

3D COMPUTER VISION ASSIGNMENT-2

Dataset Description:

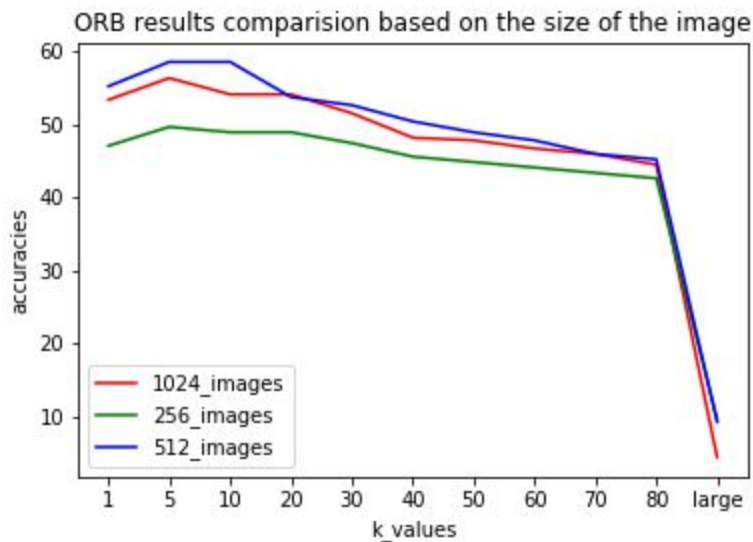
I have collected the dataset based on the following variations:

- A normal straight image
- Image tilted towards the right at an angle
- Image titled towards the left at an angle
- An image which is slightly non-overlapped with the straight image
- Image with high illumination
- Image with low illumination
- A good mixture of day and night images

Converted the size of the image to 256,512 and 1024 keeping the aspect ratio the same.

RESULTS

For ORB:

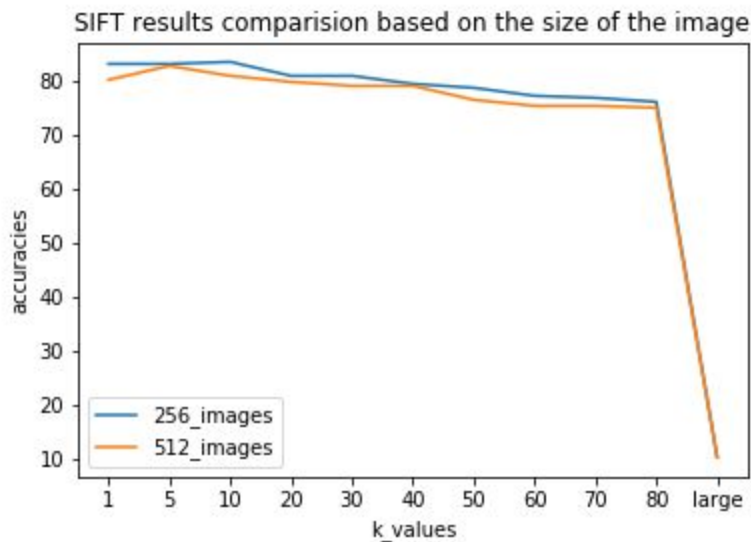


ORB algorithm works best for 512_images. I found no particular reason why it works best for the 512_images. However, the accuracy of this ORB algorithm is very less since it is not robust to the intensity and non-overlapped images.

As we increase the k value(beyond-10), the accuracy decreases irrespective of the size of the image. This might be due to the noise present in the image due to which the keypoint matching gets affected.

The best accuracy was observed at a k_value = 10 for the 512_images which is 58.51851852 %

FOR SIFT:



As compared to ORB I found SIFT is more robust to angle variation, intensity, and nonoverlapping images. Moreover, As the size of the image increases the Accuracy values do not change drastically which proves that SIFT is also robust to the size of the image used.

As we increase the k value(beyond-10), the accuracy decreases irrespective of the size of the image. This might be due to the noise present in the image due to which the keypoint matching gets affected.

The best accuracy was observed at a k value = 10 for 256_images with an accuracy of 83.7037037%

Both SIFT and ORB work really badly for high values of k. The main reason for this is the noise due to which the keypoint matching does not happen correctly.

The computational complexity of SIFT is more than that of ORB. This is due to the dimension of descriptors produced by SIFT is 128 and that of ORB is 32. The size of the descriptor may also be the reason why ORB is not robust to different types of images.

NOTE: I have not performed SIFT on 1024_images due to the above reason

Performance of SIFT:

On illuminated images:

In the low illuminated case, as the illumination becomes lower and lower, the performance also degrades substantially. However, if the image is not complex, SIFT does not show any significant decrease in its accuracy.

In the case of high illuminated images, if the key objects of the image are visible, then the SIFT performs similar to the case of good contrast images. As illumination increases the performance degrades substantially.

On angular images:

I found SIFT to be robust to angular rotation. However, if the complex of the image increases the SIFT does not perform well.

On nonoverlapping images:

SIFT accuracy does not change based on the nonoverlapping of images.