

DEC 10, 2023

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**External link:**

<https://algaeorithm.com/>

**Protocol Citation:** Ashwin Mukherjee, rohan chanani 2023. Algaeorithm Classroom Guide: Analyzing Microscope Images. **protocols.io** <https://protocols.io/view/algaeorithm-classroom-guide-analyzing-microscope-i-c3h7yj9n>

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**Protocol status:** Working  
We use this protocol and it's working

**Created:** Oct 17, 2023

**Last Modified:** Dec 10, 2023

## Algaeorithm Classroom Guide: Analyzing Microscope Images

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Algaeorithm



Ashwin Mukherjee

### ABSTRACT

A guide to using Algaeorithm to analyze microscope images of algae.

**Keywords:** algae, bioenergy,  
machine learning,  
computational biology

## Preparation

- 1 Before getting started, you'll want to ensure your photos meet the following criteria:
  1. 400x magnification (typically through a 40x objective lens)
  2. clear/focused viewfinder
  3. high contrast between the viewfinder and the background

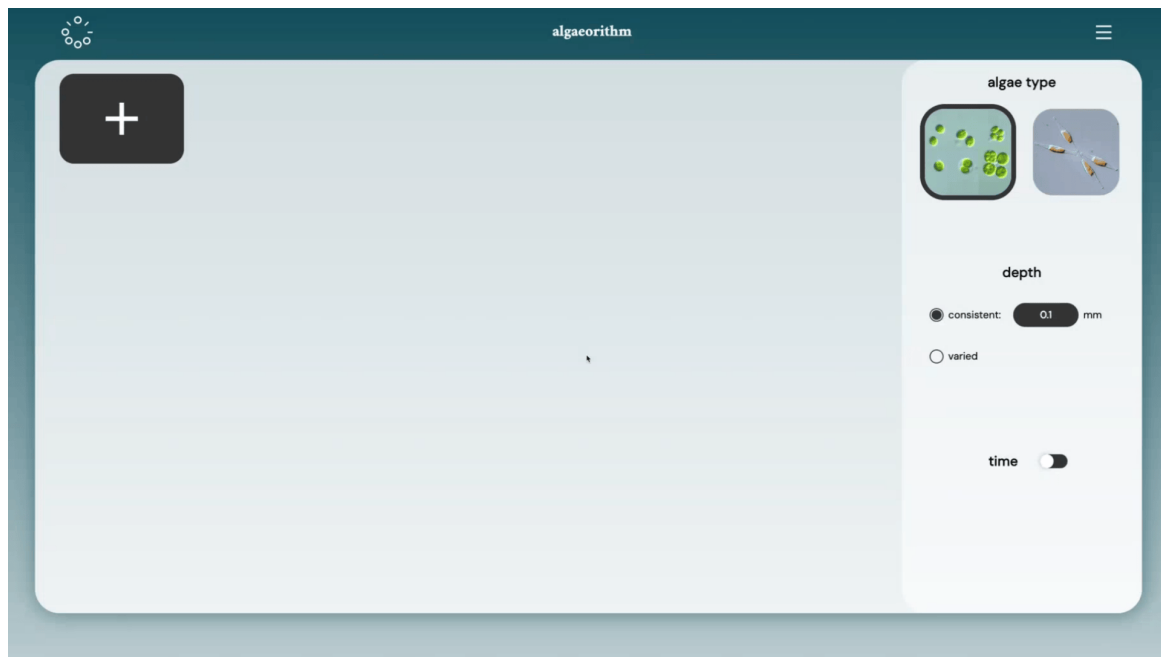
*see examples of photos below:*





## Uploading Images

- 2 Once your images have been prepared, head to [algaeorithm.com](https://algaeorithm.com).
- 3 Click the "add image" button in the top left corner of your workspace to upload your photos; photos should appear as previews here.

