Feature Extraction From Labeled Blobs

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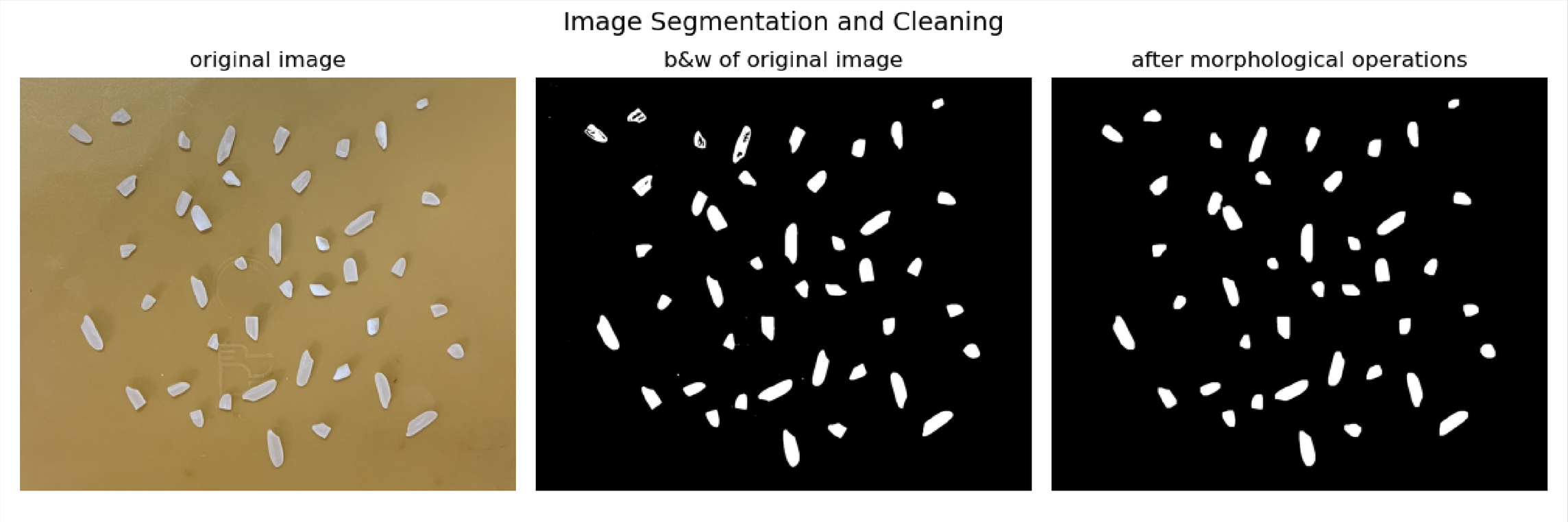
Objectives

1 Extract the features of Rice Grains using Python

Results and Analysis

Feature Extraction of Rice Grains



Here, the **image is pre-processed using segmentation and morphological operations**. We use otsu's method for the segmentation, and different combinations of morphological operations to get the final image.

