Name: Drumil Kotecha

Roll no. C052

Sem: XII BTI

Aim

Task 1: resize the given in multiples of 8

Task 2: Determine HoG features for 8x8 pixels per cell and 2x2 cells per block

Task 3: Visualize HoG features

Task 4: Change parameter values and observe the effects

In [22]:
```python
import numpy as np
import cv2
import matplotlib.pyplot as plt
from skimage.color import rgb2gray
from skimage.io import imread
from matplotlib.pyplot import imshow
from skimage.transform import resize
from skimage.feature import hog
from skimage import exposure #Just for enhancement
```

In [18]:
```python
image = imread('cat.png')
plt.imshow(image)
```

Out[18]: <matplotlib.image.AxesImage at 0x2396755bf50>

```
In [16]:  image.shape
```

```
Out[16]:  (733, 490, 3)
```

```
In [20]:  image = resize(image,(728,488))
          image.shape
```
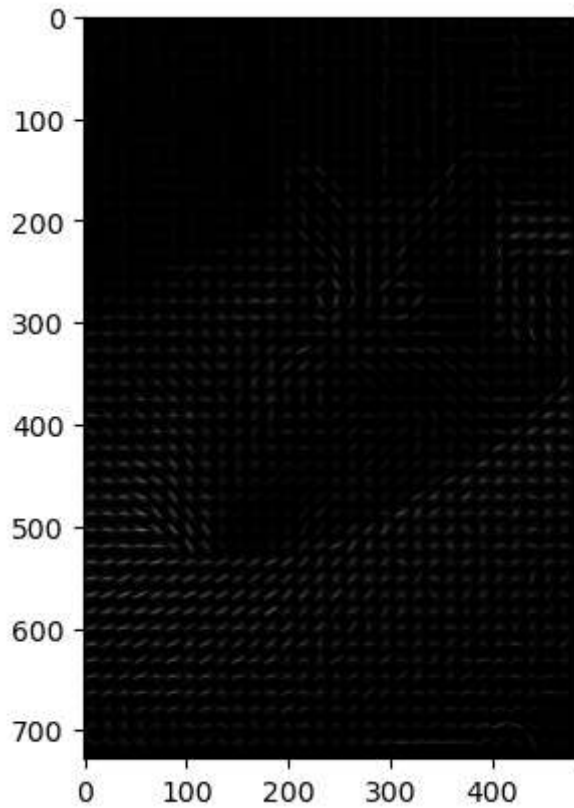
```
Out[20]:  (728, 488, 3)
```

```
In [80]:  img1 = image
          fd1, hog_img1 = hog(img1, orientations = 9, pixels_per_cell = (16,16), cells_per_block
          len_fd1 = len(fd1)
          len_fd1
```

```
Out[80]:  1036800
```

```
In [76]:  plt.imshow(hog_img1, cmap='gray')
```

```
Out[76]:  <matplotlib.image.AxesImage at 0x23975b28d90>
```
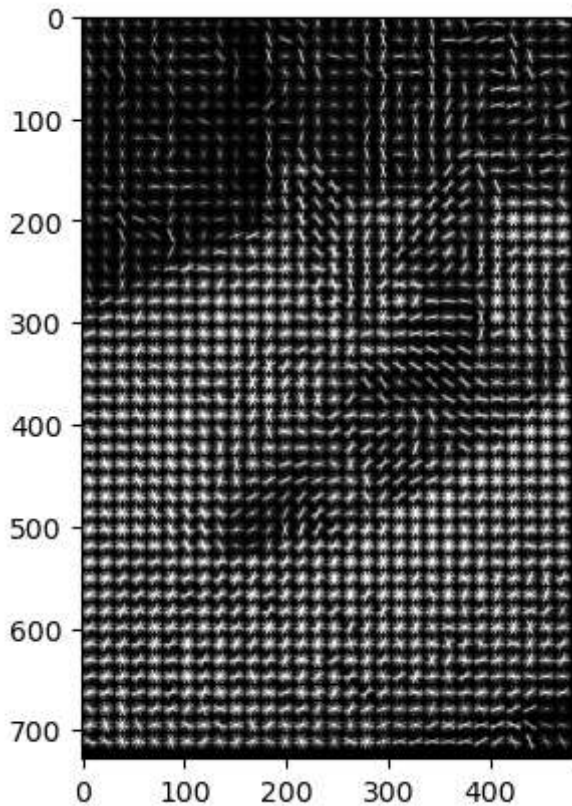
```
In [79]:  # pl_2,pl_90=np.percentile(hog_img1,(2,90))
          # hog_img1_enh=exposure.rescale_intensity(hog_img1,in_range=(pl_2,pl_90))
          # fig, axs = plt.subplots(1, 2, figsize=(15, 15))

          # axs[0].imshow(hog_img1_enh, cmap='gray')
          # axs[1].imshow(hog_img1_enh)
```

```
In [78]:  pl_2,pl_90=np.percentile(hog_img1,(2,90))
          hog_img1_enh=exposure.rescale_intensity(hog_img1,in_range=(pl_2,pl_90))
          plt.imshow(hog_img1_enh, cmap='gray')
```

```
Out[78]:  <matplotlib.image.AxesImage at 0x239783d5ad0>
```

Conclusion

HOG is applied to determine feature descriptor of given image = 'cat.png'. Parameters used for this are

pixels_per_cell = (8,8)

cells_per_block = (24,24),

number of orientations = 9,

Range of percentile to enhance HOG = 2 -> 90% for this combination length of feature vector = 1,94,400

To reduce effect of finer details like the basket of given image, cell size increased from (8,8) -> (16.16) and block size is increased (2,2) -> (16,16).