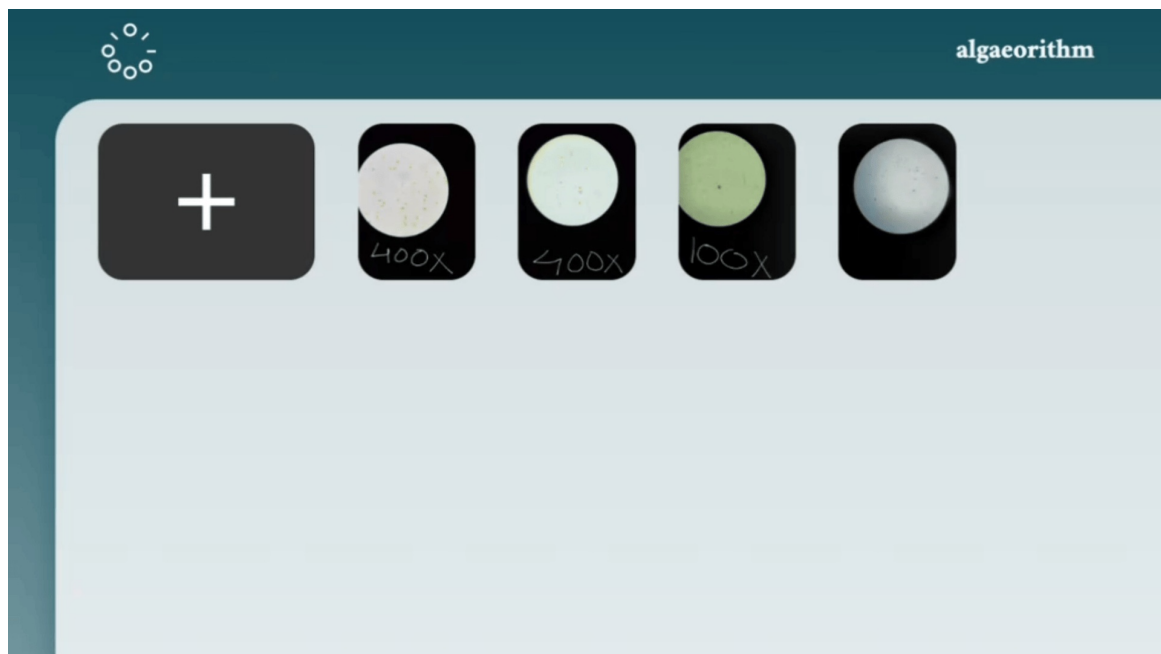


### Note

Naming your files by their species/date/sample # enables easier data analysis down the road.

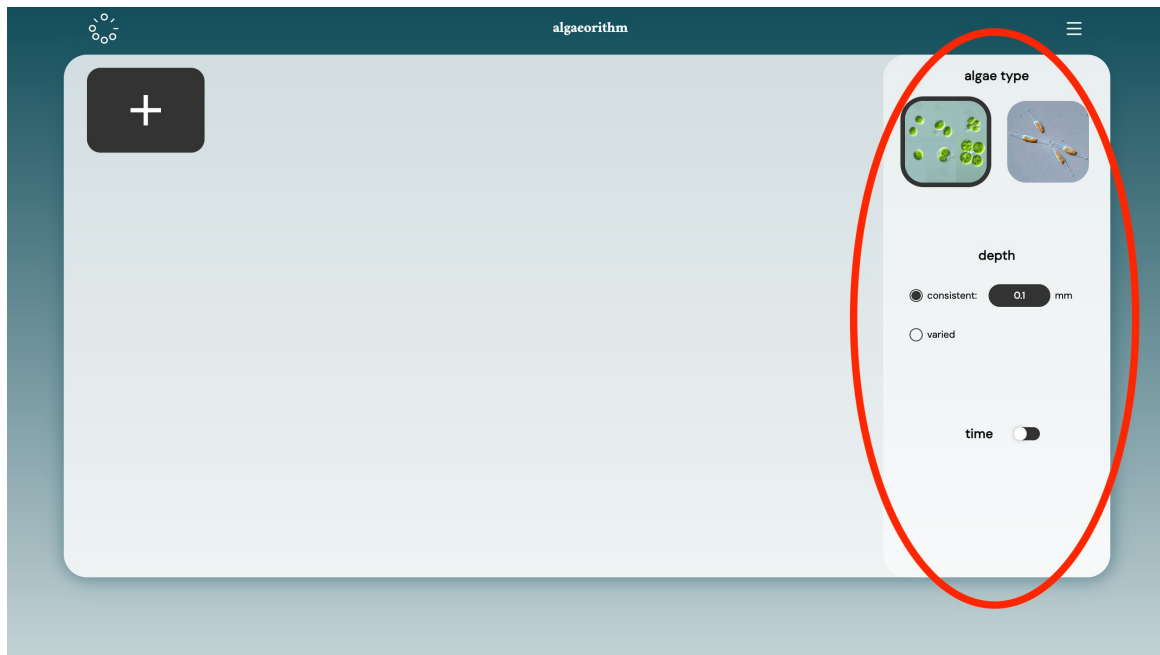
ex. chlamy\_01-01-23\_sample01

- 4 If unwanted photos are uploaded, hover over them and click the "delete image" button in the top right of the image to delete them.



