Final Project Milestone Report

Project Title: Bird Nests		Report Date: May 17th, 2015		
Milestones To Date	Description of Deliverables	Due Date	Completion Time/Status	Comments
Get images from NGB camera	NGB images (e4e.ucsd.edu/eric/san_elijo.tar.gz)	End of WK 4	WK 4	Provided by Eric
Understand how to generate NDVI image	NDVI images (See WK4 Update https://github.com/shl202/BirdNest/wiki/Weekly-Updates)	End of WK 4	End of WK 4	Not satisfactory, binary image from threshold the NDVI image returns ~50% white and ~50% black
Implement NIR	NDVI Visualization of search area for ecologists.	End of WK 6	Pending	Since the NDVI images is not satisfactory, we decided to use some machine learning algorithm to further reduce our search area. Hoping to finish this by the end of week 8.
New: Approach to further reduce search area.	Methodology Proposal (See WK5 Update https://github.com/shl202/BirdNest/wiki/Weekly-Updates)	End of WK 5	End of WK 5	See Week 5 update on our wiki page.
New: Collect Training Data	Classified training data for water, rock, grass etc.	End of WK 6	End of WK 7	We have 537 images total as of now, and it is working for the classification method, although more samples the better.
New: Try Classification by texture and train.	Classification Report https://github.com/shl202/BirdNest/blob/master/doc/Classification%20Report.pdf	End of WK 6	End of WK 7 (Late)	The accuracy is good based on our current samples

New: Pipeline our results to eliminate non-bird-nests	A program that combine our classification results	End of WK 6	Pending (Overdue)	Work in progress
Get and analyze thermal images	Thermal images	End of WK 7	Not started	Drop this feature from the scope of this quarter?
Integrate thermal analysis into our search area	Report of how thermal images helps	End of WK 8	Not started	Drop this feature from the scope of this quarter?
Acoustic impact analysis	Acoustic impact analysis	End of WK 8	Pending	Started, will need some measurements from Eric for the acoustic impact of our quadcopters.
Put everything together	Demo on raw images → useful information	End of WK 9	Not started	

Description of Change:

In our last milestone report, we added three new tasks to accomplish for week 6, because our initial result was not satisfactory. I believe that was rather naive think we can add three new tasks to finish in a week so not to delay the overall project progress. Now by the end of week 7, we finished two of the three tasks and are still actively working on the last. After two weeks of learning and applying the machine learning algorithm and extracting data from sample images, we have a working algorithm with a decent sample size, which turn out to have a quite satisfactory accuracy. We plan to use this as another layer of information we can use to find bird's nests. We are considering the following approaches.

1. Location the environment birds build their nests in (namely trees)
    a. Identify and remove dead material from the images (rock, road, water, etc) using NDVI.
    b. Use machine learning algorithm to find leaves among the living material and give them a higher normalized score for the picture.
2. Location unidentified objects and assume there's a chance that's bird nest
    a. Identify and remove living material from the images (leaves, grass, etc) using NDVI.
    b. Use machine learning algorithm to identify and remove road, water, rock, etc.
    c. Assume remaining materials could be bird nests and give them a higher normalized score for the picture.
3. Why not use both?
    a. Use both methods 1 and 2 to find the score of the image.
    b. Use both scores to produce the final result!

From the results we got so far, it seems adding the new tasks are fruitful, however, this put us behind the schedule by quite a bit, which mean we, unfortunately, might need to cut the thermal camera feature (for the scope of this class). Anyhow, here are the plans for the project group members for the remaining weeks to make a final push toward finding bird nests!

Individual Member Plan:

	Cloud	Mike
WK8	Integrate machine learning algorithm on terrain and Near IR together to reduce search area.	Help Cloud with integrating machine learning algorithm on terrain and Near IR together.
	Score the images.	Help with scoring the images.
		Start acoustic impact report.
WK9	Fine Tune	Finish acoustic impact report
	Prepare Demo	Fine Tune (a lot)
		Prepare Demo
WK10	Present	Present