EXPT NO: 6	SIFT AND HOG FEATURES FOR IMAGE ANALYSIS
DATE: 22/08/2025	

AIM:

To perform the Utilization of SIFT and HOG features for image analysis.

ALGORITHM:

1. Read image and convert to grayscale.
2. Initialize **SIFT/HOG detector** (cv2.SIFT_create(), cv2.HOGDescriptor()).
3. Detect keypoints and **compute descriptors**.
4. Draw **keypoints** on the image.
5. Display or store the **extracted features**.
6. Use features for **comparison or matching.**

CODE:

```
import cv2
import matplotlib.pyplot as plt
from skimage.feature import hog
from skimage import color

# ----------- SIFT -------------------
img = cv2.imread('/content/drive/MyDrive/input.jpg')

# Check if image was loaded successfully
if img is None:
    print("Error: Could not load image from the specified path. Please check
the file path and ensure the image exists.")
else:
    gray = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)

    # SIFT detector
```

```
    sift = cv2.SIFT_create()
    keypoints, descriptors = sift.detectAndCompute(gray, None)

    # Draw keypoints
    sift_img = cv2.drawKeypoints(img, keypoints, None,
flags=cv2.DRAW_MATCHES_FLAGS_DRAW_RICH_KEYPOINTS)

    # ------------------ HOG -----------
    # Convert to grayscale for HOG
    gray_hog = color.rgb2gray(cv2.cvtColor(img, cv2.COLOR_BGR2RGB))

    # Compute HOG features and visualization
    hog_features, hog_img = hog(gray_hog, orientations=9, pixels_per_cell=(8,
8),
                                cells_per_block=(2, 2), visualize=True,
channel_axis=None)

    # ------------------ Display Results -----------
    plt.figure(figsize=(10,5))

    plt.subplot(1,2,1)
    plt.imshow(cv2.cvtColor(sift_img, cv2.COLOR_BGR2RGB))
    plt.title("SIFT Features")
    plt.axis('off')

    plt.subplot(1,2,2)
    plt.imshow(hog_img, cmap='gray')
    plt.title("HOG Features")
    plt.axis('off')

    plt.show()
```

OUTPUT:

RESULT:

Thus, Utilization of SIFT and HOG features for image analysis was implemented successfully.