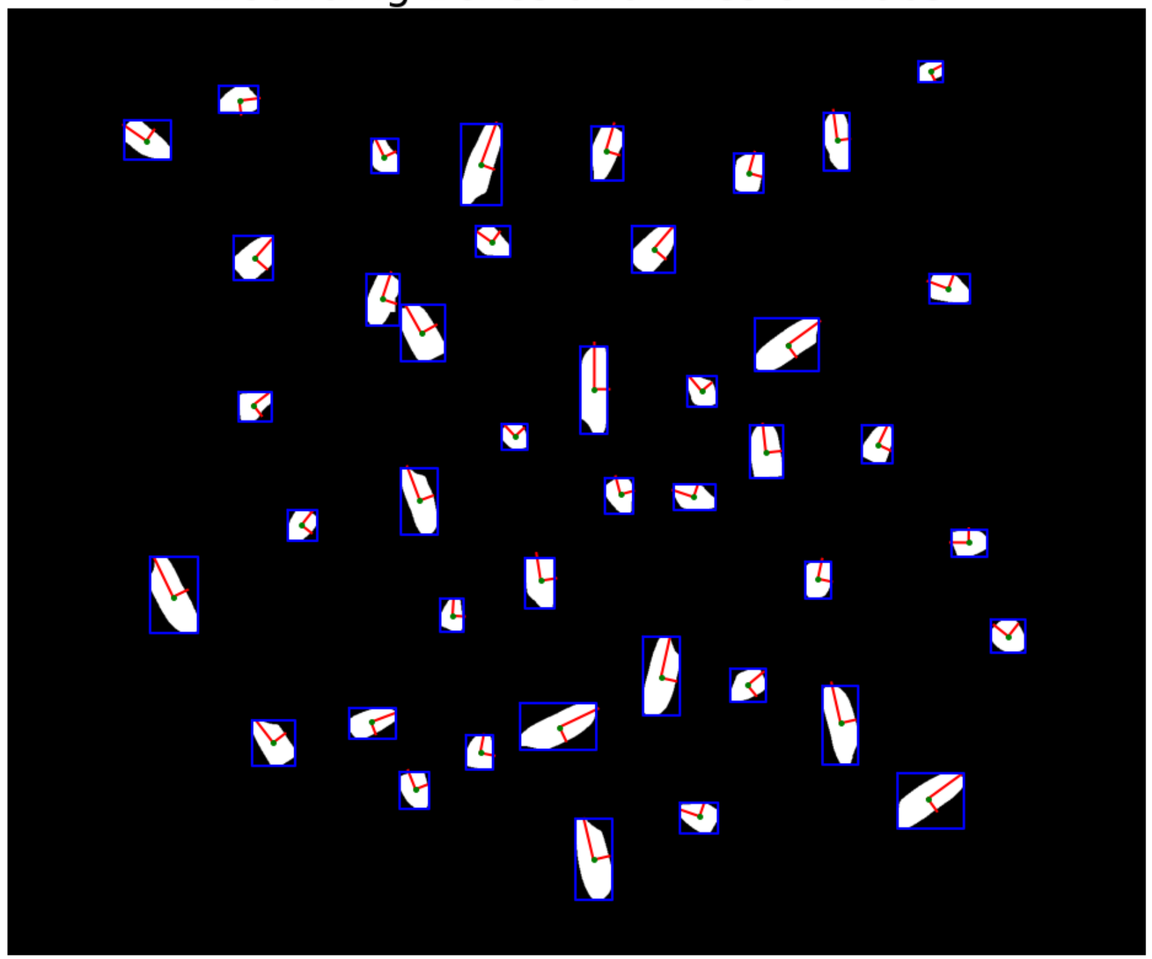
We use **scikit-image's `label` function** to **identify the blobs in the image,** which as shown to the side we have successfully done.

Scikit-image has a `regionprops` function that allows us to **extract the features** of each labeled region in the image as a class object. Using this feature, we can get each blob's area, centroid, axes, bounding boxes and more. There's also a **`regionprops_table` function** which **returns the features in a convenient dataframe** format.

