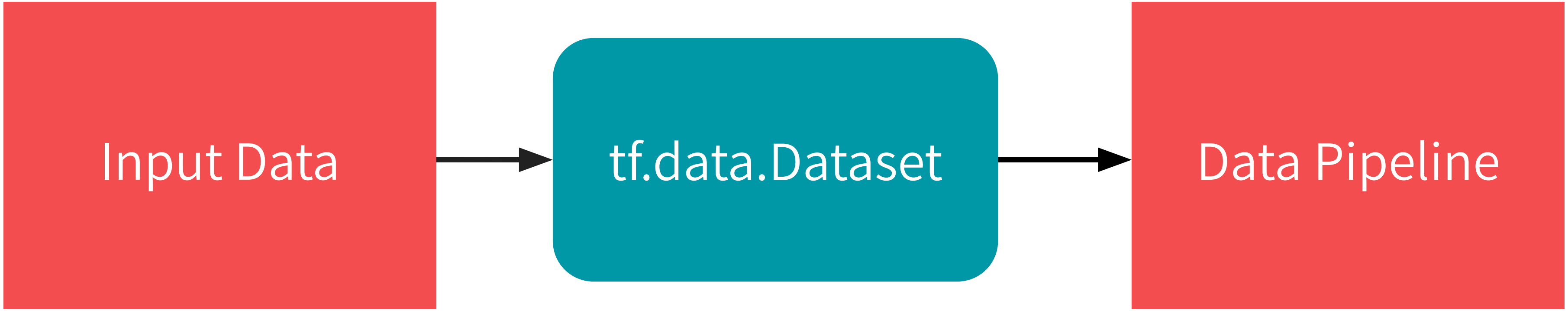
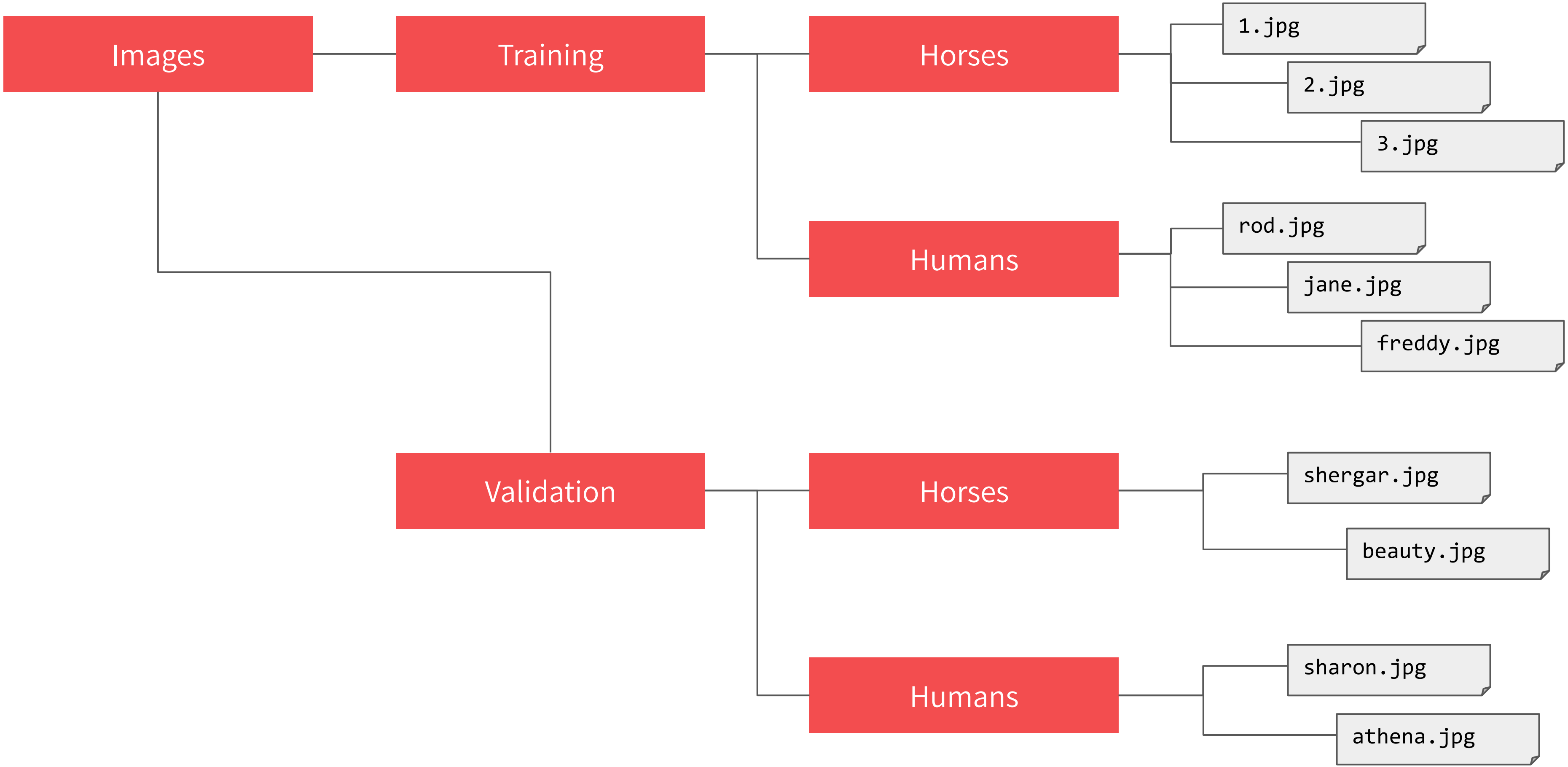
# Copyright Notice

