv2D) (None, 37, 37, 128) 73856

activation (Activation) (None, 37, 37, 128) 0

max\_pooling2d\_2 (MaxPoolin (None, 18, 18, 128) 0

g2D)

conv2d\_3 (Conv2D) (None, 18, 18, 256) 295168

activation\_1 (Activation) (None, 18, 18, 256) 0

max\_pooling2d\_3 (MaxPoolin (None, 9, 9, 256) 0

g2D)

conv2d\_4 (Conv2D) (None, 9, 9, 512) 1180160

activation\_2 (Activation) (None, 9, 9, 512) 0

max\_pooling2d\_4 (MaxPoolin (None, 4, 4, 512) 0

g2D)

flatten (Flatten) (None, 8192) 0

dense (Dense) (None, 512) 4194816

dropout (Dropout) (None, 512) 0

dense\_1 (Dense) (None, 3) 1539

=================================================================

Total params: 5764931 (21.99 MB)

Trainable params: 5764931 (21.99 MB)

Non-trainable params: 0 (0.00 Byte)

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Found 9600 images belonging to 3 classes.

Found 2400 images belonging to 3 classes.

Epoch 1/40

300/300 [==============================] - ETA: 0s - loss: 0.8469 - accuracy: 0.5900

Epoch 1: val\_accuracy improved from -inf to 0.64083, saving model to /content/Model.hdf5

300/300 [==============================] - 72s 216ms/step - loss: 0.8469 - accuracy: 0.5900 - val\_loss: 0.7680 - val\_accuracy: 0.6408

Epoch 2/40

/usr/local/lib/python3.10/dist-packages/keras/src/engine/training.py:3103: UserWarning: You are saving your model as an HDF5 file via `model.save()`. This file format is considered legacy. We recommend using instead the native Keras format, e.g. `model.save('my\_model.keras')`.

saving\_api.save\_model(

300/300 [==============================] - ETA: 0s - loss: 0.7211 - accuracy: 0.6677

Epoch 2: val\_accuracy improved from 0.64083 to 0.71917, saving model to /content/Model.hdf5

300/300 [==============================] - 65s 216ms/step - loss: 0.7211 - accuracy: 0.6677 - val\_loss: 0.6265 - val\_accuracy: 0.7192

Epoch 3/40

300/300 [==============================] - ETA: 0s - loss: 0.6028 - accuracy: 0.7274

Epoch 3: val\_accuracy improved from 0.71917 to 0.74667, saving model to /content/Model.hdf5

300/300 [==============================] - 65s 216ms/step - loss: 0.6028 - accuracy: 0.7274 - val\_loss: 0.5465 - val\_accuracy: 0.7467

Epoch 4/40

300/300 [==============================] - ETA: 0s - loss: 0.5416 - accuracy: 0.7592

Epoch 4: val\_accuracy improved from 0.74667 to 0.75833, saving model to /content/Model.hdf5

300/300 [==============================] - 65s 215ms/step - loss: 0.5416 - accuracy: 0.7592 - val\_loss: 0.5333 - val\_accuracy: 0.7583

Epoch 5/40

300/300 [==============================] - ETA: 0s - loss: 0.4958 - accuracy: 0.7860

Epoch 5: val\_accuracy improved from 0.75833 to 0.78792, saving model to /content/Model.hdf5

300/300 [==============================] - 65s 217ms/step - loss: 0.4958 - accuracy: 0.7860 - val\_loss: 0.5488 - val\_accuracy: 0.7879

Epoch 6/40

300/300 [==============================] - ETA: 0s - loss: 0.4572 - accuracy: 0.8046

Epoch 6: val\_accuracy improved from 0.78792 to 0.79667, saving model to /content/Model.hdf5

300/300 [==============================] - 64s 215ms/step - loss: 0.4572 - accuracy: 0.8046 - val\_loss: 0.4601 - val\_accuracy: 0.7967

Epoch 7/40

300/300 [==============================] - ETA: 0s - loss: 0.4354 - accuracy: 0.8173

Epoch 7: val\_accuracy improved from 0.79667 to 0.82042, saving model to /content/Model.hdf5

300/300 [==============================] - 65s 215ms/step - loss: 0.4354 - accuracy: 0.8173 - val\_loss: 0.4146 - val\_accuracy: 0.8204

