

## COMPUTER VISION LAB-IV

NAME: KHUSHI AGRAWAL

ROLL NO.: 191020429

BRANCH: DSAI

### SYSTEM CONFIGURATION

- DISTRIB\_ID = ManjaroLinux
- DISTRIB\_RELEASE = 21.1.1
- RAM GB: 16

### AIM

The purpose of the lab work is to perform the WAP for feature extraction using SIFT, SURF, BRIEF and ORB and test each program for any 3-5 images from all given dataset. Also,

- Test the above methods on both grayscale and color images.
- Tilt the images to a certain degree over any axis, and test the methods.
- Write the analysis at last depending upon the results obtained in the above 2 cases.

### FILE STRUCTURE

Consists of the following files and folders:

- **images/**: Contains input image folders (**lwf** & **MSRA-Images**) and the **output/** folder.
- **ques1/**: Code I implemented for question 1.
- **ques2.py**: Implementation of question 2.

*Note: All the programs are implemented in OpenCV-Python with the help NumPy's support.*

*Dependencies:*

- *OpenCV: 4.5.3*
- *NumPy: 1.21.2*

**PERFORM SIFT, SURF, BRIEF AND ORB FEATURE EXTRACTIONS IN COLORED AND GRAY-SCALE IMAGE.**

**USING MSRA DATASET**

**COLORED IMAGE**



**GRAY-SCALE IMAGE**



**USING SIFT**



**USING SURF**

SURF IS DEPRECIATED IN OPENCV-4.5.x

Link for description: <https://github.com/opencv/opencv-python/issues/126>

Traceback (most recent call last):

File `"/home/khushi/Documents/college/cv/191020429_Khushi-Agrawal_DSAI/ques1/surf_brief_orb.py"`, line 23, in `<module>`

`surf = cv2.xfeatures2d.SURF_create()`

`cv2.error: OpenCV(4.5.4-dev) /tmp/pip-req-build-iefu5nf2/opencv_contrib/modules/xfeatures2d/src/surf.cpp:1027: error: (-213:The function/feature is not implemented) This algorithm is patented and is excluded in this configuration; Set OPENCV_ENABLE_NONFREE CMake option and rebuild the library in function 'create'`

## USING BRIEF



## USING ORB



**USING LWF DATASET IMAGE-I****COLORED IMAGE****GRAY-SCALE IMAGE****USING SIFT****USING SURF**

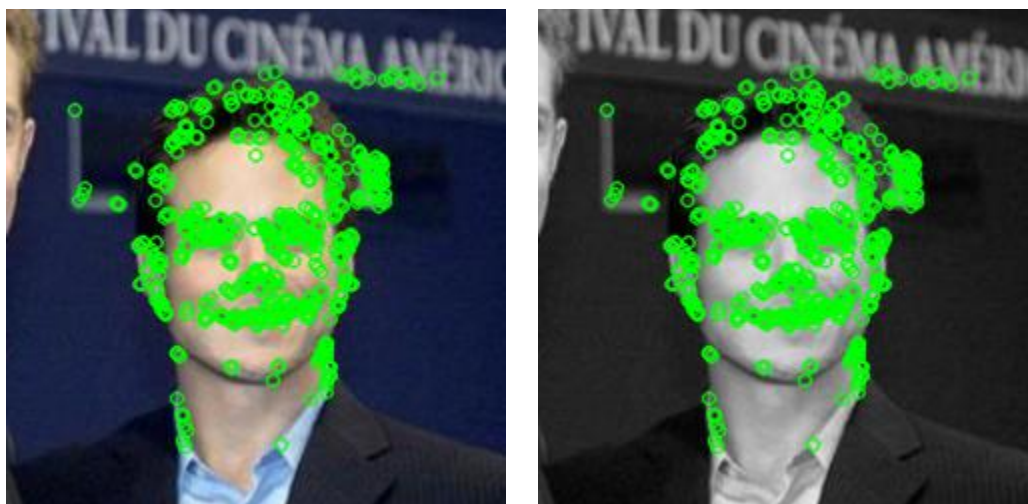
Surf is depreciated in OpenCV 4.5.x. The error is mentioned in above section.

