```
from google.colab import files
files.upload()
```

```
Choose Files No file chosen  Upload widget is only available when the cell has been executed in the current browser session. Please rerun this cell to enable.
Saving kaggle.json to kaggle (1).json
```

```
!mkdir -p ~/.kaggle
!cp kaggle.json ~/.kaggle/
!chmod 600 ~/.kaggle/kaggle.json


import tensorflow_datasets as tfds
import tensorflow as tf

(ds_train, ds_test), ds_info = tfds.load(
    'oxford_iiit_pet',
    split=['train', 'test'],
    with_info=True,
    as_supervised=True
)

print("✅ Dataset loaded:", ds_info.features['label'].names)



import tensorflow_datasets as tfds
import tensorflow as tf

# Load the Oxford-IIIT Pet Dataset
(ds_train_raw, ds_test_raw), ds_info = tfds.load(
    'oxford_iiit_pet',
    split=['train', 'test'],
    with_info=True,
    as_supervised=True
)

# Get list of all labels (cats + dogs)
all_labels = ds_info.features['label'].names

# List of known cat breeds in the dataset (12 cat breeds)
cat_breeds = [
    'Abyssinian', 'Bengal', 'Birman', 'Bombay', 'British_Shorthair',
    'Egyptian_Mau', 'Maine_Coon', 'Persian', 'Ragdoll',
    'Russian_Blue', 'Siamese', 'Sphynx'
]

# Get indices of cat breeds
cat_label_indices = [all_labels.index(breed) for breed in cat_breeds]

# Filter function to include only cat breeds
def is_cat(image, label):
    return tf.reduce_any([tf.equal(label, idx) for idx in cat_label_indices])

# Filter train and test datasets
ds_train_cats = ds_train_raw.filter(is_cat)
ds_test_cats = ds_test_raw.filter(is_cat)

# Preprocessing function
def preprocess(image, label):
    image = tf.image.resize(image, (224, 224))
    image = tf.cast(image, tf.float32) / 255.0
    return image, label

# Apply preprocessing
ds_train = ds_train_cats.map(preprocess).batch(32).prefetch(tf.data.AUTOTUNE)
ds_test = ds_test_cats.map(preprocess).batch(32).prefetch(tf.data.AUTOTUNE)

# Count number of unique cat classes
num_cat_classes = len(cat_label_indices)

# Done! You now have ds_train and ds_test ready for training only on cat breeds.
num_cat_classes
```

```
import tensorflow as tf
from tensorflow.keras import layers, models
from tensorflow.keras.applications import MobileNetV2

# Define the base model (no top layers)
base_model = MobileNetV2(input_shape=(224, 224, 3),
                         include_top=False,
                         weights='imagenet')
base_model.trainable = False  # Freeze base model

# Build the model
model = models.Sequential([
    base_model,
    layers.GlobalAveragePooling2D(),
    layers.Dense(128, activation='relu'),
    layers.Dropout(0.3),
    layers.Dense(12, activation='softmax')  # 12 cat breeds
])

# Compile the model
model.compile(optimizer='adam',
              loss='sparse_categorical_crossentropy',
              metrics=['accuracy'])

# Train the model
history = model.fit(
    ds_train,
    validation_data=ds_test,
    epochs=10
)



# Save the model
model.save("cat_breed_model.keras")

# Save the class names (in the correct order)
import json
cat_class_names = [
    'Abyssinian', 'Bengal', 'Birman', 'Bombay', 'British_Shorthair',
    'Egyptian_Mau', 'Maine_Coon', 'Persian', 'Ragdoll',
    'Russian_Blue', 'Siamese', 'Sphynx'
]

with open("cat_class_names.json", "w") as f:
    json.dump(cat_class_names, f)



from google.colab import files

# First, ensure the model is saved
model.save("cat_breed_model.keras")

# Then download the file
files.download("cat_breed_model.keras")



# Unfreeze top layers of the base model
base_model.trainable = True