Epoch 8/40

300/300 [==============================] - ETA: 0s - loss: 0.3916 - accuracy: 0.8401

Epoch 8: val\_accuracy improved from 0.82042 to 0.84167, saving model to /content/Model.hdf5

300/300 [==============================] - 64s 214ms/step - loss: 0.3916 - accuracy: 0.8401 - val\_loss: 0.4009 - val\_accuracy: 0.8417

Epoch 9/40

300/300 [==============================] - ETA: 0s - loss: 0.3871 - accuracy: 0.8382

Epoch 9: val\_accuracy improved from 0.84167 to 0.86042, saving model to /content/Model.hdf5

300/300 [==============================] - 65s 215ms/step - loss: 0.3871 - accuracy: 0.8382 - val\_loss: 0.3663 - val\_accuracy: 0.8604

Epoch 10/40

300/300 [==============================] - ETA: 0s - loss: 0.3622 - accuracy: 0.8496

Epoch 10: val\_accuracy did not improve from 0.86042

300/300 [==============================] - 70s 235ms/step - loss: 0.3622 - accuracy: 0.8496 - val\_loss: 0.3889 - val\_accuracy: 0.8375

Epoch 11/40

300/300 [==============================] - ETA: 0s - loss: 0.3427 - accuracy: 0.8580

Epoch 11: val\_accuracy did not improve from 0.86042

300/300 [==============================] - 66s 219ms/step - loss: 0.3427 - accuracy: 0.8580 - val\_loss: 0.3638 - val\_accuracy: 0.8450

Epoch 12/40

300/300 [==============================] - ETA: 0s - loss: 0.3347 - accuracy: 0.8603

Epoch 12: val\_accuracy improved from 0.86042 to 0.86875, saving model to /content/Model.hdf5

300/300 [==============================] - 72s 240ms/step - loss: 0.3347 - accuracy: 0.8603 - val\_loss: 0.3291 - val\_accuracy: 0.8687

Epoch 13/40

300/300 [==============================] - ETA: 0s - loss: 0.3176 - accuracy: 0.8709

Epoch 13: val\_accuracy did not improve from 0.86875

300/300 [==============================] - 64s 213ms/step - loss: 0.3176 - accuracy: 0.8709 - val\_loss: 0.3611 - val\_accuracy: 0.8625

Epoch 14/40

300/300 [==============================] - ETA: 0s - loss: 0.3215 - accuracy: 0.8683

Epoch 14: val\_accuracy did not improve from 0.86875

300/300 [==============================] - 63s 211ms/step - loss: 0.3215 - accuracy: 0.8683 - val\_loss: 0.3996 - val\_accuracy: 0.8242

Epoch 15/40

300/300 [==============================] - ETA: 0s - loss: 0.3090 - accuracy: 0.8739

Epoch 15: val\_accuracy did not improve from 0.86875

300/300 [==============================] - 63s 210ms/step - loss: 0.3090 - accuracy: 0.8739 - val\_loss: 0.3715 - val\_accuracy: 0.8587

Epoch 16/40

300/300 [==============================] - ETA: 0s - loss: 0.3081 - accuracy: 0.8725

Epoch 16: val\_accuracy improved from 0.86875 to 0.87500, saving model to /content/Model.hdf5

300/300 [==============================] - 65s 215ms/step - loss: 0.3081 - accuracy: 0.8725 - val\_loss: 0.3197 - val\_accuracy: 0.8750

Epoch 17/40

300/300 [==============================] - ETA: 0s - loss: 0.2906 - accuracy: 0.8813

Epoch 17: val\_accuracy did not improve from 0.87500

300/300 [==============================] - 68s 228ms/step - loss: 0.2906 - accuracy: 0.8813 - val\_loss: 0.3448 - val\_accuracy: 0.8637

Epoch 18/40

300/300 [==============================] - ETA: 0s - loss: 0.2820 - accuracy: 0.8869

Epoch 18: val\_accuracy did not improve from 0.87500

300/300 [==============================] - 72s 241ms/step - loss: 0.2820 - accuracy: 0.8869 - val\_loss: 0.3230 - val\_accuracy: 0.8658

