

Detecting Soil Protists Using Deep-learning

Jingmo Bai & Zuoyi Yu

June 2024

Introduction

We train a deep-learning detection model for soil protists, analyze the collected data and try to investigate the effects of plastics on soil protists. We demonstrate the feasibility of leveraging the power of AI and deep learning to help scientific research.

Popular Science Summary

Imagine your room is full of plastics, and you absorb them as food. How will you be affected? Our aim in this thesis is to uncover the effects of nanoplastics on soil protists.

Traditional manual analysis can not handle large amounts of data, so we train a deep-learning-based real-time object detection model to detect and track 9 classes of protists in the videos. Our model achieves decent performance and accuracy. Then we record the data and analyze if and how nanoplastics treatments affect the movements of protists.

We find indications that nanoplastics have some effect on protists. High-concentration nanoplastics seem to cause the protists to move slower than usual. We also find that different protists have disparate moving patterns. Compared to other classes of protists, amoeba tend to move relatively slowly and ciliate tend to move relatively fast.

In this thesis, we demonstrate the feasibility of leveraging the power of AI and deep learning to help scientific research. Our model can be integrated into microscopes in the laboratory in the future to improve research efficiency.