Community Spotlight

Each Community Spotlight features an outstanding group, partner, resource, or member of our community.

Leaf cutter ant foraging (Version 1.0)

By Jeremy M Wojdak, Justin Touchon, and Myra Hughey

Module Description:

This module introduces students to leaf-cutter ants in the rainforests of Panama. Students derive their own research hypotheses regarding ant foraging or allometric scaling relationships.

This module was created as a way to give students a realistic, open-inquiry research experience, even when lab or field research is not possible. Students are introduced to leaf-cutter ants and how they forage, provided with images and videos, and are asked to develop a hypothesis, plan a study, collect real primary data, and analyze the data. Minimally the experience can take a couple of hours of class time and some report writing as homework. On the other end, full research papers or posters could be the product of a more rigorous research experience.

Potential Learning Objectives:

Basic

- Students will be able to generate meaningful scientific hypotheses given a context for study.
- Students will use image analysis software to generate data from an image set.
- Students will be able to conduct and interpret linear regression analyses (including R2, p-values, hypothesis testing, slopes/y-intercepts), given data they've collected.
- Students will write a results section in typical scientific literature format.

Advanced/Extensions

- Students will be able to construct and interpret frequency histograms.
- Students will apply programming concepts to automate a series of procedures.
- Students will be able to conduct appropriate statistical analysis for a categorical independent and numerical dependent variable.

Teaching Setting:

This module can be used in a variety of teaching settings, including introductory or advanced undergraduate biology courses, high school, and AP biology. This module is designed to fit into a study of ecology, evolution, animal behavior, or the like. Alternatively, it could be used in a biostatistics course as an interesting context for analysis. Previous experience with image analysis is not required for either the instructor or the students.

QUBES Citation:

Wojdak, J. M., Touchon, J., Hughey, M. (2018). Leaf cutter ant foraging. AIMS: Analyzing Images to learn Mathematics and Statistics, QUBES Educational Resources. doi:10.25334/Q4RB0M

Visit Resource

Related Materials and Opportunities:

This resource was created by members of the Analyzing Images to Learn Mathematics and Statistics (AIMS) project, which focuses on using image analysis and interesting biological contexts to motivate student learning of mathematics and statistics. Learn more about the AIMS project and browse additional AIMS resources by visiting the AIMS group on QUBES. Please feel free to join the AIMS group if you are interested in staying apprised of new resources and opportunities from the AIMS project.

In this resource, students use the image processing software ImageJ, which is one of several software hosted by QUBES. There is no need to have students download the software because they can launch it directly in their browser from the ImageJ Software page on QUBES, saving precious class time. Other QUBES-hosted software includes R-Studio, Jupyter Notebooks, NetLogo, and more. Browse all software on QUBES.

This resource was nominated by a postdoctoral associate at Radford University. Read their testimonial bellow.

> "I used this module in my class last semester. It is a great resource for inquiry-based learning, data collection, learning how to use a tool (ImageJ), and run data analysis. It uses real pictures from the field, and students get to collect real data from the videos and pictures. It is great for introducing a bunch of concepts when field projects are not possible."

If you would like to nominate a QUBES resource for the ROW, please send your nominations to Elia Crisucci at emc22 "at" pitt.edu.

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P.O. Box 1452, Raymond, NH 03077

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