Epoch 19/40

300/300 [==============================] - ETA: 0s - loss: 0.2695 - accuracy: 0.8946

Epoch 19: val\_accuracy improved from 0.87500 to 0.90083, saving model to /content/Model.hdf5

300/300 [==============================] - 71s 235ms/step - loss: 0.2695 - accuracy: 0.8946 - val\_loss: 0.2768 - val\_accuracy: 0.9008

Epoch 20/40

300/300 [==============================] - ETA: 0s - loss: 0.2785 - accuracy: 0.8878

Epoch 20: val\_accuracy did not improve from 0.90083

300/300 [==============================] - 76s 252ms/step - loss: 0.2785 - accuracy: 0.8878 - val\_loss: 0.2949 - val\_accuracy: 0.8833

Epoch 21/40

300/300 [==============================] - ETA: 0s - loss: 0.2785 - accuracy: 0.8881

Epoch 21: val\_accuracy did not improve from 0.90083

300/300 [==============================] - 70s 233ms/step - loss: 0.2785 - accuracy: 0.8881 - val\_loss: 0.3097 - val\_accuracy: 0.8808

Epoch 22/40

300/300 [==============================] - ETA: 0s - loss: 0.2566 - accuracy: 0.8981

Epoch 22: val\_accuracy did not improve from 0.90083

300/300 [==============================] - 63s 211ms/step - loss: 0.2566 - accuracy: 0.8981 - val\_loss: 0.2733 - val\_accuracy: 0.8929

Epoch 23/40

300/300 [==============================] - ETA: 0s - loss: 0.2628 - accuracy: 0.8959

Epoch 23: val\_accuracy did not improve from 0.90083

300/300 [==============================] - 64s 214ms/step - loss: 0.2628 - accuracy: 0.8959 - val\_loss: 0.2989 - val\_accuracy: 0.8804

Epoch 24/40

300/300 [==============================] - ETA: 0s - loss: 0.2469 - accuracy: 0.9022

Epoch 24: val\_accuracy did not improve from 0.90083

300/300 [==============================] - 68s 226ms/step - loss: 0.2469 - accuracy: 0.9022 - val\_loss: 0.3010 - val\_accuracy: 0.8796

Epoch 25/40

300/300 [==============================] - ETA: 0s - loss: 0.2477 - accuracy: 0.9014

Epoch 25: val\_accuracy did not improve from 0.90083

300/300 [==============================] - 75s 249ms/step - loss: 0.2477 - accuracy: 0.9014 - val\_loss: 0.3073 - val\_accuracy: 0.8779

Epoch 26/40

300/300 [==============================] - ETA: 0s - loss: 0.2491 - accuracy: 0.9017

Epoch 26: val\_accuracy did not improve from 0.90083

300/300 [==============================] - 74s 247ms/step - loss: 0.2491 - accuracy: 0.9017 - val\_loss: 0.2677 - val\_accuracy: 0.8954

Epoch 27/40

300/300 [==============================] - ETA: 0s - loss: 0.2392 - accuracy: 0.9043

Epoch 27: val\_accuracy did not improve from 0.90083

300/300 [==============================] - 70s 232ms/step - loss: 0.2392 - accuracy: 0.9043 - val\_loss: 0.2929 - val\_accuracy: 0.8788

Epoch 28/40

300/300 [==============================] - ETA: 0s - loss: 0.2309 - accuracy: 0.9071

Epoch 28: val\_accuracy did not improve from 0.90083

300/300 [==============================] - 69s 230ms/step - loss: 0.2309 - accuracy: 0.9071 - val\_loss: 0.2837 - val\_accuracy: 0.8950

Epoch 29/40

300/300 [==============================] - ETA: 0s - loss: 0.2400 - accuracy: 0.9040

Epoch 29: val\_accuracy did not improve from 0.90083

300/300 [==============================] - 67s 224ms/step - loss: 0.2400 - accuracy: 0.9040 - val\_loss: 0.2709 - val\_accuracy: 0.8954

Epoch 30/40

300/300 [==============================] - ETA: 0s - loss: 0.2287 - accuracy: 0.9095

Epoch 30: val\_accuracy did not improve from 0.90083

300/300 [==============================] - 63s 210ms/step - loss: 0.2287 - accuracy: 0.9095 - val\_loss: 0.3051 - val\_accuracy: 0.8758