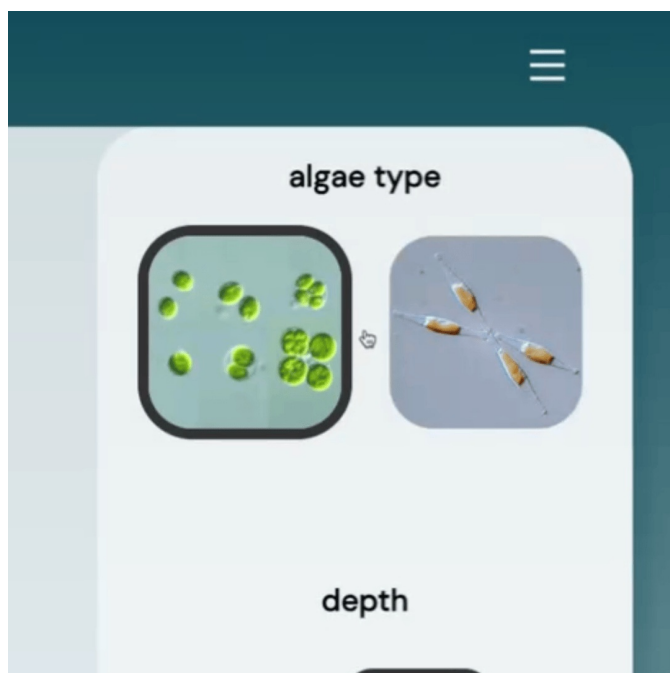
## Labeling Data

- 5 The settings area on the right of your workspace is where you'll provide relevant information about your images.



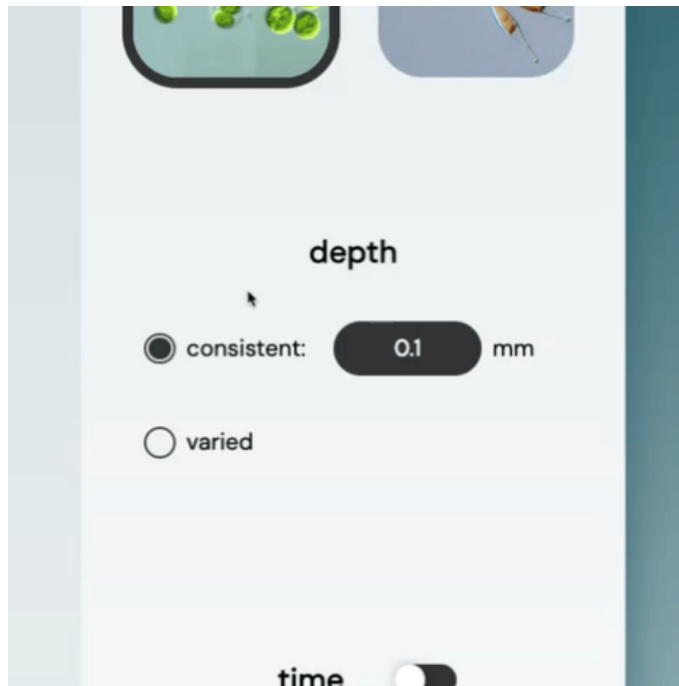
### 5.1 *Algae Type*

Starting at the top, you can toggle between either *Chlamydomonas* (represented by the circular green cells) or *Phaeodactylum* (represented by the banana-shaped beige cells).

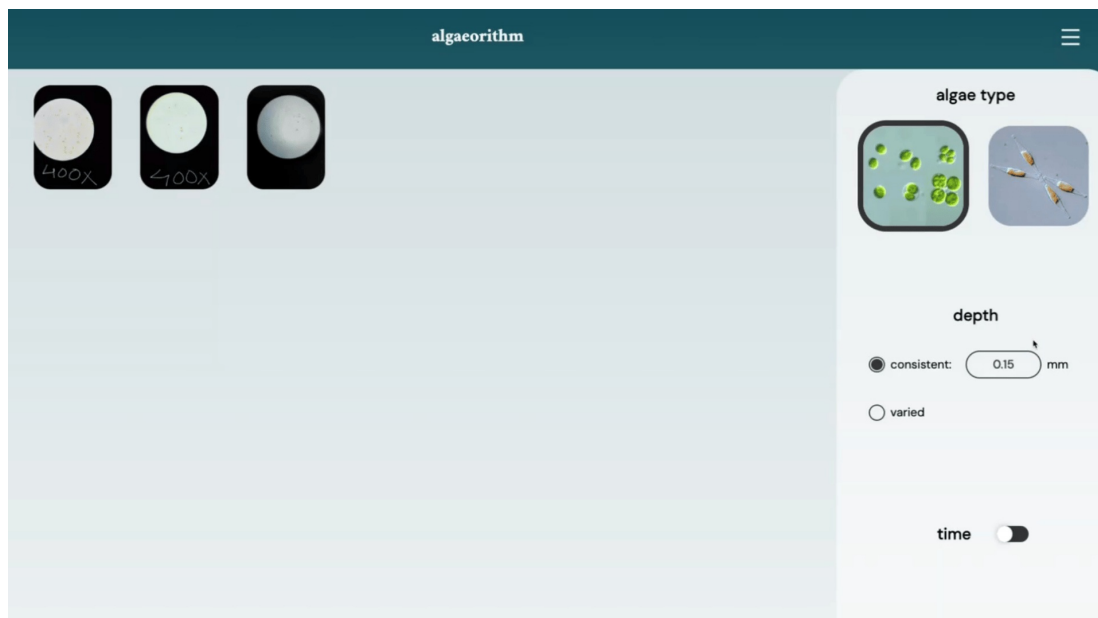


### 5.2 *Depth*

If all your photos were taken in plates with the same depth, keep the "consistent" option and change the depth (in millimeters) as appropriate.