With that, we have successfully extracted the features of rice grains

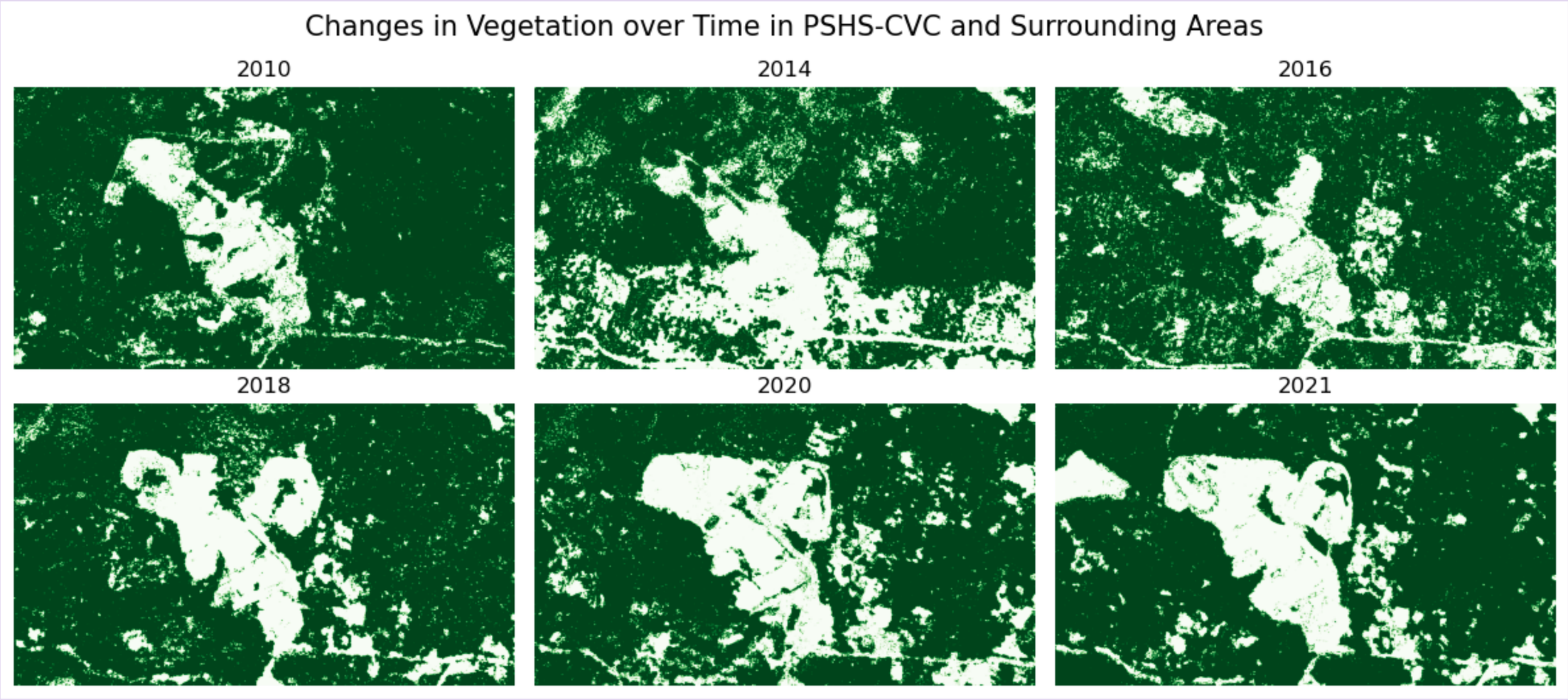
regionprops_table of rice grains

	label	centroid-0	centroid-1	eccentricity	area	orientation	solidity
0	1	94.859667	1394.059252	0.732934	962	-1.089350	0.982635
1	2	139.023462	349.640772	0.730414	1918	-1.444515	0.973604
2	3	199.091611	1253.539367	0.910660	2718	0.131311	0.971061
3	4	199.736075	209.022056	0.873850	2675	0.962313	0.979853
4	5	235.598105	714.839150	0.950833	4327	-0.352288	0.969310