**USING BRIEF**





**USING ORB**



**USING LWF DATASET IMAGE-II**

**COLORED IMAGE**

**GRAY-SCALE IMAGE**



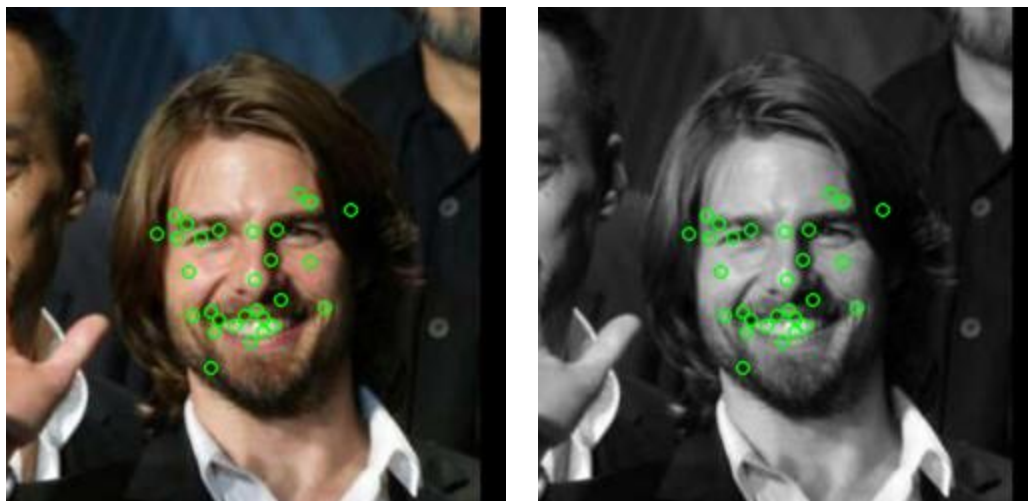
### USING SIFT



### USING SURF

Surf is depreciated in OpenCV 4.5.x. The error is mentioned in above section.