In [81]:
```python
pushpa = imread('pushpa.jpg')
plt.imshow(pushpa)
```

Out[81]: `<matplotlib.image.AxesImage at 0x23976698d90>`

```
In [83]: pushpa.shape
```

```
Out[83]: (353, 236, 3)
```

```
In [84]: pushpa_resize = resize(pushpa,(352,232))
         pushpa_resize.shape
```
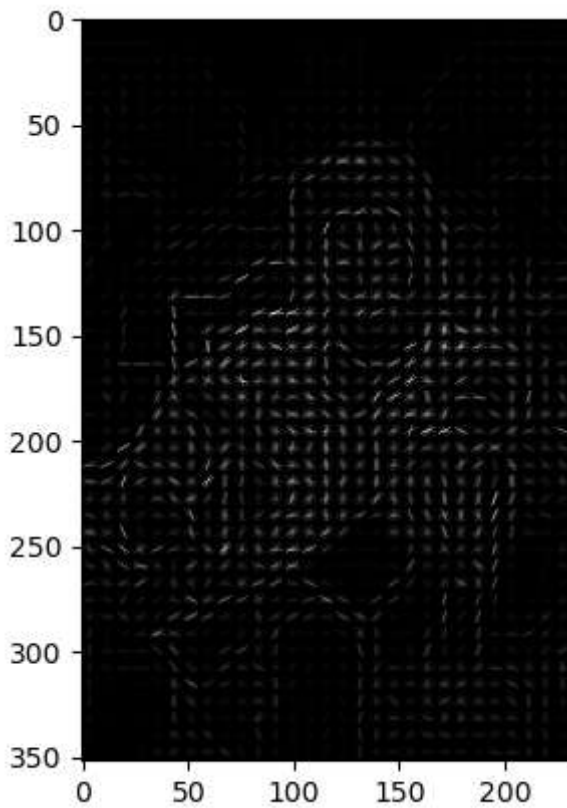
```
Out[84]: (352, 232, 3)
```

```
In [95]: img2 = pushpa_resize
         fd2, hog_img2 = hog(img2, orientations = 9, pixels_per_cell = (8,8), cells_per_block =
         len_fd2 = len(fd2)
         len_fd2
```
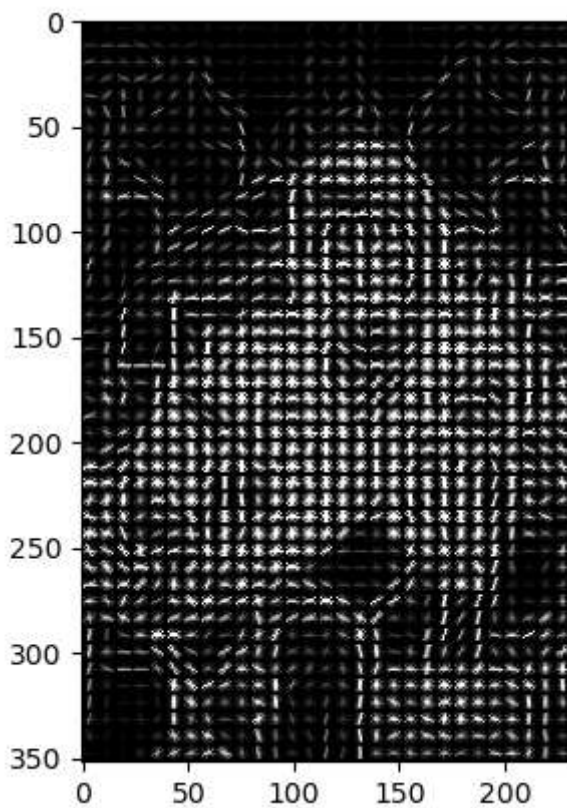
```
Out[95]: 43344
```

```
In [96]: plt.imshow(hog_img2, cmap='gray')
```

```
Out[96]: <matplotlib.image.AxesImage at 0x23977e8bf50>
```

In [97]:
```python
pl_2,pl_98=np.percentile(hog_img1,(2,98))
hog_img2_enh=exposure.rescale_intensity(hog_img2,in_range=(pl_2,pl_98))
plt.imshow(hog_img2_enh, cmap='gray')
```

Out[97]: <matplotlib.image.AxesImage at 0x2397bb65ad0>

In [104…
```python
fig, axs = plt.subplots(1, 3, figsize=(15, 15))

axs[0].imshow(pushpa, cmap='gray')
axs[0].set_title('Original Image')

axs[1].imshow(hog_img2, cmap='gray')
axs[1].set_title('HOG')

axs[2].imshow(hog_img2_enh, cmap='gray')
axs[2].set_title('Enhanced HOG')
```

Out[104]:   Text(0.5, 1.0, 'Enhanced HOG')