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20K-0134

BAI-7A

CV Lab 08 - Lab Tasks

Task 01

In [4]:

```
# First ran it for train01.mp4 and then for train02.mp4
import cv2
import numpy as np

name = input("Enter your name: ")
num = 300  # Number of frames to be taken
face_data = []

# Init Camera
cap = cv2.VideoCapture("train02.mp4")  # Video location or 0 for video stream
        
# Instantiate the cascade_classifier with file name
face_cascade = cv2.CascadeClassifier("haarcascade_frontalface_alt.xml")
while num > 0:
    ret, frame = cap.read()

    if not ret:
        print("Error reading frame. Skipping...")
        continue

    # Find all the faces in the frame
    faces = face_cascade.detectMultiScale(frame, 1.3, 5)  # Frame, scaling fac
    faces = sorted(faces, key=lambda x: x[2] * x[3], reverse=True)
    faces = faces[:1]
    for (x, y, w, h) in faces:
        face_selection = frame[y:y + h, x:x + w]  # Area of interest
        cv2.imshow("Face_selection", face_selection)
        face_selection = cv2.resize(face_selection, (100, 100))
        print(face_selection.shape)
        face_data.append(face_selection)

        cv2.rectangle(frame, (x, y), (x + w, y + h), (0, 255, 0), 3)  # Frame,

        num -= 1

    cv2.imshow("Video frame", frame)

    # Wait for user to stop
    key_pressed = cv2.waitKey(1) & 0xFF
    if key_pressed == ord('q'):
        break

face_data = np.array(face_data)
print(face_data.shape)

# Convert face list array into numpy array
face_data = face_data.reshape((face_data.shape[0], -1))
print(face_data.shape)
np.save(name, face_data)

cap.release()
cv2.destroyAllWindows()
```

```
Enter your name: manahil
(100, 100, 3)
(100, 100, 3)
(100, 100, 3)
(100, 100, 3)
(100, 100, 3)
(100, 100, 3)
(100, 100, 3)
(100, 100, 3)
(100, 100, 3)
(100, 100, 3)
(100, 100, 3)
(100, 100, 3)
(100, 100, 3)
(100, 100, 3)
(100, 100, 3)
(100, 100, 3)
(100, 100, 3)
(100, 100, 3)
(100, 100, 3)
```

In [4]:

```
import os
from sklearn.neighbors import KNeighborsClassifier
from sklearn.preprocessing import LabelEncoder
```

In [5]:
```
files = [faces for faces in  os.listdir('datasets') if faces.endswith('.npy') ]
names = [faces[:-4] for faces in files]
label_encoder = LabelEncoder()
names = label_encoder.fit_transform(names)

print(names)

face_data = []

for filename in files:
    data = np.load('datasets/' + filename)
    print(data.shape)
    face_data.append(data)

face_data=np.array(face_data)
print(face_data.shape)
print(names)
face_data = np.concatenate(face_data ,axis = 0)
print(face_data.shape)
names = np.repeat(names ,300)
print(names.shape)
names = names.reshape((names.shape[0],1))
print(names.shape)
# dataset = np.hstack((face_data, names))
dataset = np.hstack((face_data, names.reshape(-1, 1)))
print(dataset.shape)
```

```
[0 1]
(300, 30000)
(300, 30000)
(2, 300, 30000)
[0 1]
(600, 30000)
(600,)
(600, 1)
(600, 30001)
```

In [6]:
```
face_pred=KNeighborsClassifier()
```

In [7]:
```
face_pred.fit(dataset[:, :-1], dataset[:, -1])
```

Out[7]:
```
KNeighborsClassifier()
```

In a Jupyter environment, please rerun this cell to show the HTML representation or trust the notebook.
On GitHub, the HTML representation is unable to render, please try loading this page with nbviewer.org.

In [13]:
```
cap = cv2.VideoCapture('test.mp4')  # video location or 0 for video stream fron
face_cascade = cv2.CascadeClassifier('haarcascade_frontalface_alt.xml')

while True:
    ret, frame = cap.read()  # Status, Frame
    if not ret:
        break  # Break the loop when there are no more frames

    # Find All the faces in the frame
    faces = face_cascade.detectMultiScale(frame, 1.3, 5)  # Frame, scaling fact

    for face in faces:
        x, y, w, h = face
        face_selection = frame[y:y + h, x:x + w]
        face_selection = cv2.resize(face_selection, (100, 100))
        face_cropped = face_selection.reshape((1, -1))

        # pred = face_pred.predict(face_cropped)
        pred = face_pred.predict(face_cropped)
        pred = label_encoder.inverse_transform(pred)

        cv2.rectangle(frame, (x, y), (x + w, y + h), (0, 255, 0), 5)  # Frame,
        cv2.putText(frame, pred[0], (x, y), cv2.FONT_HERSHEY_SIMPLEX, 1, (255,

    cv2.imshow("Feed", frame)

    key = cv2.waitKey(1) & 0xFF
    if key == ord('q'):
        break  # Break the loop if 'q' is pressed

cap.release()
cv2.destroyAllWindows()
```