# tf.data API



# tf.keras.utils.image_dataset_from_directory



Images

Training

Horses

1.jpg

2.jpg

3.jpg

Humans

rod.jpg

jane.jpg

freddy.jpg

Validation

Horses

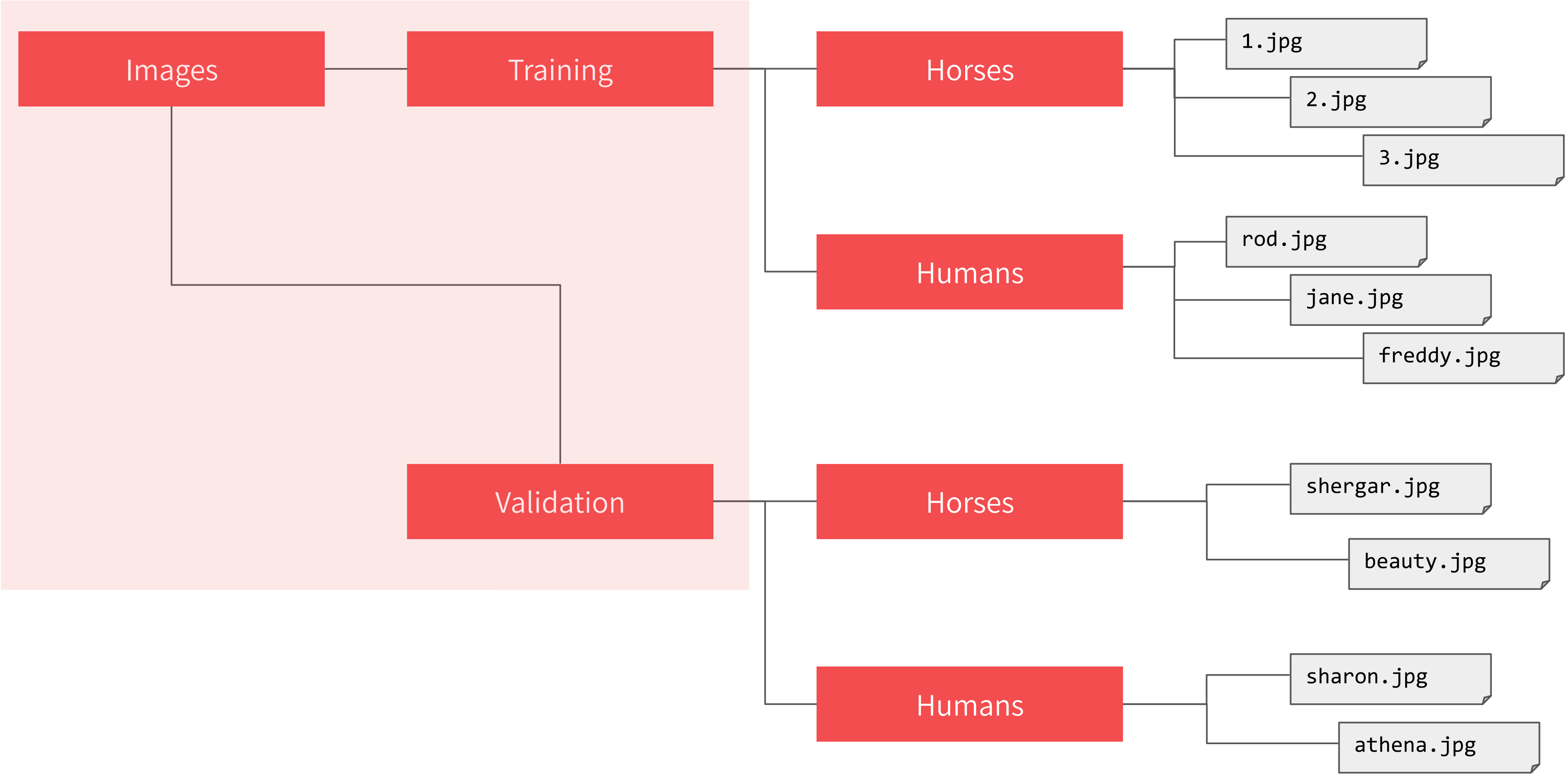
shergar.jpg

beauty.jpg

Humans

sharon.jpg