Epoch 31/40

300/300 [==============================] - ETA: 0s - loss: 0.2260 - accuracy: 0.9105

Epoch 31: val\_accuracy did not improve from 0.90083

300/300 [==============================] - 63s 209ms/step - loss: 0.2260 - accuracy: 0.9105 - val\_loss: 0.2841 - val\_accuracy: 0.8904

Epoch 32/40

300/300 [==============================] - ETA: 0s - loss: 0.2137 - accuracy: 0.9156

Epoch 32: val\_accuracy did not improve from 0.90083

300/300 [==============================] - 66s 219ms/step - loss: 0.2137 - accuracy: 0.9156 - val\_loss: 0.2828 - val\_accuracy: 0.8904

Epoch 33/40

300/300 [==============================] - ETA: 0s - loss: 0.2206 - accuracy: 0.9128

Epoch 33: val\_accuracy did not improve from 0.90083

300/300 [==============================] - 71s 236ms/step - loss: 0.2206 - accuracy: 0.9128 - val\_loss: 0.2590 - val\_accuracy: 0.9000

Epoch 34/40

300/300 [==============================] - ETA: 0s - loss: 0.2094 - accuracy: 0.9172

Epoch 34: val\_accuracy did not improve from 0.90083

300/300 [==============================] - 73s 245ms/step - loss: 0.2094 - accuracy: 0.9172 - val\_loss: 0.3191 - val\_accuracy: 0.8754

Epoch 35/40

300/300 [==============================] - ETA: 0s - loss: 0.2224 - accuracy: 0.9092

Epoch 35: val\_accuracy improved from 0.90083 to 0.90167, saving model to /content/Model.hdf5

300/300 [==============================] - 73s 243ms/step - loss: 0.2224 - accuracy: 0.9092 - val\_loss: 0.2697 - val\_accuracy: 0.9017

Epoch 36/40

300/300 [==============================] - ETA: 0s - loss: 0.2100 - accuracy: 0.9183

Epoch 36: val\_accuracy did not improve from 0.90167

300/300 [==============================] - 73s 243ms/step - loss: 0.2100 - accuracy: 0.9183 - val\_loss: 0.2806 - val\_accuracy: 0.8992

Epoch 37/40

300/300 [==============================] - ETA: 0s - loss: 0.1967 - accuracy: 0.9235

Epoch 37: val\_accuracy did not improve from 0.90167

300/300 [==============================] - 74s 245ms/step - loss: 0.1967 - accuracy: 0.9235 - val\_loss: 0.2901 - val\_accuracy: 0.8954

Epoch 38/40

300/300 [==============================] - ETA: 0s - loss: 0.1940 - accuracy: 0.9219

Epoch 38: val\_accuracy did not improve from 0.90167

300/300 [==============================] - 73s 243ms/step - loss: 0.1940 - accuracy: 0.9219 - val\_loss: 0.3702 - val\_accuracy: 0.8587

Epoch 39/40

300/300 [==============================] - ETA: 0s - loss: 0.1985 - accuracy: 0.9216

Epoch 39: val\_accuracy did not improve from 0.90167

300/300 [==============================] - 73s 243ms/step - loss: 0.1985 - accuracy: 0.9216 - val\_loss: 0.2668 - val\_accuracy: 0.8975

Epoch 40/40

300/300 [==============================] - ETA: 0s - loss: 0.2002 - accuracy: 0.9216

Epoch 40: val\_accuracy did not improve from 0.90167

300/300 [==============================] - 73s 243ms/step - loss: 0.2002 - accuracy: 0.9216 - val\_loss: 0.3229 - val\_accuracy: 0.8821

Temps d'entraînement total: 2734.39 secondes.

A graph of different types of lines

Description automatically generated with medium confidence

Found 3000 images belonging to 3 classes.

94/94 [==============================] - 4s 39ms/step - loss: 0.2318 - accuracy: 0.9147

>Test loss (Erreur): 0.23177549242973328

>Test précision: 0.9146666526794434

94/94 [==============================] - 3s 32ms/step

> 2744 Ètiquettes bien classÈes

> 256 Ètiquettes mal classÈes

A screenshot of a chart

Description automatically generated

A collage of whales

Description automatically generated