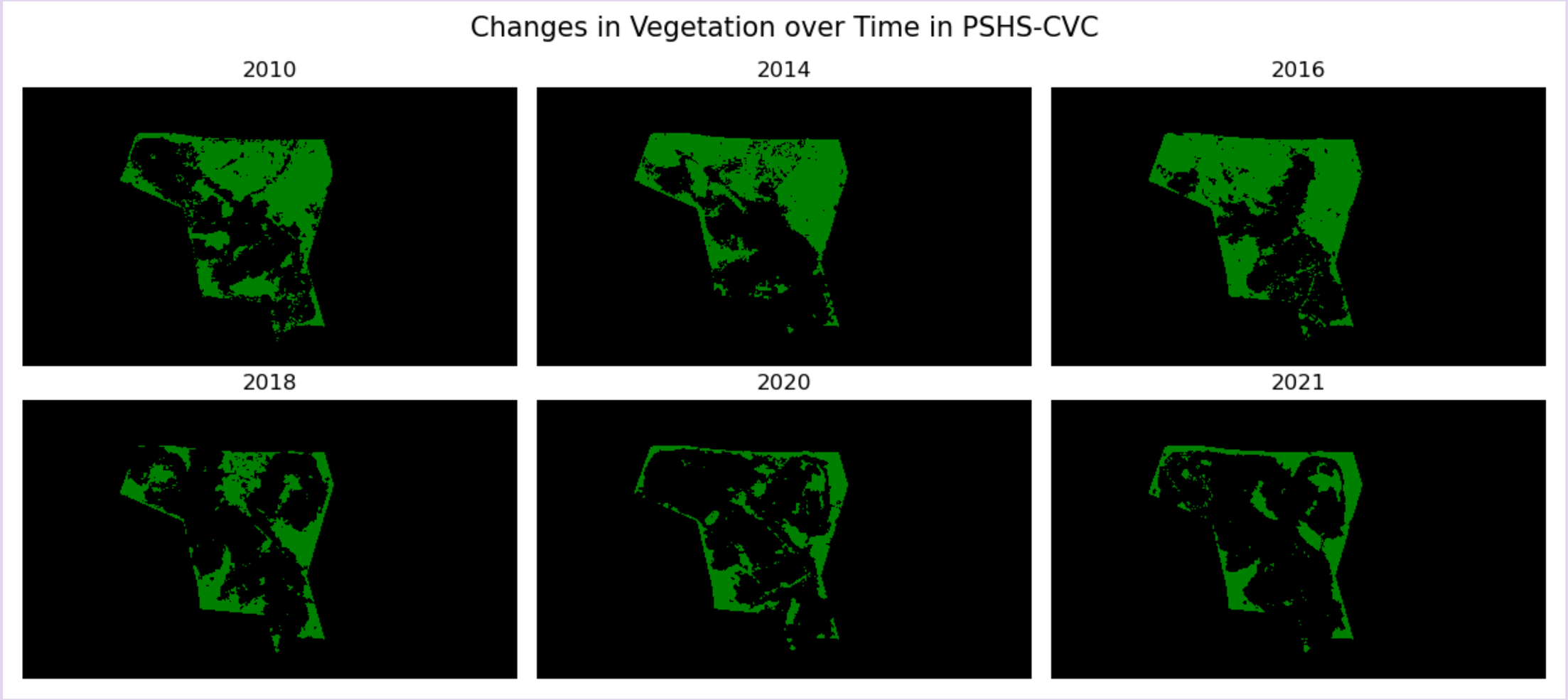


Extra Challenge

Tracking Change in Vegetation Area inside PSHS-CVC Over Time



For a previous bonus activity, I used segmentation to detect vegetation and tree coverage areas in a satellite image. Here, I want to expand on that previous work and use feature extraction to quantify the change in the vegetation area.