# Optionally, freeze all layers up to a certain depth
for layer in base_model.layers[:100]:
    layer.trainable = False

# Recompile the model (important after changing trainable state)
model.compile(
    optimizer=tf.keras.optimizers.Adam(learning_rate=1e-5),  # Smaller LR
    loss='sparse_categorical_crossentropy',
    metrics=['accuracy']
)

# Continue training (fine-tune)
fine_tune_epochs = 5  # You can increase this
history_finetune = model.fit(
    ds_train,
    validation_data=ds_test,
```

```
    epochs=fine_tune_epochs
)
```

```
Epoch 1/5
38/38 ━━━━━━━━━━━━━━━━━━━━ 64s 1s/step - accuracy: 0.0839 - loss: nan - val_accuracy: 0.0820 - val_loss: nan
Epoch 2/5
38/38 ━━━━━━━━━━━━━━━━━━━━ 59s 673ms/step - accuracy: 0.0839 - loss: nan - val_accuracy: 0.0820 - val_loss: nan
Epoch 3/5
38/38 ━━━━━━━━━━━━━━━━━━━━ 83s 2s/step - accuracy: 0.0839 - loss: nan - val_accuracy: 0.0820 - val_loss: nan
Epoch 4/5
38/38 ━━━━━━━━━━━━━━━━━━━━ 26s 694ms/step - accuracy: 0.0839 - loss: nan - val_accuracy: 0.0820 - val_loss: nan
Epoch 5/5
38/38 ━━━━━━━━━━━━━━━━━━━━ 27s 710ms/step - accuracy: 0.0839 - loss: nan - val_accuracy: 0.0820 - val_loss: nan
```

```
model.save("cat_breed_model_finetuned.keras")
```

```
files.download("cat_breed_model_finetuned.keras")
```

```
# Unfreeze the base model (MobileNetV2)
base_model.trainable = True

# Optionally freeze the first 100 layers to avoid overfitting
for layer in base_model.layers[:100]:
    layer.trainable = False

# Recompile the model with a low learning rate
model.compile(
    optimizer=tf.keras.optimizers.Adam(learning_rate=1e-5),
    loss='sparse_categorical_crossentropy',
    metrics=['accuracy']
)

# Fine-tune the model
fine_tune_epochs = 5
history_finetune = model.fit(
    ds_train,
    validation_data=ds_test,
    epochs=fine_tune_epochs
)
```

```
Epoch 1/5
38/38 ━━━━━━━━━━━━━━━━━━━━ 75s 1s/step - accuracy: 0.0839 - loss: nan - val_accuracy: 0.0820 - val_loss: nan
Epoch 2/5
38/38 ━━━━━━━━━━━━━━━━━━━━ 50s 680ms/step - accuracy: 0.0839 - loss: nan - val_accuracy: 0.0820 - val_loss: nan
Epoch 3/5
38/38 ━━━━━━━━━━━━━━━━━━━━ 25s 649ms/step - accuracy: 0.0839 - loss: nan - val_accuracy: 0.0820 - val_loss: nan
Epoch 4/5
37/38 ━━━━━━━━━━━━━━━━━━━━ 0s 337ms/step - accuracy: 0.0842 - loss: nan/usr/local/lib/python3.11/dist-packages/keras/src/trainers/epoch_
  self._interrupted_warning()
38/38 ━━━━━━━━━━━━━━━━━━━━ 40s 1s/step - accuracy: 0.0839 - loss: nan - val_accuracy: 0.0820 - val_loss: nan
Epoch 5/5
38/38 ━━━━━━━━━━━━━━━━━━━━ 26s 675ms/step - accuracy: 0.0839 - loss: nan - val_accuracy: 0.0820 - val_loss: nan
```

```
from tensorflow import keras

# Load your already trained cat breed model
model = keras.models.load_model("cat_breed_model.keras")

# Load MobileNetV2 base
base_model = model.layers[0]  # assuming first layer is MobileNetV2
```

```
!pip install -q tensorflow_datasets
```

```
import tensorflow_datasets as tfds
import tensorflow as tf

# Load full dataset
```

```
(ds_train_raw, ds_test_raw), ds_info = tfds.load(
    'oxford_iiit_pet',
    split=['train', 'test'],
    with_info=True,
    as_supervised=True
)

# Known cat breeds in the dataset
cat_breeds = [
    'Abyssinian', 'Bengal', 'Birman', 'Bombay', 'British_Shorthair',
    'Egyptian_Mau', 'Maine_Coon', 'Persian', 'Ragdoll',
    'Russian_Blue', 'Siamese', 'Sphynx'
]
all_labels = ds_info.features['label'].names
cat_label_indices = [all_labels.index(b) for b in cat_breeds]

# Filter dataset to only cats
def is_cat(image, label):
