Where's my Sheep?
Research project in collaboration with biologists and farmers to look at automatically detecting sheep from aerial imagery.

Report Name	Project Outline
Author (User Id)	Nathan Williams (naw21)
Supervisor (User Id)	Fred Labrosse (ffl)
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1 Project Description

Locate and count sheep in ariael images from rededge camera, with rgb, infrared, rededge layers. Sheep are a simple step to begin with as most are white, but we should consider more genral approaches so we can identify darker coloured sheep also, this would leave room to identify other darker coloured mammels such as deer or cows. In the ariael images the scale is 10cm per pixel approximatly, so each sheep only 20-30 pixels of an image, but this can vary based on the height of the flight. We also have landscape images taken from the ground, can we use the same methods to identify sheep in these images?

- Can we get a method to work on white sheep, if we can does it also work on brown sheep?

- Can we get it to work on other animals?

- What colour spectrums are most useful when identifying the sheep, could we combine layers?

- What happens when sheep move between stitched images?

Tools and workflow

- QGIS to view images

- Python, OpenCV to process images

- Tensorflow to train model

- Jira scumban

- github repository, wiki for meeting notes and blog/log

2 Proposed Tasks

1. Attempt two basic computer vision methods thresholding or template matching to identify sheep.

2. Write tests to determine failure point for these methods. e.g brightly lit backgrounds

3. Write tests to identify which colour spectrums make the sheep more obvious and get us the most use out of these methods.

4. Look into using a machine learning approach by training a model and giving it an image to try.

5. Write tests to identify how good machine learning attempt is compared to the previous attempts.

6. Write tests to guage effectivness on other mammals e.g deer, cows.

Similar to face or object detection, find papers related to this that could be adapted to less detailed images. investigate spectral signiture

Figure 1: Project Roadmap
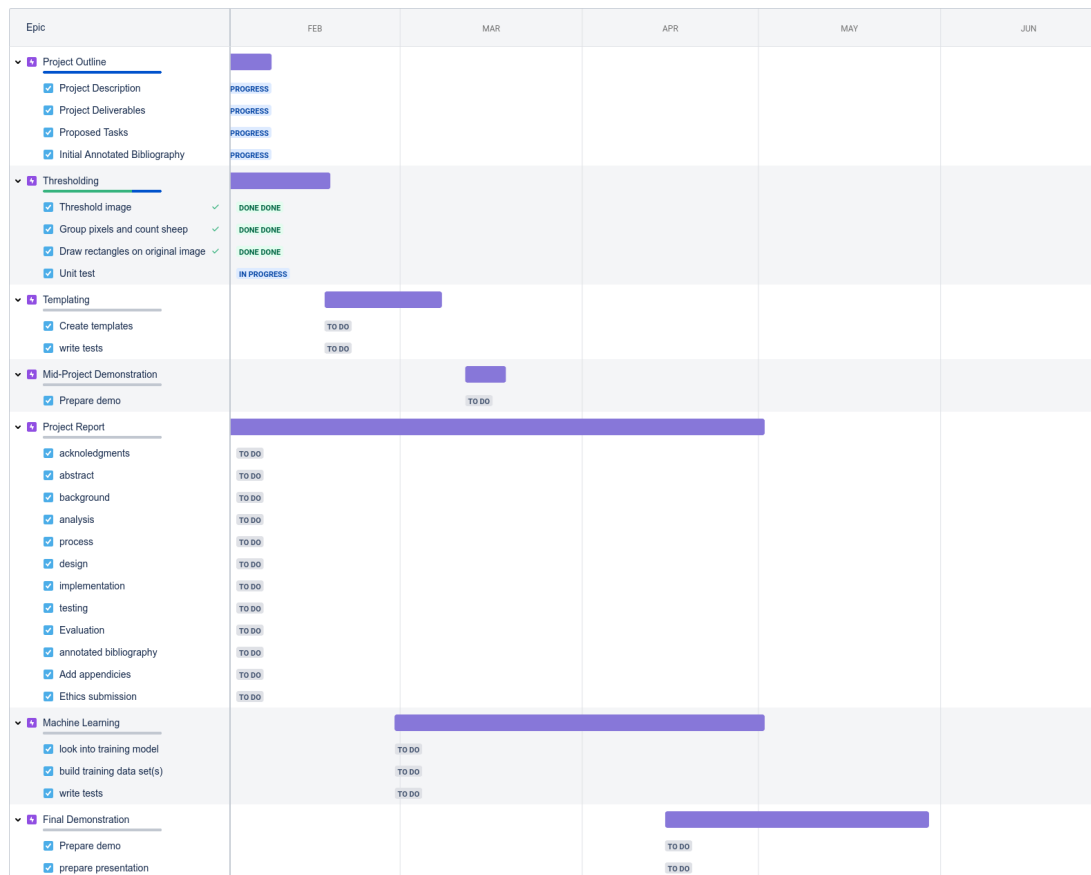
3 Project Deliverables

- Project Outline, this document

- Project Report

- Python OpenCV script with thresholding attempt, for white sheep.

- Python OpenCv script with templating attempt.

- Tests for the thresholding and templating attempt

- Mid project Demo

- Tensorflow model with scripts to apply it to image.

- Tests for the final code

- Final Demo

Annotated Bibliography

[1] Various, "Opencv open source computer vision," https://docs.opencv.org/master/d6/d00/tutorial_py_root.html, Feb. 2020, accessed Feb 2020.

> The primary documentation to all things openCV for loading and saving and manipulating images with ease in python.

[2] ——, "Python 3.8.1 documentation," https://docs.python.org/3/, Feb. 2020, Copyright 2001-2020, Python Software Foundation. Accessed Feb 2020.

> The primary documentation to all things python as I intend to use it as my main programming language in this project.

[3] ——, "Image segmentation, tensorflow," https://www.tensorflow.org/tutorials/images/segmentation, Feb. 2020, creative Commons Attribution 4.0 License, and code samples are licensed under the Apache 2.0 License. Accessed Feb 2020.

> The primary documentation to all things Tensorflow as I intend to use it for image segmentation, other options may be explored.

[4] ——, "Micasense rededge-mx camera," https://www.micasense.com/rededge-mx, Feb. 2020, accessed Feb 2020.

> Information on the camera used on the plane to get the multi band images.

[5] ——, "Atlassian jira," https://www.atlassian.com/software/jira, Feb. 2020, copyright 2020 Atlassian. Accessed Feb 2020.

> Project Issue and Tracking software. I will use this to plan out tasks and track my progress in completing them.

[6] ——, "Git," https://git-scm.com/, Feb. 2020, accessed Feb 2020.

> Version Control System to track changes in the project.

[7] ——, "Github," https://github.com/, Feb. 2020, accessed Feb 2020.

> Repository host for hosting my git repository at a remote location so I don't loose work. Also planning on using the wiki pages as a blog.