```
import tensorflow as tf
from tensorflow.keras import layers, models
from tensorflow.keras.preprocessing.image import ImageDat
from sklearn.model_selection import train_test_split


# Connect to TPU
try:
    tpu = tf.distribute.cluster_resolver.TPUClusterResolv
    print('Running on TPU ', tpu.cluster_spec().as_dict()
except ValueError:
    raise BaseException('ERROR: Not connected to a TPU ru

tf.config.experimental_connect_to_cluster(tpu)
tf.tpu.experimental.initialize_tpu_system(tpu)
tpu_strategy = tf.distribute.TPUStrategy(tpu)
```

```
Running on TPU  ['10.81.186.194:8470']
```

```
# Set up parameters
AUTO = tf.data.experimental.AUTOTUNE
IMAGE_SIZE = [224, 224]  # adjust size as needed
batch_size = 32 * tpu_strategy.num_replicas_in_sync
gcs_pattern_train = 'gs://grad_proj/train/*/*.jpg'
gcs_pattern_test = 'gs://grad_proj/test/*/*.jpg'
num_images_per_class = 100


# Define data loading functions
def parse_image(filename, label):
    img = tf.io.read_file(filename)
    img = tf.image.decode_jpeg(img, channels=3)
    img = tf.image.resize(img, IMAGE_SIZE)
    img = tf.cast(img, tf.float32) / 255.0
    return img, label

# Define data loading functions
def load_dataset(gcs_pattern, num_images):
    filenames = tf.io.gfile.glob(gcs_pattern)
    random.shuffle(filenames)  # Shuffle the filenames
    filenames = filenames[:num_images]  # Select a subse
    labels = [1 if 'dog' in filename else 0 for filename
    dataset = tf.data.Dataset.from_tensor_slices((filena
    dataset = dataset.map(parse_image, num_parallel_cal
    return dataset
```

```
import random
# Load datasets
train_dataset = load_dataset(gcs_pattern_train, num_imag
test_dataset = load_dataset(gcs_pattern_test, num_images

# Assuming your train dataset is named 'train_dataset'
train_dataset_length = tf.data.experimental.cardinality(

print(f"Train dataset length: {train_dataset_length}")
```

Resources ×

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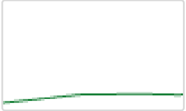
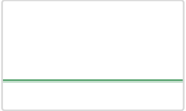
Python 3 Google Compute Engine backend (TPU)
Showing resources from 03:28 to 03:33

System RAM
1.8 / 12.7 GB



Disk
29.2 / 107.7 GB



```
    Train dataset length: 100
```

```
# Load datasets
train_dataset = load_dataset(gcs_pattern_train)
test_dataset = load_dataset(gcs_pattern_test)


# Assuming your train dataset is named 'train_dataset'
train_dataset_length = tf.data.experimental.cardinality

print(f"Train dataset length: {train_dataset_length}")



# Define and compile the model
with tpu_strategy.scope():
    model = models.Sequential()
    model.add(layers.Conv2D(32, kernel_size=(3, 3), pad
    model.add(layers.BatchNormalization())
    model.add(layers.MaxPooling2D(pool_size=(2, 2), str
    model.add(layers.Conv2D(64, kernel_size=(3, 3), pad
    model.add(layers.BatchNormalization())
    model.add(layers.MaxPooling2D(pool_size=(2, 2), str
    model.add(layers.Conv2D(128, kernel_size=(3, 3), pa
    model.add(layers.BatchNormalization())
    model.add(layers.MaxPooling2D(pool_size=(2, 2), str
    model.add(layers.Flatten())
    model.add(layers.Dense(128, activation='relu'))
    model.add(layers.Dropout(0.1))
    model.add(layers.Dense(64, activation='relu'))
    model.add(layers.Dropout(0.1))
    model.add(layers.Dense(1, activation='sigmoid'))

    model.compile(optimizer='adam', loss='binary_crosse



import time

start_time = time.time()

history = model.fit(
    train_dataset.shuffle(1000).batch(batch_size).prefetc
    epochs=10,
    validation_data=test_dataset.batch(batch_size).prefet
)

end_time = time.time()
elapsed_time = end_time - start_time

print(f"Training took {elapsed_time} seconds.")
```

```
    Epoch 1/10
    1/1 [==============================] - 22s 22s/step
    Epoch 2/10
    1/1 [==============================] - 7s 7s/step -
    Epoch 3/10
    1/1 [==============================] - 7s 7s/step -
    Epoch 4/10
    1/1 [==============================] - 7s 7s/step -
    Epoch 5/10
    1/1 [==============================] - 7s 7s/step -
```

```
Epoch 6/10
1/1 [==============================] - 8s 8s/step -
Epoch 7/10
1/1 [==============================] - 7s 7s/step -
Epoch 8/10
1/1 [==============================] - 7s 7s/step -
Epoch 9/10
1/1 [==============================] - 8s 8s/step -
Epoch 10/10
1/1 [==============================] - 6s 6s/step -
Training took 94.66769695281982 seconds.
```

Change runtime type