Task 02

In [1]:
```
import numpy as np
import random
import matplotlib.pyplot as plt
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Conv2D, MaxPooling2D, Dense, Flatten
```

In [2]:
```
!pip install tensorflow
```

```
Collecting tensorflow
  Obtaining dependency information for tensorflow from https://files.python
hosted.org/packages/80/6f/57d36f6507e432d7fc1956b2e9e8530c5c2d2bfcd8821bcbf
ae271cd6688/tensorflow-2.14.0-cp311-cp311-win_amd64.whl.metadata (https://f
iles.pythonhosted.org/packages/80/6f/57d36f6507e432d7fc1956b2e9e8530c5c2d2b
fcd8821bcbfae271cd6688/tensorflow-2.14.0-cp311-cp311-win_amd64.whl.metadat
a)
  Downloading tensorflow-2.14.0-cp311-cp311-win_amd64.whl.metadata (3.3 kB)
Collecting tensorflow-intel==2.14.0 (from tensorflow)
  Obtaining dependency information for tensorflow-intel==2.14.0 from http
s://files.pythonhosted.org/packages/ad/6e/1bfe367855dd87467564f7bf9fa14f3b1
7889988e79598bc37bf18f5ffb6/tensorflow_intel-2.14.0-cp311-cp311-win_amd64.w
hl.metadata (https://files.pythonhosted.org/packages/ad/6e/1bfe367855dd8746
7564f7bf9fa14f3b17889988e79598bc37bf18f5ffb6/tensorflow_intel-2.14.0-cp311-
cp311-win_amd64.whl.metadata)
  Downloading tensorflow_intel-2.14.0-cp311-cp311-win_amd64.whl.metadata
(4.8 kB)
Collecting absl-py>=1.0.0 (from tensorflow-intel==2.14.0->tensorflow)
  Obtaining dependency information for absl-py>=1.0.0 from https://files.py
```

In [2]:
```
X_train = np.loadtxt(r'C:\Users\ABC\Desktop\BAI\BAI-S7\CV Lab\Lab 08\Lab -08\in
Y_train = np.loadtxt(r'C:\Users\ABC\Desktop\BAI\BAI-S7\CV Lab\Lab 08\Lab -08\la
X_test = np.loadtxt(r'C:\Users\ABC\Desktop\BAI\BAI-S7\CV Lab\Lab 08\Lab -08\inp
Y_test = np.loadtxt(r'C:\Users\ABC\Desktop\BAI\BAI-S7\CV Lab\Lab 08\Lab -08\lab
```

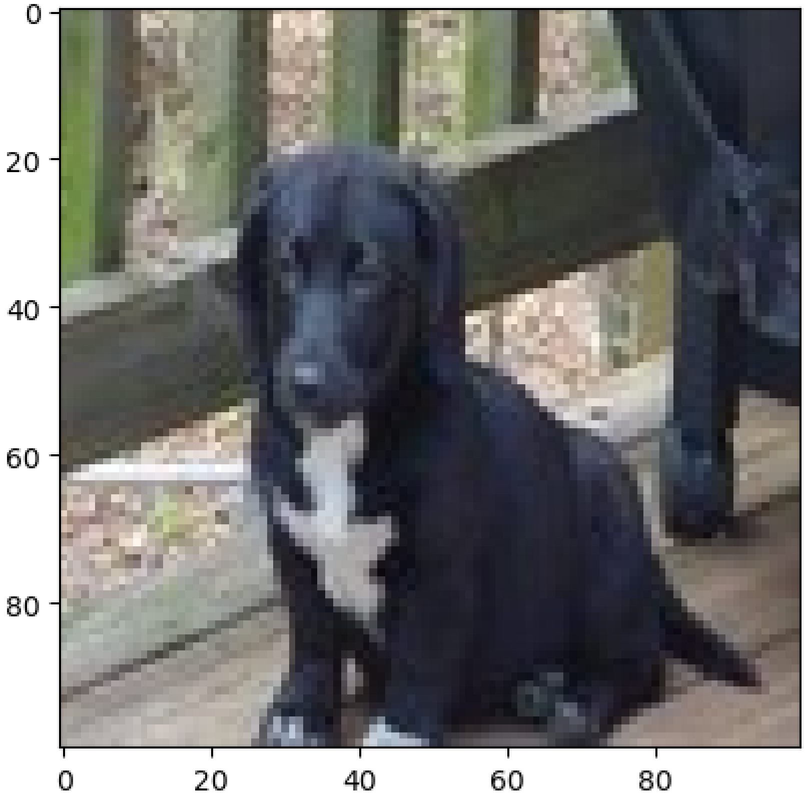
In [3]:
```
X_train = X_train.reshape(len(X_train), 100, 100, 3)
Y_train = Y_train.reshape(len(Y_train), 1)

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

X_train = X_train/255.0
X_test = X_test/255.0
```

In [4]:
```
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_test: ", 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_test:  (400, 1)
```

In [5]:

```
idx = random.randint(0, len(X_train))
plt.imshow(X_train[idx, :])
plt.show()
```