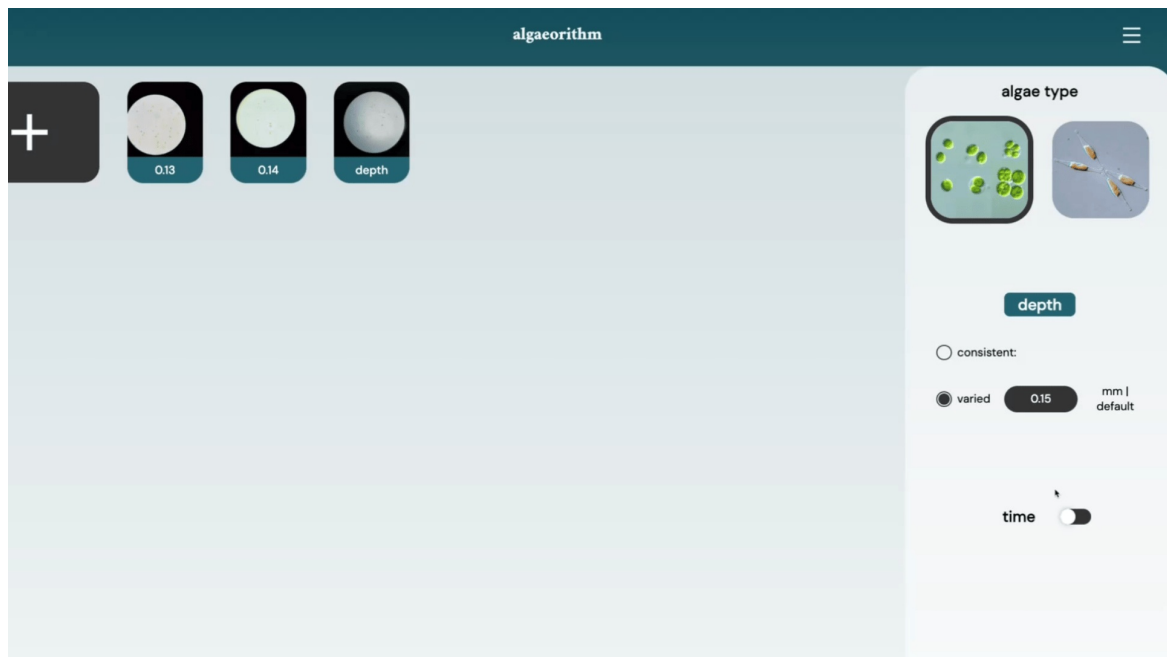
If photos are a mix of plates with varied depths, choose the "varied" option and label each image's depth as appropriate (in millimeters). You also have the option to specify a depth that non-labeled images will default to.