### USING BRIEF



### USING ORB



**TILT THE IMAGES AND USING FEATURE EXTRACTION TECHNIQUES (SIFT, SURF, BRIEF & ORB)**

### USING MSRA DATASET

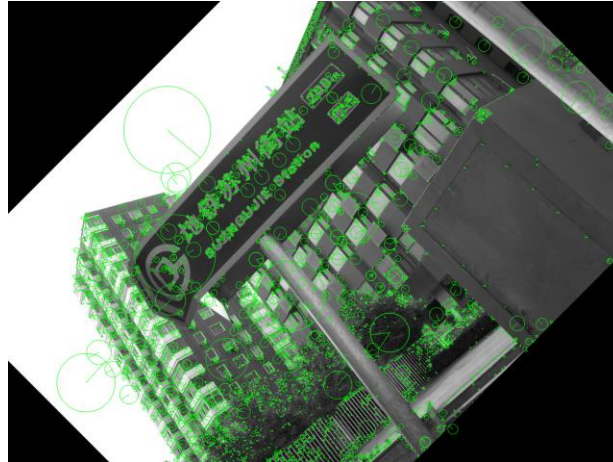
**ROTATED COLORED IMAGE**

**ROTATED GRAY-SCALE IMAGE**





### USING SIFT

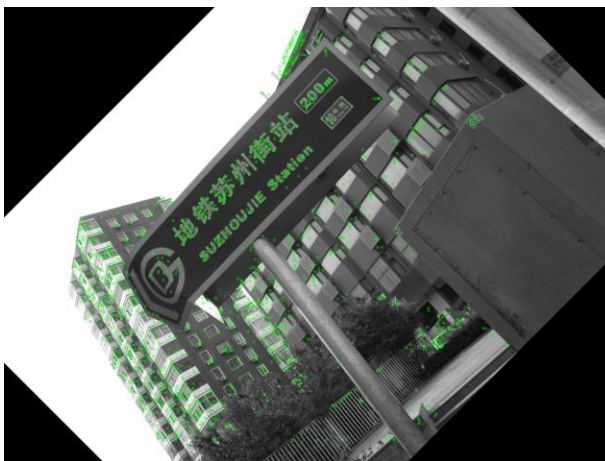


### USING SURF

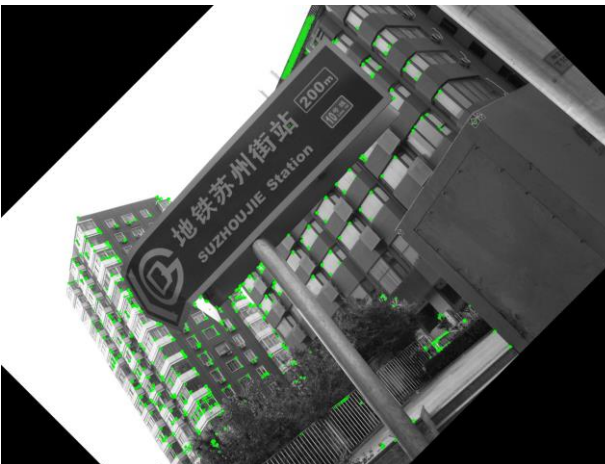
Surf is deprecated in OpenCV 4.5.x. The error is mentioned in above section.

### USING BRIEF





### USING ORB



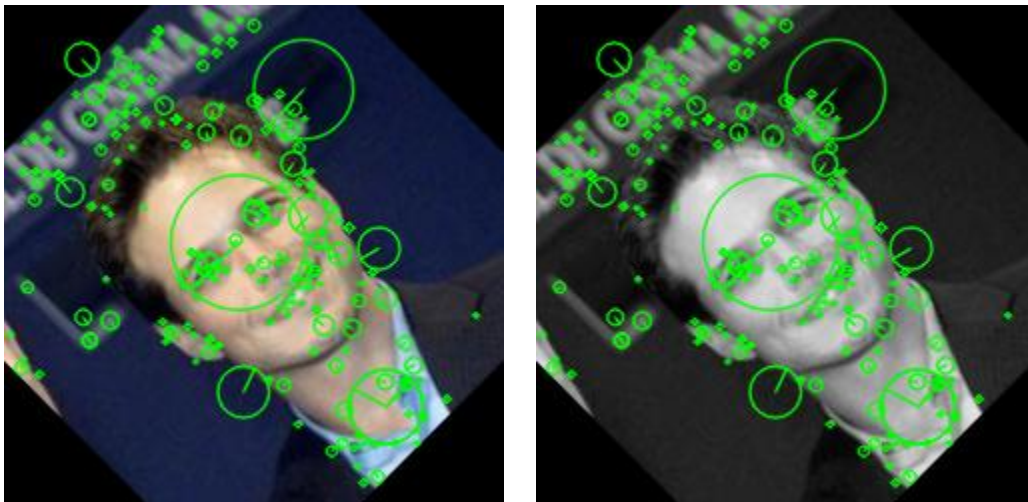
### USING LWF DATASET IMAGE-I

**ROTATED COLORED IMAGE**

**ROTATED GRAY-SCALE IMAGE**



### USING SIFT



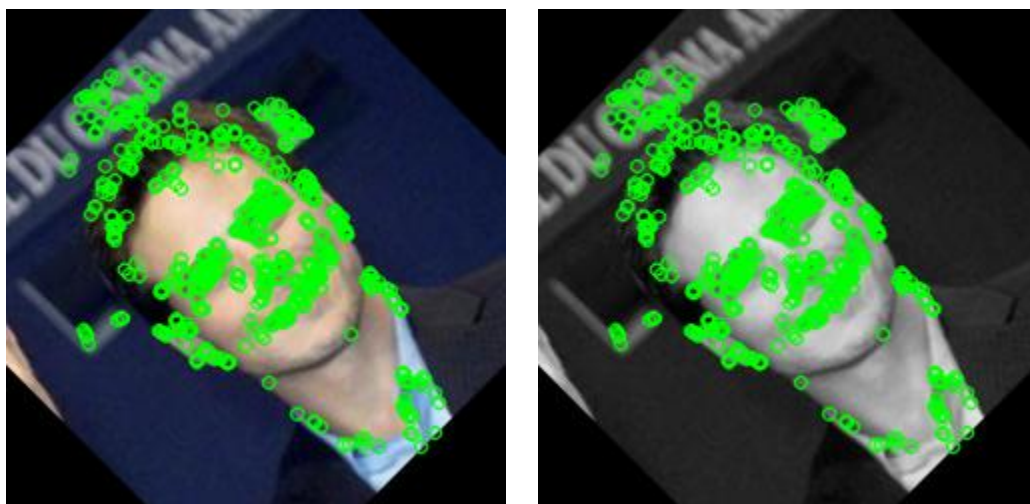
### USING SURF

Surf is depreciated in OpenCV 4.5.x. The error is mentioned in above section.