In [6]:

```
model = Sequential([
    Conv2D(32, (3,3), activation = 'relu', input_shape = (100, 100, 3)),
    MaxPooling2D((2,2)),

    Conv2D(32, (3,3), activation = 'relu'),
    MaxPooling2D((2,2)),

    Flatten(),
    Dense(64, activation = 'relu'),
    Dense(1, activation = 'sigmoid')
])
```

In [7]:

```
model = Sequential()

model.add(Conv2D(32, (3,3), activation = 'relu', input_shape = (100, 100, 3)))
model.add(MaxPooling2D((2,2)))

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

model.add(Flatten())
model.add(Dense(64, activation = 'relu'))
model.add(Dense(1, activation = 'sigmoid'))
```

In [8]:
```
model.compile(loss = 'binary_crossentropy', optimizer = 'adam', metrics = ['ac
```

In [9]:
```
model.fit(X_train, Y_train, epochs = 10, batch_size = 64)
```

```
Epoch 1/10
32/32 [==============================] - 15s 429ms/step - loss: 0.7481 - accu
racy: 0.4985
Epoch 2/10
32/32 [==============================] - 15s 453ms/step - loss: 0.6932 - accu
racy: 0.5010
Epoch 3/10
32/32 [==============================] - 15s 461ms/step - loss: 0.6931 - accu
racy: 0.5010
Epoch 4/10
32/32 [==============================] - 15s 465ms/step - loss: 0.6923 - accu
racy: 0.5335
Epoch 5/10
32/32 [==============================] - 18s 566ms/step - loss: 0.6797 - accu
racy: 0.5820
Epoch 6/10
32/32 [==============================] - 16s 504ms/step - loss: 0.6629 - accu
racy: 0.6115
Epoch 7/10
32/32 [==============================] - 16s 498ms/step - loss: 0.6272 - accu
racy: 0.6560
Epoch 8/10
32/32 [==============================] - 16s 512ms/step - loss: 0.5712 - accu
racy: 0.7065
Epoch 9/10
32/32 [==============================] - 16s 508ms/step - loss: 0.5181 - accu
racy: 0.7405
Epoch 10/10
32/32 [==============================] - 15s 467ms/step - loss: 0.4436 - accu
racy: 0.7835
```

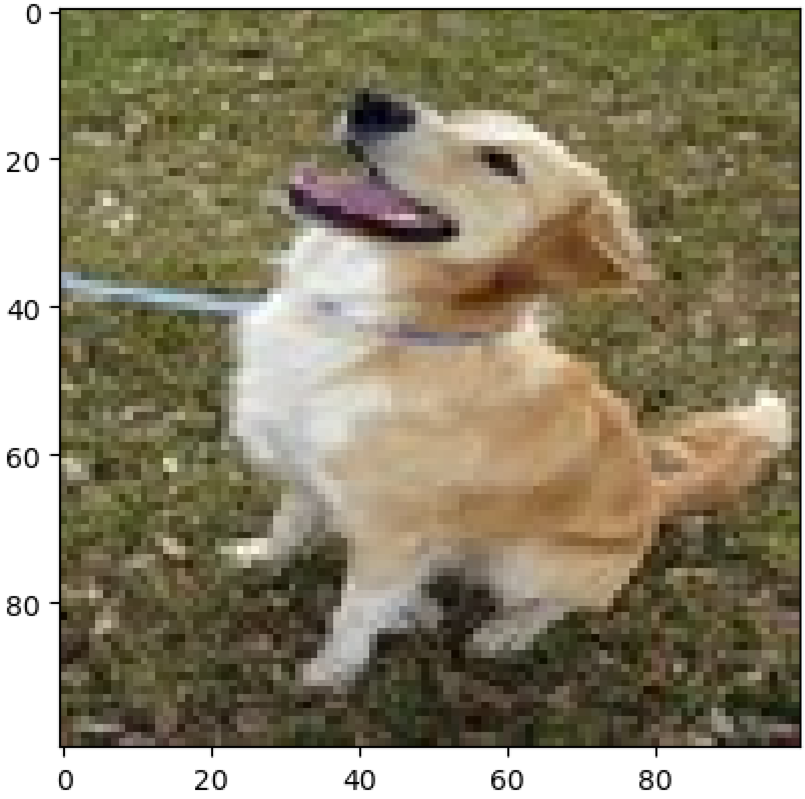
Out[9]:
```
<keras.src.callbacks.History at 0x2261e2f2950>
```

In [10]:
```
model.evaluate(X_test, Y_test)
```

```
13/13 [==============================] - 1s 54ms/step - loss: 0.6335 - accura
cy: 0.6925
```

Out[10]:
```
[0.6335276961326599, 0.6924999952316284]
```

In [11]:
```
idx2 = random.randint(0, len(Y_test))
plt.imshow(X_test[idx2, :])
plt.show()

y_pred = model.predict(X_test[idx2, :].reshape(1, 100, 100, 3))
y_pred = y_pred > 0.5

if(y_pred == 0):
    pred = 'dog'
else:
    pred = 'cat'

print("Our model says it is a :", pred)
```



```
1/1 [==============================] - 0s 408ms/step
Our model says it is a : dog
```