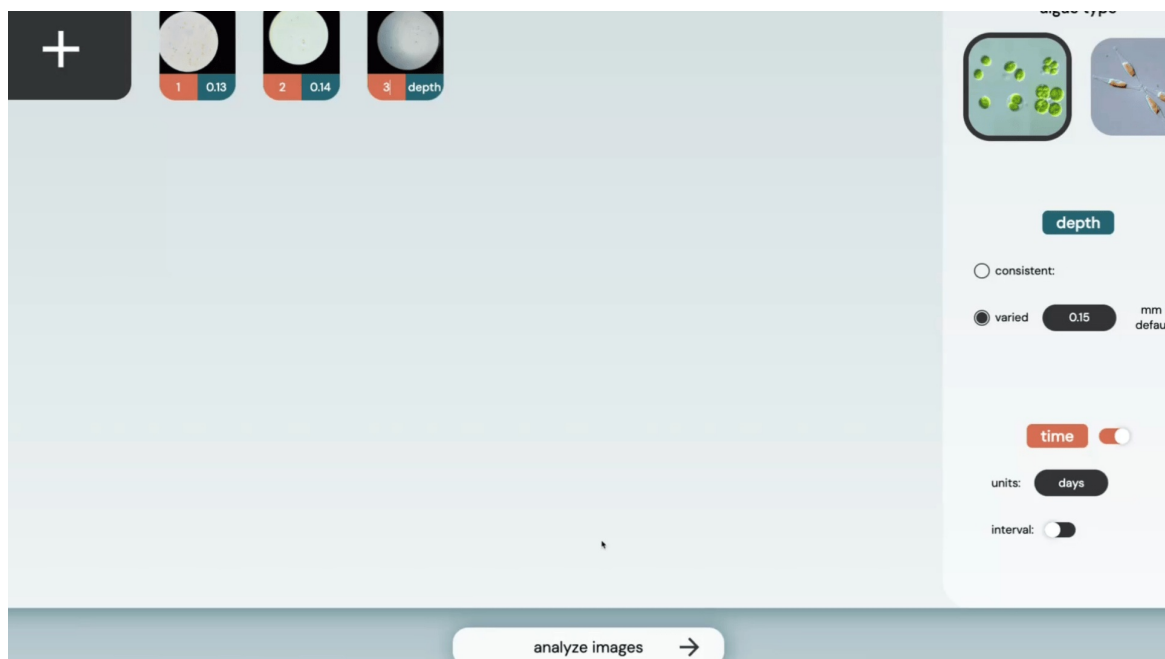
### 5.3 *Time*

If you have time-sensitive data, you can toggle the "time" switch, enter units manually, and label individual images. You also have the option to specify a regular interval between when photos were

taken.



- 6 Double-check that all relevant images have been uploaded and labeled with accurate information, then click the "analyze images" button at the bottom.

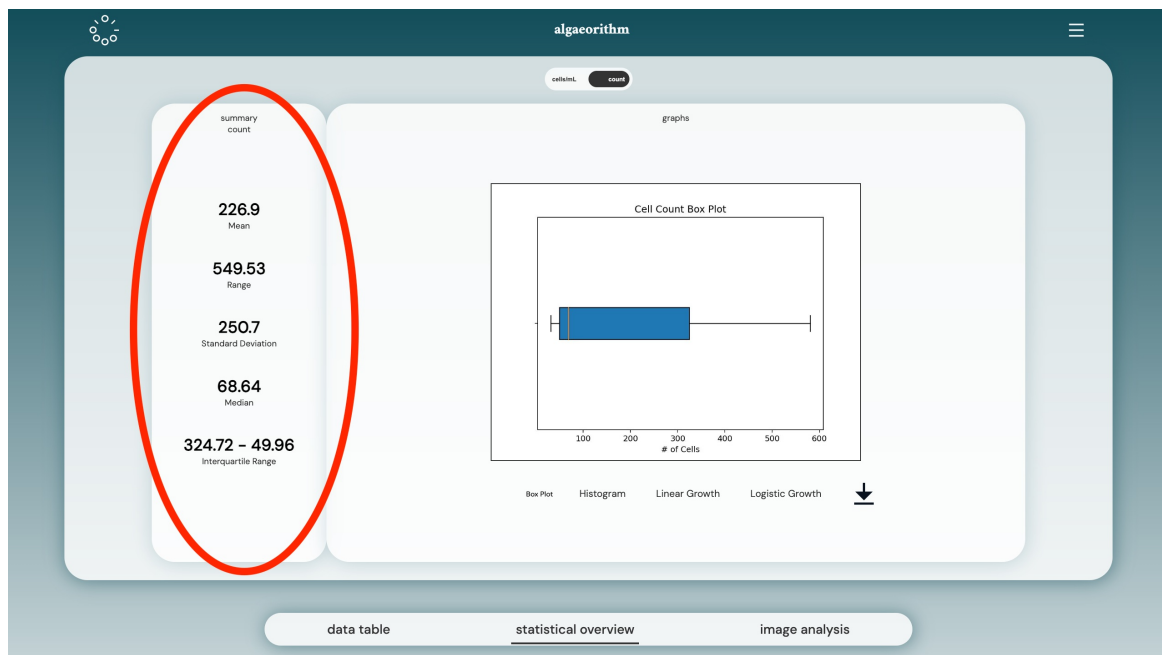


## Data Interpretation + Analysis

### 7 *Statistical Overview*

You'll start with an overview of your data that includes relevant statistics in addition to visual representations of your data.

