Import

In [1]:

```
import numpy as np
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Conv2D, MaxPooling2D, Dense, Flatten


import random
import matplotlib.pyplot as plt
```

In [2]:

```
import os
print(os.getcwd())
print(os.listdir('imageClassification'))
```

```
/Users/rsn/ML:DL
['labels_test.csv', 'labels.csv', 'input.csv', 'input_test.csv']
```

Adding Dataset

In [3]:

```
X_train = np.loadtxt('imageClassification/input.csv', delimiter=',')
Y_train = np.loadtxt('imageClassification/labels.csv', delimiter=',')

X_test = np.loadtxt('imageClassification/input_test.csv', delimiter=',')
Y_test = np.loadtxt('imageClassification/labels_test.csv', delimiter=',')
```

Reshaping/shaping

In [4]:

```
X_train = X_train.reshape(len(X_train),100,100,3)
Y_train = Y_train.reshape(len(Y_train),1)

X_test = X_test.reshape(len(X_test),100,100,3)
Y_test = Y_test.reshape(len(Y_test),1)
```

In [5]:

```
print("shape of X_train", X_train.shape)
print("shape of Y_train", Y_train.shape)
print("shape of X_test", X_test.shape)
print("shape of Y_train", Y_test.shape)
```

```
shape of X_train (2000, 100, 100, 3)
shape of Y_train (2000, 1)
shape of X_test (400, 100, 100, 3)
shape of Y_train (400, 1)
```

In [6]:

```
# X_train[1,:]
# <!--it shows values ranging upto 255 which is RGB values  -->
```

In [7]:

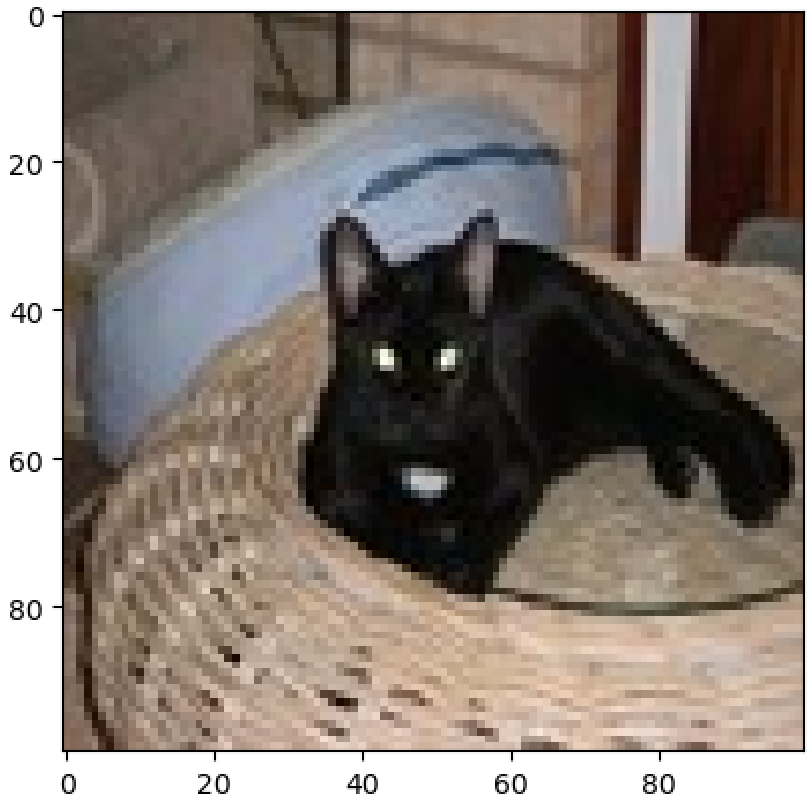
```
X_train = X_train/255.0
X_test = X_test/255.0
# here we divide it with 255 to rescale our value between 0 to 1
```

In [8]:

```
# by using matplotlib we display the image
idx = random.randint(0, len(X_train))
plt.imshow(X_train[idx, :],cmap = "gray")
plt.figure(figsize = (15,2))
plt.show
```

Out[8]:

```
<function matplotlib.pyplot.show(close=None, block=None)>
```



```
<Figure size 1500x200 with 0 Axes>
```

Model....

In [9]:

```
model  = Sequential()
# 1. first layer
model.add(Conv2D(32,(3,3),activation = 'relu',input_shape =(100,100,3)))
model.add(MaxPooling2D(2,2))

# 2. sec layer
model.add(Conv2D(32,(3,3),activation = 'relu'))
model.add(MaxPooling2D(2,2))

# 3.
model.add(Flatten())
# 4.
model.add(Dense(64,activation = 'relu'))
# 5.
model.add(Dense(1, activation = "sigmoid"))
```

```
/Users/rsn/anaconda3/lib/python3.11/site-packages/keras/src/layers/convolutional/base_conv.py:107: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `Input(shape)` object as the first layer in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

Compiling

In [10]:

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

Model Fit