### USING BRIEF



**USING ORB**



**USING LWF DATASET IMAGE-II**

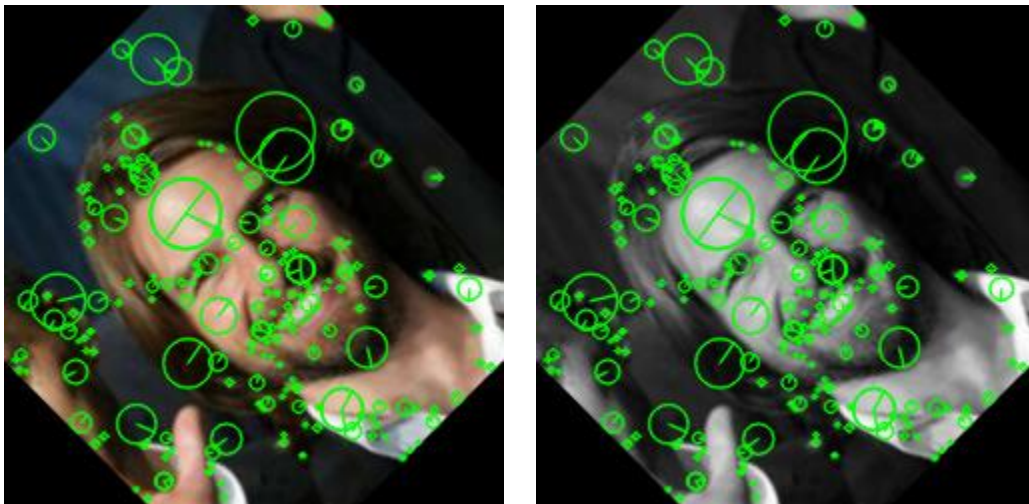
**ROTATED COLORED IMAGE**

**ROTATED GRAY-SCALE IMAGE**





### USING SIFT



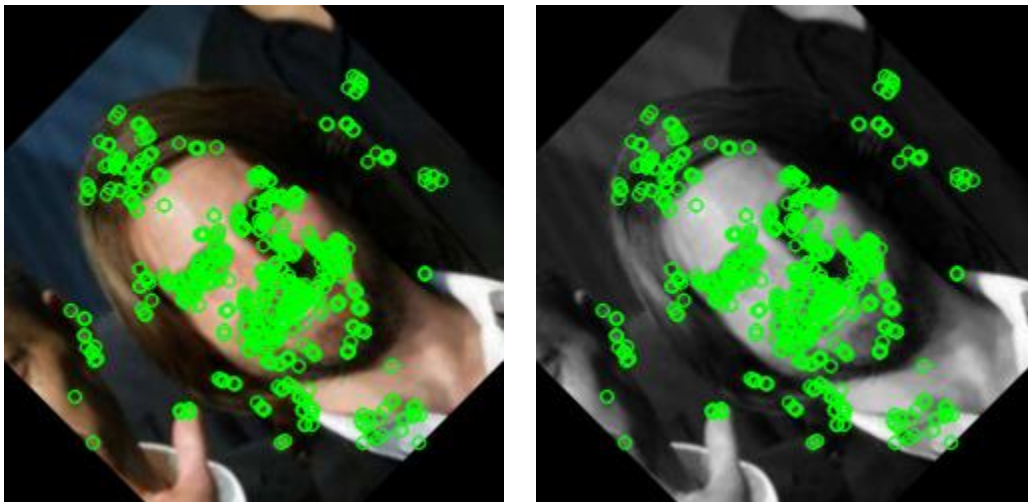
### USING SURF

Surf is depreciated in OpenCV 4.5.x. The error is mentioned in above section.

### USING BRIEF



### USING ORB



### ANALYSIS

- We observe that the SIFT feature extractor provides both key points and the key point descriptors. The detected images have circle which depicts key points/features. The size of the circle represents the strength of the key point and the line inside the circle denotes the orientation of the key point.
- ORB computes fewer key points compared to SIFT, but they are observed to be more effective.
- SIFT gets different key points for the same image when they are rotated. Even the number of detected key points differs.
- ORB gets the same number of key points for both rotated and original images and matches 100%.

- BRIEF and ORB are faster than the other two algorithms.

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