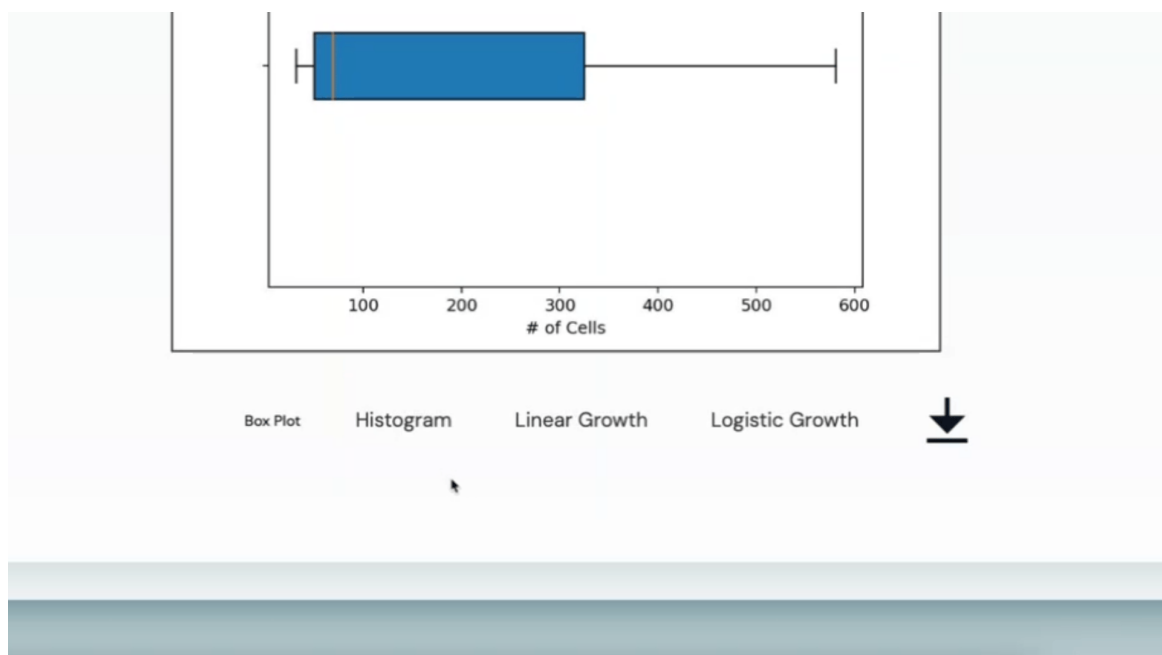
- 7.1 The summary area on the left displays the mean, range, standard deviation, median, and interquartile range for your data.



### Note

Highlight any of the numbers on this page to easily copy and paste for further data analysis.

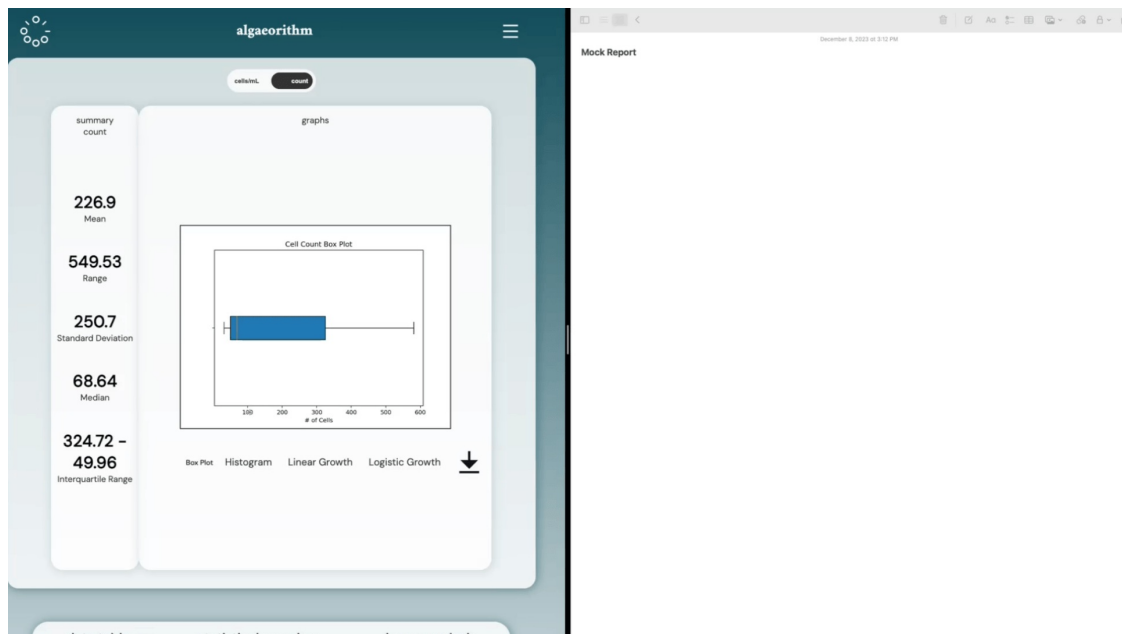
- 7.2 The graph area on the right presents visual interpretations of your data in the form of a box plot and histogram. If you input time data, you'll also be able to view exponential, linear, and logistic growth curves. Toggle between these graphs using the labels at the bottom.



