Project Title:
Distance Measurement in Sugar Cane Rows to Determine Replantation using Aerial Imagery.

Group Members:

Jose Barreiros	jab879
Jonathan Wu	jzw8

Description:
We want to use a multispectral aerial image in order to extract features such as distance between the sugarcane crops. Under certain bands, clorophilla and vegetation are contrasted better with the soil. With 5 different bands, we can use certain bands to finetune our data collection and determine with better precision the distance between sugarcane crops in a row. With the distance between each crop, we can determine whether or not an area of sugarcane crop should be replanted. The algorithm will segment each sugar cane, calculate the distance between sugarcanes in a row and finally highlight the regions in the aerial image that needs to be replanted.

Algorithm Outline:
1. **Threshold image**
2. **Define rows in image**
3. **Segment image (check for connected regions within same row and label them the same weight if they are the same region). Get area of each region as well**
4. **Threshold regions out that are too small**
5. **Do pre calculations for distance**
    a. **Center of mass**
    b. **Average radial distance**
        i. **Approximate circle for crops**
6. **Calculate distance regions**
    a. **Find regions that need to be replanted**
7. **Draw ellipses from center of the distance regions**

Reference:
http://www.mdpi.com/2072-4292/8/6/500/pdf

Image Data Set:
Aerial imagery of Sugar cane plantation in Ecuador. 100 multispectral images (5 bands), images taken with RedEdge camera and a fixed wing UAV.
Data Link: https://drive.google.com/open?id=0B84VPqHJUVeudmJ1OWtjZmNFOHM