ECEn 631 Motion Field – HW 5
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Task 1

It was found that skipping 10 frames brought the number of found matches to about 50% while flying straight. While the UAV rotated, the number of found matches was between 15-25%. Thus, the videos below were recorded with no skipped frames for the first part, then 10 skipped frames for the second part.

A pyramid level of 3 improved performance in that much more features were found and the optical flow lines were almost all correct, as opposed to some lines that were not pointing in the correct direction when a pyramid level of 0 was used.

Pyramid Level 0:

https://youtu.be/guM5CnTGrhQ

Pyramid Level 3:

https://youtu.be/guM5CnTGrhQ

Task 2

The number of matches once again dropped below about 50% when skipping 10 frames.

This template matching method did not give as accurate results as the pyramid LK method. Many optical flow lines were pointing in various incorrect directions.

https://youtu.be/WkP-Q01t4Tk

Task 3

The video was recorded with matching features between two consecutive frames ($m = 1$) and between 11 consecutive frames ($m = 10$).

Finding matching features across multiple frames greatly improved the accuracy of the template matching method. Also, outliers were removed in this task, removing many incorrect feature matches and optical flow lines.

https://youtu.be/glUPQRdCZ_4