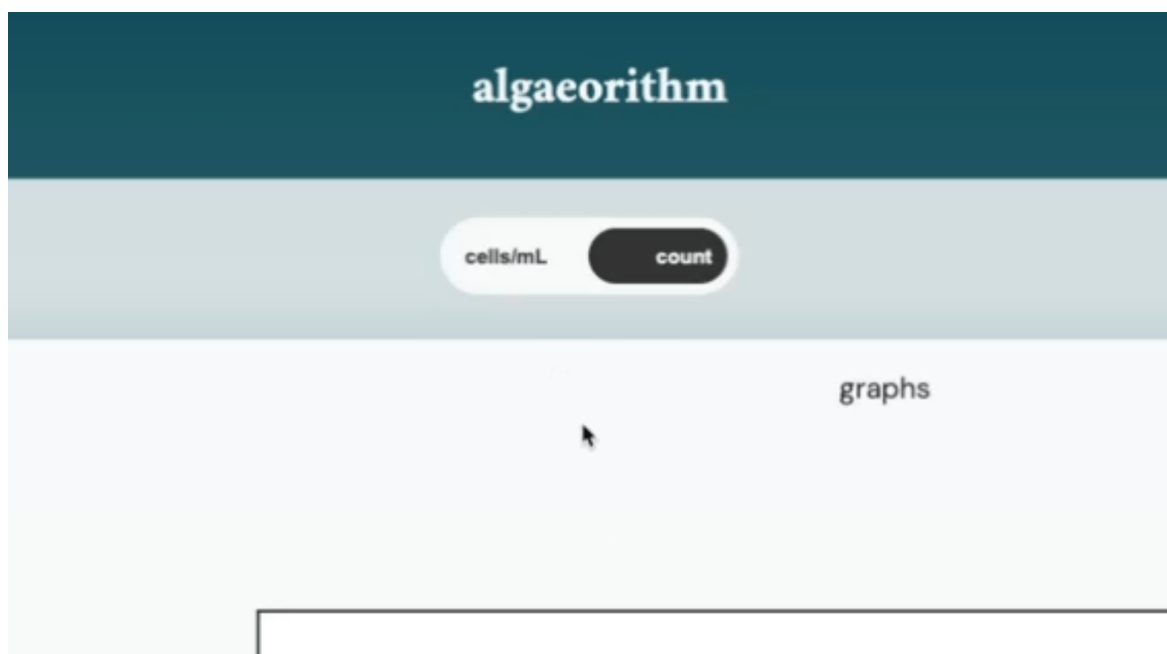


## Note

Use the download button in the bottom right or right-click any graph to easily copy any of these graphs and utilize them in reports.



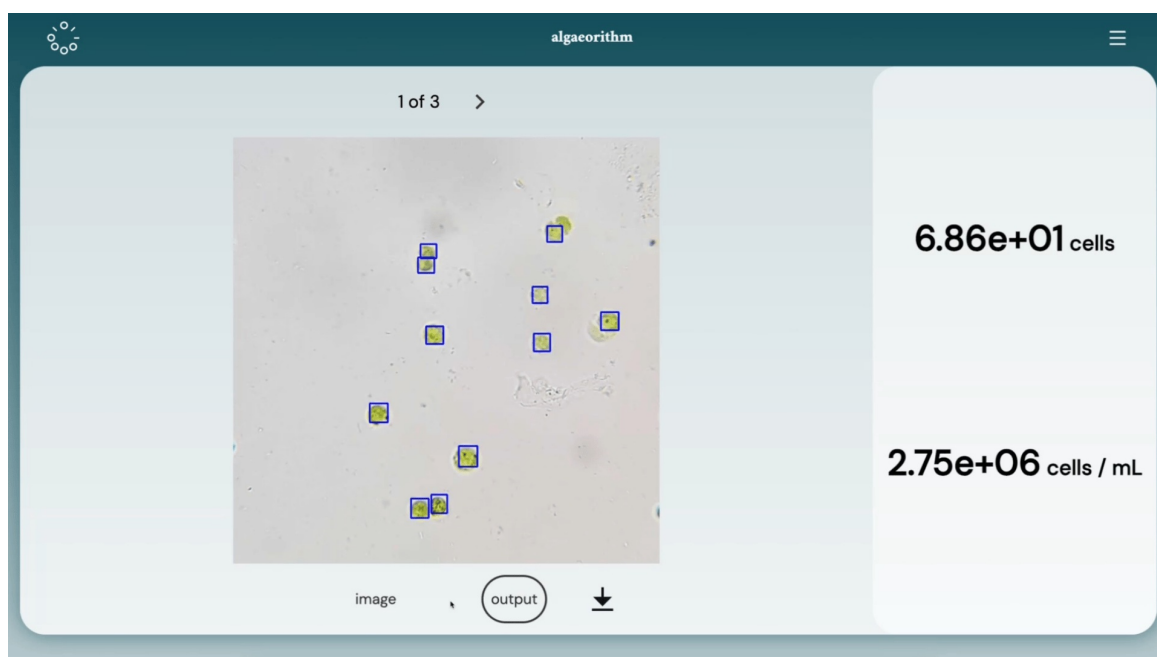
- 7.3 You can also switch the units between cell concentration in cells/mL to absolute cell count for all this information using the slider at the top of the screen.