    return tf.reduce_any([tf.equal(label, idx) for idx in cat_label_indices])

ds_train_cats = ds_train_raw.filter(is_cat)
ds_test_cats = ds_test_raw.filter(is_cat)

# Preprocessing: resize and normalize
def preprocess(image, label):
    image = tf.image.resize(image, (224, 224)) / 255.0
    return image, label

# Prepare datasets
ds_train = ds_train_cats.map(preprocess).shuffle(1000).batch(32).prefetch(tf.data.AUTOTUNE)
ds_test = ds_test_cats.map(preprocess).batch(32).prefetch(tf.data.AUTOTUNE)
```

```
WARNING:absl:Variant folder /root/tensorflow_datasets/oxford_iiit_pet/4.0.0 has no dataset_info.json
Downloading and preparing dataset Unknown size (download: Unknown size, generated: Unknown size, total: Unknown size) to /root/tensorflc
Dl Completed...: 100%  2/2 [01:30<00:00, 31.97s/ url]
Dl Size...: 100%  773/773 [01:30<00:00, 19.99 MiB/s]
Extraction completed...: 100%  18473/18473 [01:30<00:00, 710.31 file/s]
```

```
import tensorflow_datasets as tfds
import tensorflow as tf

# Load dataset
(ds_train_raw, ds_test_raw), ds_info = tfds.load(
    'oxford_iiit_pet',
    split=['train', 'test'],
    with_info=True,
    as_supervised=True
)

# Cat breeds and label remapping
cat_breeds = [
    'Abyssinian', 'Bengal', 'Birman', 'Bombay', 'British_Shorthair',
    'Egyptian_Mau', 'Maine_Coon', 'Persian', 'Ragdoll',
    'Russian_Blue', 'Siamese', 'Sphynx'
]

all_labels = ds_info.features['label'].names
cat_label_map = {all_labels.index(breed): new_idx for new_idx, breed in enumerate(cat_breeds)}

# ✅ Fix TypeError by matching int64
def is_cat(image, label):
    label = tf.cast(label, tf.int64)
    return tf.reduce_any([tf.equal(label, tf.constant(idx, dtype=tf.int64)) for idx in cat_label_map.keys()])
```

```
# Relabel and set shapes properly
def remap_and_preprocess(image, label):
    image = tf.image.resize(image, (224, 224)) / 255.0
    label = tf.cast(cat_label_map[label.numpy()], tf.int64)
    return image, label

def tf_remap(image, label):
    image, label = tf.py_function(remap_and_preprocess, [image, label], [tf.float32, tf.int64])
    image.set_shape((224, 224, 3))
    label.set_shape(())
    return image, label

# Datasets
ds_train = ds_train_raw.filter(is_cat).map(tf_remap).shuffle(1000).batch(32).prefetch(tf.data.AUTOTUNE)
ds_test = ds_test_raw.filter(is_cat).map(tf_remap).batch(32).prefetch(tf.data.AUTOTUNE)
```

```
WARNING:absl:Variant folder /root/tensorflow_datasets/oxford_iiit_pet/4.0.0 has no dataset_info.json
Downloading and preparing dataset Unknown size (download: Unknown size, generated: Unknown size, total: Unknown size) to /root/tensorflc
Dl Completed...: 100%  2/2 [01:03<00:00, 25.45s/ url]
Dl Size...: 100%  773/773 [01:03<00:00, 19.67 MiB/s]
Extraction completed...: 100%  18473/18473 [01:02<00:00, 481.37 file/s]
Dataset oxford_iiit_pet downloaded and prepared to /root/tensorflow_datasets/oxford_iiit_pet/4.0.0. Subsequent calls will reuse this dat
```

```
from tensorflow.keras.applications import MobileNetV2
from tensorflow.keras import layers, models

# Load base model
base_model = MobileNetV2(
    input_shape=(224, 224, 3),
    include_top=False,
    weights='imagenet'
)
base_model.trainable = False  # Freeze the base model for now

# Add custom head
model = models.Sequential([
    base_model,
    layers.GlobalAveragePooling2D(),
    layers.Dense(128, activation='relu'),
    layers.Dropout(0.3),
    layers.Dense(12, activation='softmax')  # 12 cat breeds
])

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