athena.jpg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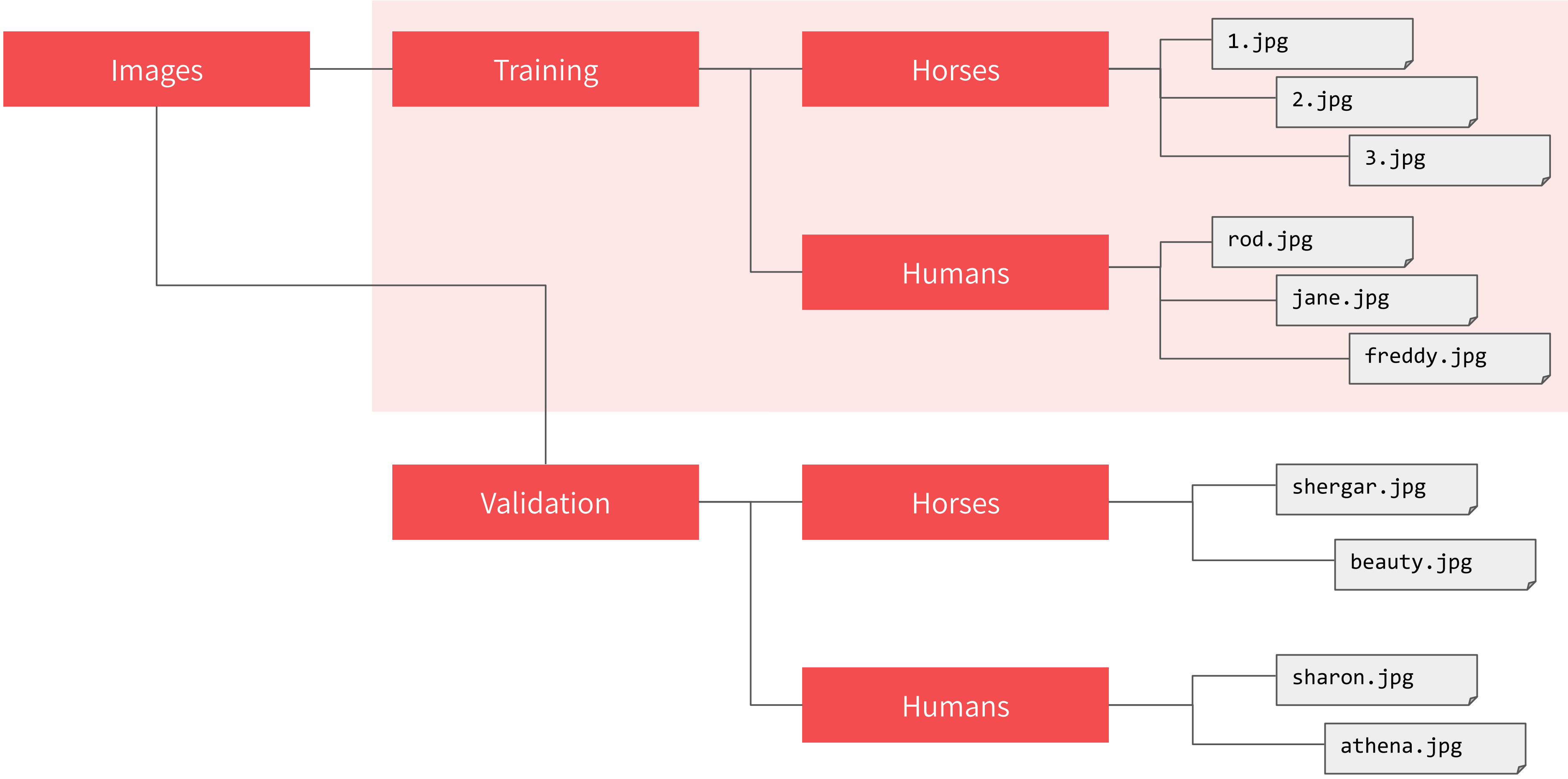
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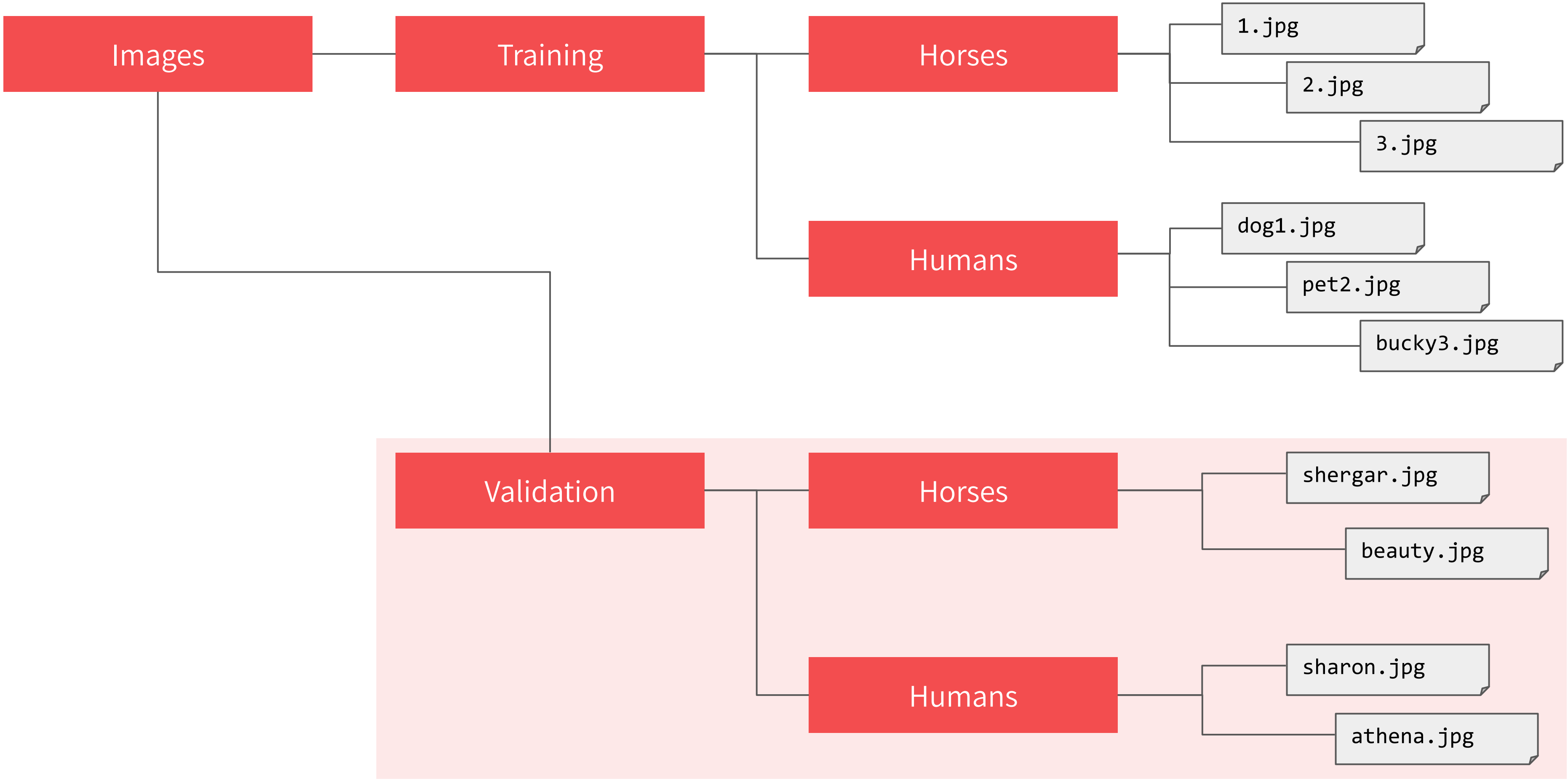
Images
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Horses
1.jpg
2.jpg
3.jpg
Humans
dog1.jpg
pet2.jpg
bucky3.jpg
Validation
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shergar.jpg
beauty.jpg
Humans
sharon.jpg
athena.jpg

```
train_dataset = tf.keras.utils.image_dataset_from_directory(
    TRAIN_DIR,
    image_size=(300, 300),
    batch_size=128,
    label_mode='binary'
    )
```

