Summer 2020

Physarum Polycephalum Network Construction

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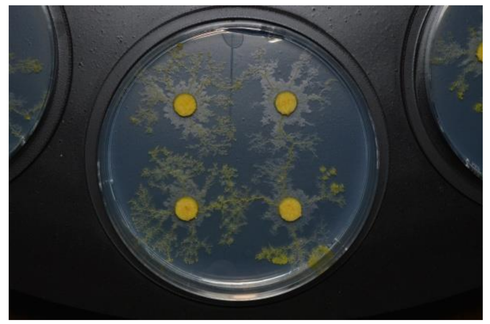


Introduction

Physarum polycephalum

- Acellular slime mold
- One big cell—coenocyte
- Creates networks when foraging
- Efficiency, cost, and robustness of networks can be quantified
- Graph theory is a way of modelling connected objects

Research Question

How does Physarum make a network? How will it change in response to disturbance?

Hypothesis: Physarum will adapt to minimize the effects of disturbance, high robustness will buffer efficiency.

Methods

Grew plasmodia on an oat media—cut out circular nodes

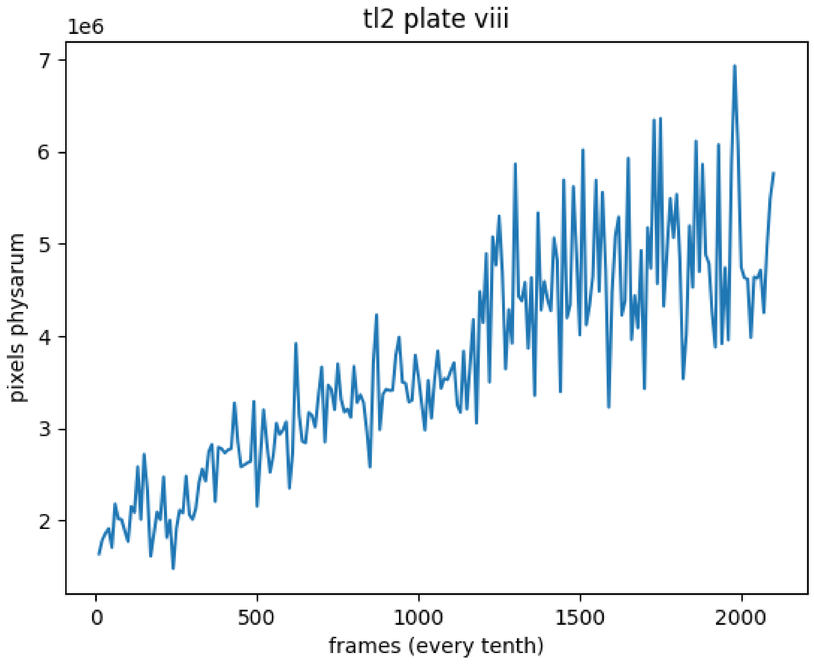
Built a machine for taking time lapse of ten petri dishes concurrently

Arduino microcontroller rotates a spinning plate 36 degrees, then tells the camera to take a photo

After taking a time lapse, Python to sort and analyze each frame

Results

Figure 1. Pixel count of a four-node configuration, every 10th frame counted. Yellow sensitivity to match *Physarum* Is not yet perfect



Discussion

Pixel count can be improved—tune sensitivity to the “Physarum yellow” in computer vision analysis

From the graph of pixel counts, determine points of growth, and choose frames for efficiency/robustness analysis

Acknowledgements

Thank you to my advisors, the McCormick funding, the Biology department, and Bob Peaslee!