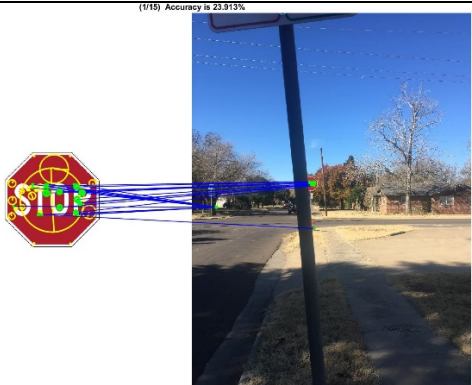Project 4

ECE 5367, Fall 2019

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Both SIFT and SURF methods were used to match a reference stop sign image to a similar stop sign in various images. Accuracy was measured by taking the ratio of matched features to the total number of features in the reference image.

$$\% \ Accurracy = \frac{\# \ of \ matched \ features}{\# \ of \ reference \ features} \times 100 \ \%$$

This measure of accuracy does have its flaws, as matched features are not always correct. However, comparing the relative accuracies of SIFT and SURF provides a good baseline measure for performance. SIFT displayed better matching capabilities with this image set than SURF. Both methods performed poorly with perspective transforms that warped the stop sign significantly.

	Deformation	SIFT Matched Features	SIFT Accuracy	SURF Matched Features	SURF Accuracy
1.	Scale with Occlusion		23.91 %		3.60 %

2.	Scale/Perspective		34.05%		10.81 %
3.	Perspective		36.23%		34.23 %
4.	Scale/Perspective		11.59%		2.70 %

5.	Perspective with shadows		43.47%		12.61 %
6.	Scale/Perspective		5.79%		4.50 %
7.	Scale		63.76%		15.32 %

8.	Scale/Perspective with Occlusion		34.05%		12.61 %
9.	Scale		57.97%		16.22 %
10.	Scale/Perspective		30.43%		11.71 %

11.	Scale/Perspective		28.98%		8.11 %
12.	Scale/Rotation/Perspective		34.06 %		18.92 %
13.	Scale/Rotation/Perspective		50 %		9.91 %

14.	Rotation/Perspective		42.75 %		10.81 %
15.	Scale/Rotation/Perspective		20.29 %		18.018 %