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```

# tf.data.Dataset

https://www.tensorflow.org/api_docs/python/tf/data/Dataset

```
rescale_layer = tf.keras.layers.Rescaling(scale=1./255)

train_dataset_scaled = train_dataset.map(
    lambda image, label: (rescale_layer(image), label))
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train_dataset_final = (train_dataset_scaled
                       .cache()
                       .shuffle(buffer_size=1000)
                       .prefetch(buffer_size=tf.data.AUTOTUNE))
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```
validation_dataset = tf.keras.utils.image_dataset_from_directory(
    VAL_DIR,
    image_size=(300, 300),
    batch_size=32,
    label_mode='binary'
    )

validation_dataset_scaled = validation_dataset.map(lambda image, label:
(rescale_layer(image), label))

# Configure the validation dataset
validation_dataset_final = (validation_dataset_scaled
                            .cache()
                            .prefetch(buffer_size=tf.data.AUTOTUNE))
```

```
validation_dataset = tf.keras.utils.image_dataset_from_directory(
    VAL_DIR,
    image_size=(300, 300),
    batch_size=128,
    label_mode='binary'
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(rescale_layer(image), label))

# Configure the validation dataset
validation_dataset_final = (validation_dataset_scaled
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```
model = tf.keras.models.Sequential([
    tf.keras.layers.Input(shape=(300, 300, 3)),
    tf.keras.layers.Conv2D(16, (3,3), activation='relu'),
    tf.keras.layers.MaxPooling2D(2, 2),
    tf.keras.layers.Conv2D(32, (3, 3), activation='relu'),
    tf.keras.layers.MaxPooling2D(2, 2),
    tf.keras.layers.Conv2D(64, (3, 3), activation='relu'),
    tf.keras.layers.MaxPooling2D(2, 2),
    tf.keras.layers.Flatten(),
    tf.keras.layers.Dense(512, activation='relu'),
    tf.keras.layers.Dense(1, activation='sigmoid')
])
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```
Layer (type)                 Output Shape              Param #
=================================================================
conv2d_5 (Conv2D)            (None, 298, 298, 16)      448
_________________________________________________________________
max_pooling2d_5 (MaxPooling2 (None, 149, 149, 16)      0
_________________________________________________________________
conv2d_6 (Conv2D)            (None, 147, 147, 32)      4640
_________________________________________________________________
max_pooling2d_6 (MaxPooling2 (None, 73, 73, 32)        0
_________________________________________________________________
conv2d_7 (Conv2D)            (None, 71, 71, 64)        18496
_________________________________________________________________
max_pooling2d_7 (MaxPooling2 (None, 35, 35, 64)        0
_________________________________________________________________
flatten_1 (Flatten)          (None, 78400)             0
_________________________________________________________________
dense_2 (Dense)              (None, 512)               40141312
_________________________________________________________________
dense_3 (Dense)              (None, 1)                 513
=================================================================
Total params: 40,165,409
Trainable params: 40,165,409
Non-trainable params: 0
```

```
model.compile(loss='binary_crossentropy',
              optimizer=tf.keras.optimizers.RMSprop(learning_rate=0.001),
              metrics=['accuracy'])
```

https://youtu.be/zLRB4oupj6g

2.1.4 Gradient Descent in Practice II Learning Rate by Andrew Ng

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history = model.fit(
      train_dataset_final,
      epochs=15,
      validation_data=validation_dataset_final,
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```python
from google.colab import files

uploaded = files.upload()

for filename in uploaded.keys():

    # predicting images
    path = '/content/' + filename
    image = tf.keras.utils.load_img(path, target_size=(300, 300))
    image = tf.keras.utils.img_to_array(image)
    image = rescale_layer(image)
    image = np.expand_dims(image, axis=0)

    prediction = model.predict(image, verbose=0)[0][0]
    print(f'\nmodel output: {prediction}')

    if prediction > 0.5:
        print(filename + " is a human")
    else:
        print(filename + " is a horse")
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