```
Downloading data from https://storage.googleapis.com/tensorflow/keras-applications/mobilenet_v2/mobilenet_v2_weights_tf_dim_ordering_tf_
9406464/9406464 ━━━━━━━━━━━━━━━━━━━━ 0s 0us/step
```

```
history = model.fit(
    ds_train,
    validation_data=ds_test,
    epochs=5
)
```

```
Epoch 1/5
     38/Unknown 24s 150ms/step - accuracy: 0.3671 - loss: 1.9242/usr/local/lib/python3.11/dist-packages/keras/src/trainers/epoch_iteratc
  self._interrupted_warning()
38/38 ━━━━━━━━━━━━━━━━━━━━ 41s 591ms/step - accuracy: 0.3715 - loss: 1.9106 - val_accuracy: 0.7777 - val_loss: 0.7351
Epoch 2/5
38/38 ━━━━━━━━━━━━━━━━━━━━ 21s 329ms/step - accuracy: 0.8340 - loss: 0.5384 - val_accuracy: 0.7980 - val_loss: 0.6264
Epoch 3/5
38/38 ━━━━━━━━━━━━━━━━━━━━ 40s 332ms/step - accuracy: 0.8943 - loss: 0.3524 - val_accuracy: 0.8140 - val_loss: 0.5732
Epoch 4/5
38/38 ━━━━━━━━━━━━━━━━━━━━ 41s 886ms/step - accuracy: 0.9204 - loss: 0.2598 - val_accuracy: 0.7853 - val_loss: 0.6291
```

```
Epoch 5/5
38/38 ━━━━━━━━━━━━━━━━━━━━ 19s 326ms/step - accuracy: 0.9073 - loss: 0.2782 - val_accuracy: 0.8005 - val_loss: 0.6075
```

```
model.save("cat_breed_model.keras")
```

```
from google.colab import files
files.download("cat_breed_model.keras")
```

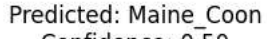
```
from google.colab import files
from tensorflow.keras.preprocessing import image
from tensorflow import keras
import numpy as np
import matplotlib.pyplot as plt

# ✅ Load the saved model
model_path = '/content/cat_breed_model.keras'  # Make sure this matches your path
model = keras.models.load_model(model_path)
print("✅ Model loaded successfully.")

# ✅ Class names (12 cat breeds used in training)
class_names = [
    'Abyssinian', 'Bengal', 'Birman', 'Bombay', 'British_Shorthair',
    'Egyptian_Mau', 'Maine_Coon', 'Persian', 'Ragdoll',
    'Russian_Blue', 'Siamese', 'Sphynx'
]

# ✅ Upload image
uploaded = files.upload()

# ✅ Predict for each uploaded image
for fname in uploaded.keys():
    img_path = fname
    img = image.load_img(img_path, target_size=(224, 224))
    img_array = image.img_to_array(img) / 255.0
    img_array = np.expand_dims(img_array, axis=0)

    prediction = model.predict(img_array)
    predicted_index = np.argmax(prediction)
    confidence = prediction[0][predicted_index]

    predicted_class = class_names[predicted_index]

    plt.imshow(img)
    plt.title(f"Predicted: {predicted_class}\nConfidence: {confidence:.2f}")
    plt.axis('off')
    plt.show()
```

```
✅ Model loaded successfully.
```

Choose Files MAine-Coon-Giant.jpg

- **MAine-Coon-Giant.jpg**(image/jpeg) - 66238 bytes, last modified: 7/1/2025 - 100% done

```
Saving MAine-Coon-Giant.jpg to MAine-Coon-Giant.jpg
WARNING:tensorflow:6 out of the last 6 calls to <function TensorFlowTrainer.make_predict_function.<locals>.one_step_on_data_distributed
1/1 ━━━━━━━━━━━━━━━━━━━━ 3s 3s/step
```




```
from google.colab import files

# Replace with your actual model filename if different
files.download("cat_breed_model.keras")
```

```
from google.colab import drive
import os

# Step 1: Mount Google Drive
drive.mount('/content/drive')

# Step 2: Define your target path in Drive
save_path = '/content/drive/MyDrive/CatBreedModel/cat_breed_model.keras'

# Step 3: Create the directory if it doesn't exist
os.makedirs(os.path.dirname(save_path), exist_ok=True)

# Step 4: Save the model
model.save(save_path)

print(f"✅ Model saved to: {save_path}")
```

```
Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True).
✅ Model saved to: /content/drive/MyDrive/CatBreedModel/cat_breed_model.keras
```