```
# Dataset - https://www.kaggle.com/datasets/salader/dogs-vs-cats
```

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

```
!kaggle datasets download -d salader/dogs-vs-cats
```

```
Downloading dogs-vs-cats.zip to /content
 99% 1.06G/1.06G [00:26<00:00, 44.3MB/s]
100% 1.06G/1.06G [00:26<00:00, 42.6MB/s]
```

```
import zipfile
zip_ref = zipfile.ZipFile('/content/dogs-vs-cats.zip', 'r')
zip_ref.extractall('/content')
zip_ref.close()
```

```
import tensorflow as tf
from tensorflow import keras
from keras import Sequential
from keras.layers import Dense,Conv2D,MaxPooling2D,Flatten,BatchNormalization,Dropout
```

```
# generators
train_ds = keras.utils.image_dataset_from_directory(
    directory = '/content/train',
    labels='inferred',
    label_mode = 'int',
    batch_size=32,
    image_size=(256,256)
)

validation_ds = keras.utils.image_dataset_from_directory(
    directory = '/content/test',
    labels='inferred',
    label_mode = 'int',
    batch_size=32,
    image_size=(256,256)
)
```

```
Found 20000 files belonging to 2 classes.
Found 5000 files belonging to 2 classes.
```

```
# Normalize
def process(image,label):
    image = tf.cast(image/255. ,tf.float32)
    return image,label

train_ds = train_ds.map(process)
validation_ds = validation_ds.map(process)
```

```
# create CNN model

model = Sequential()

model.add(Conv2D(32,kernel_size=(3,3),padding='valid',activation='relu',input_shape=(256,256,3)))
model.add(BatchNormalization())
model.add(MaxPooling2D(pool_size=(2,2),strides=2,padding='valid'))

model.add(Conv2D(64,kernel_size=(3,3),padding='valid',activation='relu'))
model.add(BatchNormalization())
model.add(MaxPooling2D(pool_size=(2,2),strides=2,padding='valid'))

model.add(Conv2D(128,kernel_size=(3,3),padding='valid',activation='relu'))
model.add(BatchNormalization())
model.add(MaxPooling2D(pool_size=(2,2),strides=2,padding='valid'))

model.add(Flatten())

model.add(Dense(128,activation='relu'))
model.add(Dropout(0.1))
model.add(Dense(64,activation='relu'))
model.add(Dropout(0.1))
model.add(Dense(1,activation='sigmoid'))
```

```
model.summary()
```

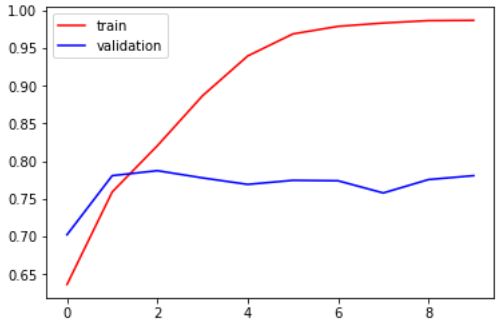
```
Model: "sequential_2"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 conv2d_4 (Conv2D)           (None, 254, 254, 32)      896

 batch_normalization (BatchN  (None, 254, 254, 32)     128
 ormalization)

 max_pooling2d_3 (MaxPooling  (None, 127, 127, 32)     0
 2D)

 conv2d_5 (Conv2D)           (None, 125, 125, 64)      18496

 batch_normalization_1 (Batc  (None, 125, 125, 64)     256
 hNormalization)

 max_pooling2d_4 (MaxPooling  (None, 62, 62, 64)       0
 2D)

 conv2d_6 (Conv2D)           (None, 60, 60, 128)       73856

 batch_normalization_2 (Batc  (None, 60, 60, 128)      512
 hNormalization)

 max_pooling2d_5 (MaxPooling  (None, 30, 30, 128)      0
 2D)

 flatten_1 (Flatten)         (None, 115200)            0

 dense_3 (Dense)             (None, 128)               14745728

 dropout (Dropout)           (None, 128)               0

 dense_4 (Dense)             (None, 64)                8256

 dropout_1 (Dropout)         (None, 64)                0

 dense_5 (Dense)             (None, 1)                 65

=================================================================
Total params: 14,848,193
Trainable params: 14,847,745
Non-trainable params: 448
_________________________________________________________________
```