```
In [ ]: model.fit(X_train, Y_train, epochs = 20, batch_size = 64)
```

```
Epoch 1/20
32/32 ━━━━━━━━━━━━━━━━━━━━ 4s 106ms/step - accuracy: 0.4975 - loss: 0.7290
Epoch 2/20
32/32 ━━━━━━━━━━━━━━━━━━━━ 4s 112ms/step - accuracy: 0.6191 - loss: 0.6602
Epoch 3/20
32/32 ━━━━━━━━━━━━━━━━━━━━ 3s 106ms/step - accuracy: 0.6787 - loss: 0.6033
Epoch 4/20
32/32 ━━━━━━━━━━━━━━━━━━━━ 3s 104ms/step - accuracy: 0.7351 - loss: 0.5374
Epoch 5/20
32/32 ━━━━━━━━━━━━━━━━━━━━ 3s 105ms/step - accuracy: 0.7584 - loss: 0.4771
Epoch 6/20
32/32 ━━━━━━━━━━━━━━━━━━━━ 3s 105ms/step - accuracy: 0.8023 - loss: 0.4206
Epoch 7/20
32/32 ━━━━━━━━━━━━━━━━━━━━ 3s 105ms/step - accuracy: 0.8772 - loss: 0.3016
Epoch 8/20
32/32 ━━━━━━━━━━━━━━━━━━━━ 3s 105ms/step - accuracy: 0.9236 - loss: 0.2429
Epoch 9/20
32/32 ━━━━━━━━━━━━━━━━━━━━ 3s 107ms/step - accuracy: 0.9476 - loss: 0.1574
Epoch 10/20
32/32 ━━━━━━━━━━━━━━━━━━━━ 3s 105ms/step - accuracy: 0.9627 - loss: 0.1110
Epoch 11/20
32/32 ━━━━━━━━━━━━━━━━━━━━ 3s 106ms/step - accuracy: 0.9861 - loss: 0.0695
Epoch 12/20
32/32 ━━━━━━━━━━━━━━━━━━━━ 3s 107ms/step - accuracy: 0.9929 - loss: 0.0437
Epoch 13/20
32/32 ━━━━━━━━━━━━━━━━━━━━ 3s 108ms/step - accuracy: 0.9995 - loss: 0.0208
Epoch 14/20
32/32 ━━━━━━━━━━━━━━━━━━━━ 3s 108ms/step - accuracy: 1.0000 - loss: 0.0141
Epoch 15/20
11/32 ━━━━━━━━━━━━━━━━━━━━ 2s 116ms/step - accuracy: 1.0000 - loss: 0.0078
```

Test accuracy

```
In [ ]: model.evaluate(X_test, Y_test)
```

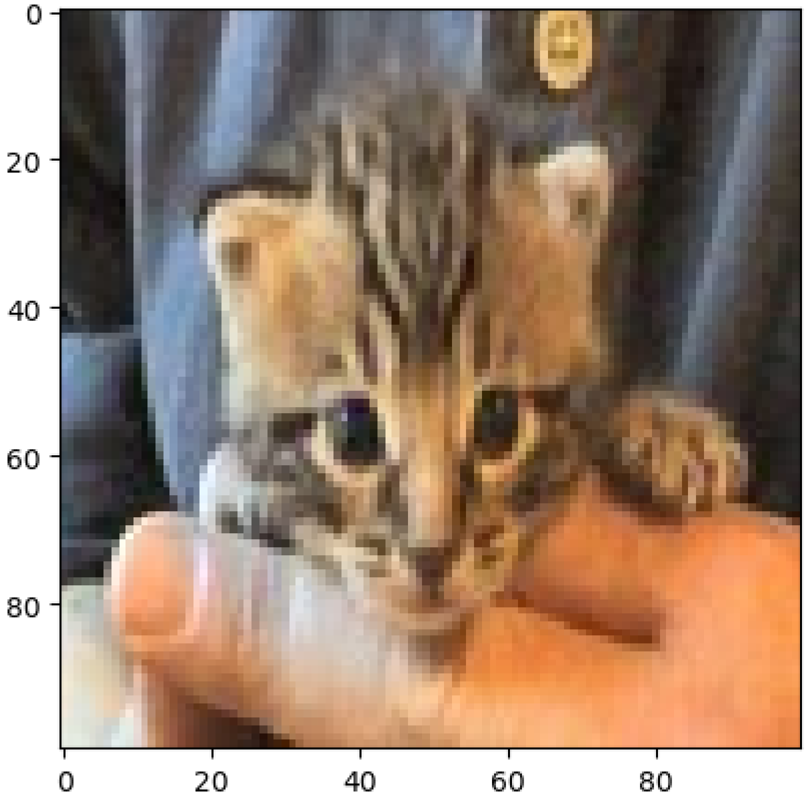
Prediction

```
In [19]: xyz = random.randint(0,len(Y_test))
         plt.imshow(X_test[xyz, :])
         plt.show()

         y_pred = model.predict(X_test[xyz, : ].reshape(1,100,100,3))

         y_pred = y_pred > 0.5
         if(y_pred == 0):
             pred = 'Dog'
         else:
             pred = 'Cat'

         print("This is a",pred)
```



```
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 8ms/step
This is a Cat
```

In [ ]:

In [ ]:

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