## 8 *Image Analysis*

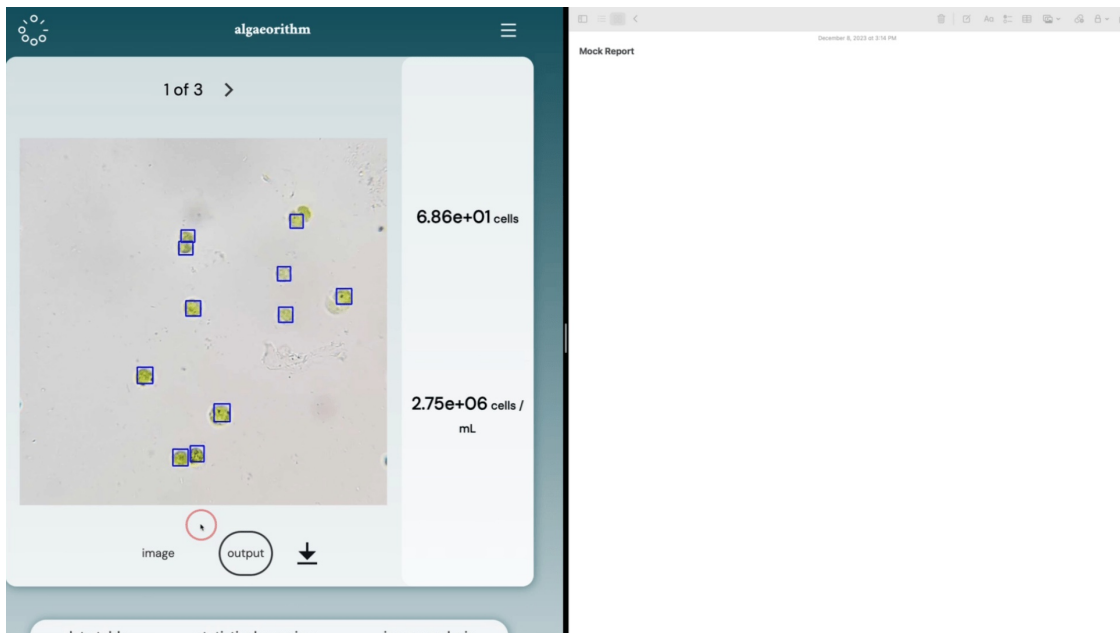
You can switch to the image analysis tab using the floating navigation menu at the bottom of the page. Here, you'll be able to view individual images and explore how Algaeorithm's neural network interprets these images.

- 8.1 Your images are displayed both in their raw form (image) and an algorithm-labeled patch (output). The space on the right displays the cell count and concentration for each image. Rotate through images using the navigation menu above the main image.



## Note

Use the download button in the bottom right or right-click any image to easily copy and utilize images in reports.



## 9 Data Table

Using the floating navigation menu, you can switch to the data table tab. This table names each image by its file name and includes any input information (depth, time, etc.) along with calculated cell count and concentration in cells/mL.

## Note

Clicking on any individual row in the table brings you to the associated image in the image analysis tab.

- 9.1 The "download table" button allows you to save your data table as a .csv file which can be opened in Microsoft Excel or Google Sheets for further analytics, or copied into other documents.

The screenshot shows the Algaeorithm app interface. On the left, a data table is displayed with the following columns: Name, Time (days), Depth (mm), Count (cells), and Concentration ... The table contains three rows of data. Below the table is a 'download table' button. On the right, a 'Mock Report' document is shown, dated December 8, 2023 at 3:16 PM.

Name	Time (days)	Depth (mm)	Count (cells)	Concentration ...
chlamy_01-01-...	1	0.13	68.64	2752756.61
chlamy_01-01-...	2	0.14	31.27	1303278.72
chlamy_01-01-...	3	0.15	580.79	7103915.81

download table

Mock Report  
December 8, 2023 at 3:16 PM

## More Content

- 10 Using the menu at the top right, you can access pages that host educational content, Algaeorithm's story, and press this project has received.

The screenshot shows the Algaeorithm app interface. A data table is displayed with the following columns: Name, Time (days), Depth (mm), Count (cells), and Concentration (cel...). The table contains three rows of data. Below the table is a 'download table' button.

Name	Time (days)	Depth (mm)	Count (cells)	Concentration (cel...
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download table

*Thanks for using Algaeorithm!*