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

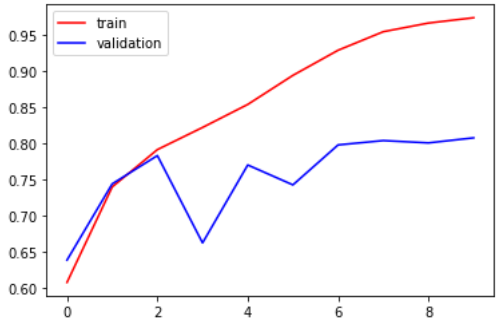
```
history = model.fit(train_ds,epochs=10,validation_data=validation_ds)
```

```
Epoch 1/10
625/625 [==============================] - 71s 112ms/step - loss: 1.2870 - accuracy: 0.6077 - val_loss: 0.6443 - val_accuracy: 0.638
Epoch 2/10
625/625 [==============================] - 70s 112ms/step - loss: 0.5226 - accuracy: 0.7400 - val_loss: 0.5353 - val_accuracy: 0.744
Epoch 3/10
625/625 [==============================] - 71s 113ms/step - loss: 0.4516 - accuracy: 0.7917 - val_loss: 0.4704 - val_accuracy: 0.783
Epoch 4/10
625/625 [==============================] - 70s 111ms/step - loss: 0.3935 - accuracy: 0.8224 - val_loss: 0.7385 - val_accuracy: 0.662
Epoch 5/10
625/625 [==============================] - 70s 111ms/step - loss: 0.3376 - accuracy: 0.8543 - val_loss: 0.5054 - val_accuracy: 0.776
Epoch 6/10
625/625 [==============================] - 70s 112ms/step - loss: 0.2517 - accuracy: 0.8946 - val_loss: 0.8225 - val_accuracy: 0.742
Epoch 7/10
625/625 [==============================] - 70s 112ms/step - loss: 0.1735 - accuracy: 0.9294 - val_loss: 0.5472 - val_accuracy: 0.798
Epoch 8/10
625/625 [==============================] - 70s 111ms/step - loss: 0.1200 - accuracy: 0.9551 - val_loss: 0.6331 - val_accuracy: 0.804
Epoch 9/10
625/625 [==============================] - 70s 111ms/step - loss: 0.0917 - accuracy: 0.9671 - val_loss: 0.6862 - val_accuracy: 0.801
Epoch 10/10
625/625 [==============================] - 70s 111ms/step - loss: 0.0755 - accuracy: 0.9744 - val_loss: 0.7166 - val_accuracy: 0.808
```

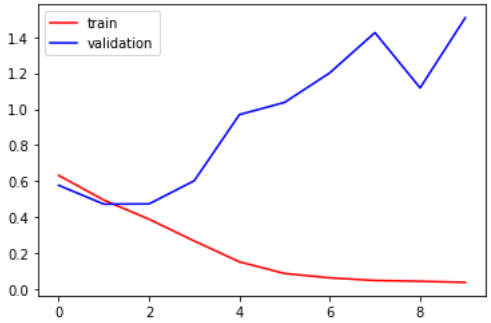
```
import matplotlib.pyplot as plt

plt.plot(history.history['accuracy'],color='red',label='train')
plt.plot(history.history['val_accuracy'],color='blue',label='validation')
plt.legend()
plt.show()
```



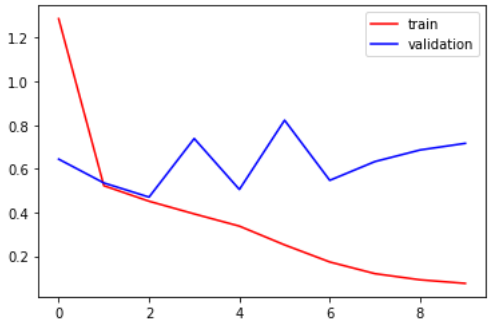

```
plt.plot(history.history['accuracy'],color='red',label='train')
plt.plot(history.history['val_accuracy'],color='blue',label='validation')
plt.legend()
plt.show()
```




```
plt.plot(history.history['loss'],color='red',label='train')
plt.plot(history.history['val_loss'],color='blue',label='validation')
plt.legend()
plt.show()
```

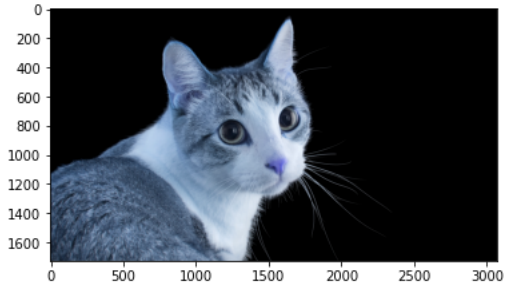



```
plt.plot(history.history['loss'],color='red',label='train')
plt.plot(history.history['val_loss'],color='blue',label='validation')
plt.legend()
plt.show()
```



```
# ways to reduce overfitting

# Add more data
# Data Augmentation -> next video
# L1/L2 Regularizer
# Dropout
# Batch Norm
# Reduce complexity


import cv2


test_img = cv2.imread('/content/cat.jpg')


plt.imshow(test_img)
```

```
<matplotlib.image.AxesImage at 0x7f133882b390>
```




```
test_img.shape
```

```
(1728, 3072, 3)
```

```
test_img = cv2.resize(test_img,(256,256))


test_input = test_img.reshape((1,256,256,3))


model.predict(test_input)
```

```
array([[0.]], dtype=float32)
```