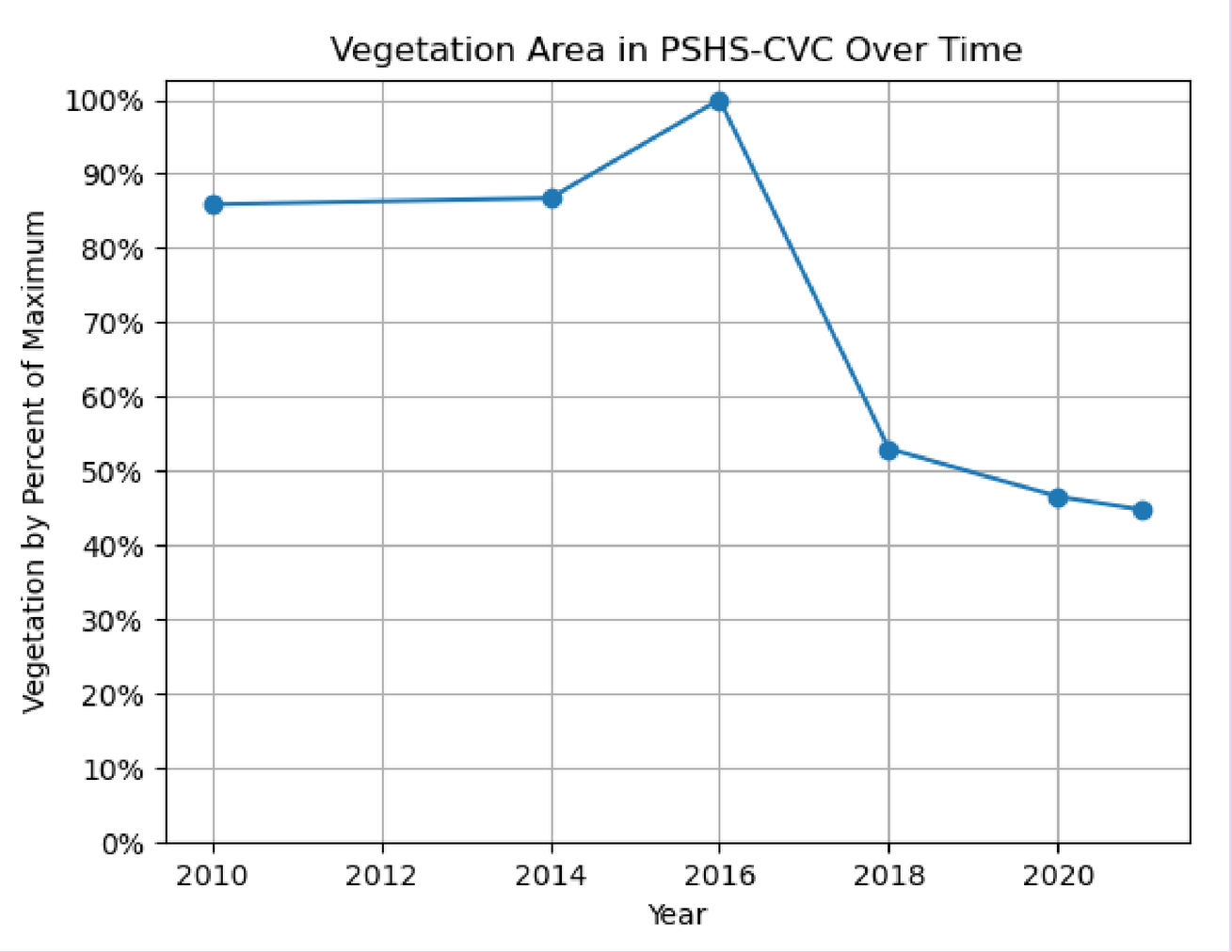


Since I want to focus on PSHS-CVC only, I **masked each image so that it only contains vegetation within the school boundaries**.

After playing with the data, I realized that the **easiest way to track the change in vegetation area is to simply count the number of green pixels in each image**.

Because there is no scale available for the satellite images, there I decided to **track the change in percent relative to the maximum value** calculated.

As shown in the graph, the vegetation area in 2010 to 2012 didn't experience much change and it experienced an increase and a maximum in 2016. However, **the vegetation declined drastically from 2016 onwards**. In a 2-year period (2016 to 2018), the vegetation area was cut down by almost half.



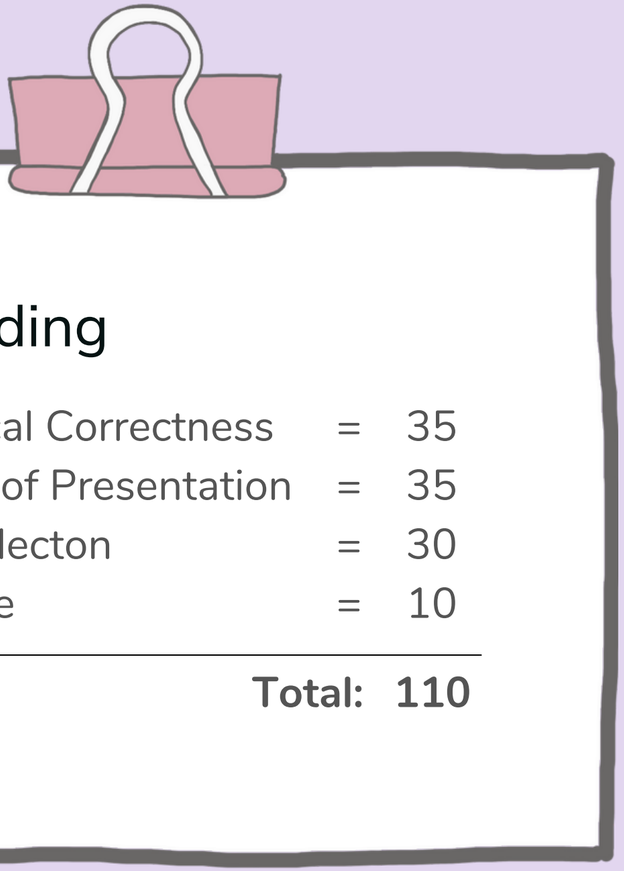
Reflection

The results of this activity are as expected, as shown by the fact that **we have successfully extracted the features of the rice grains image using Python.** It resulted in data that could be used for further quantified analysis

This activity was a bit challenging at first, because I couldn't find a direct equivalent of the matlab functions in python. Thankfully, I found scikit-image and their documentation page proved to be extremely helpful since they gave example use cases of the functions.

Overall, I'm very happy with my results. I can see feature extraction of rice grains can be used to track grain size differences among different rice variations, different fertilizer uses, or even grain size over time. Unfortunately, no such variable is available to my rice grain images.

So instead, I opted to return to a previous bonus activity. It turned out that there was a more convenient way to do it without having to need the `regionprops function`, but I do think the spirit of feature extraction is still there. The result of it was also very insightful, and it was eye-opening to quantify the amount of destruction to nature that infrastructure development causes.



Self-grading

- Technical Correctness = 35
- Quality of Presentation = 35
- Self-reflecton = 30
- Initiative = 10

Total: 110

References

I would also like to cite and thank the following sources that I used in this activity!

[1] Otsu's Method from OpenCV documentation. Retrieved from this link.

[2] RegionProps from scikit-image documentation. Retrieved from this link.