

# Preliminaries for Distributed Natural Computing Inspired by the Slime Mold *Physarum Polycephalum*

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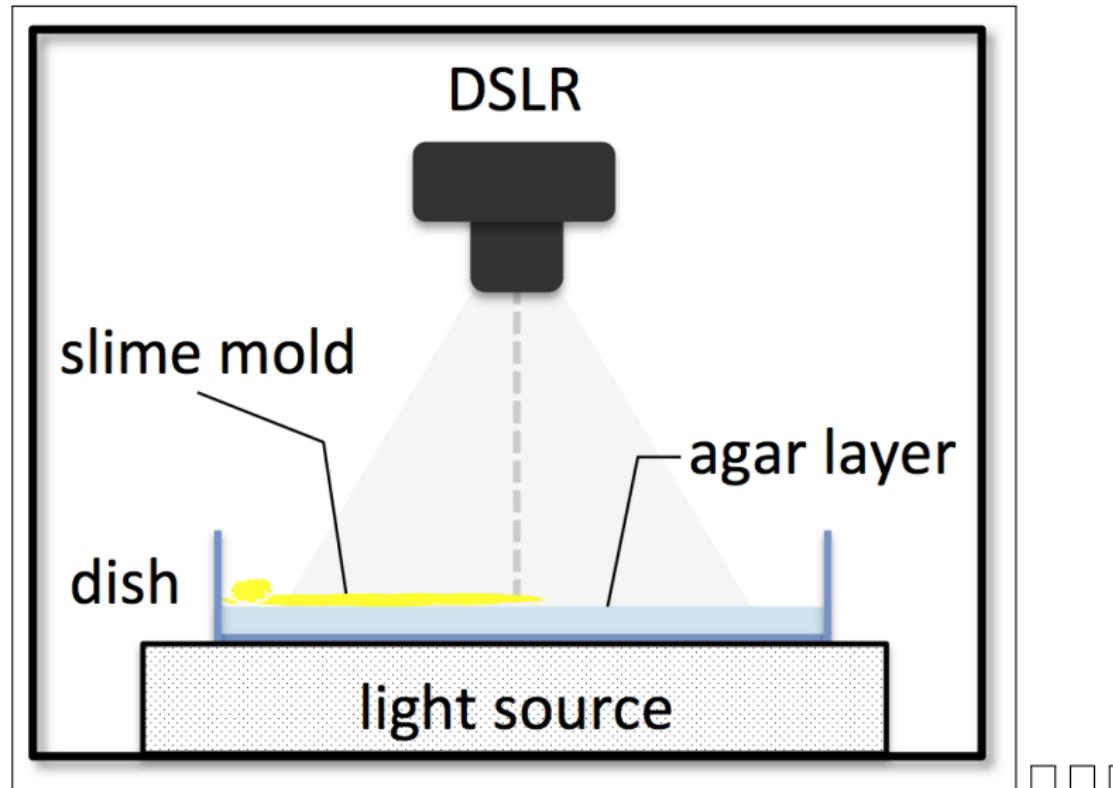
Max Planck Institute for Informatics

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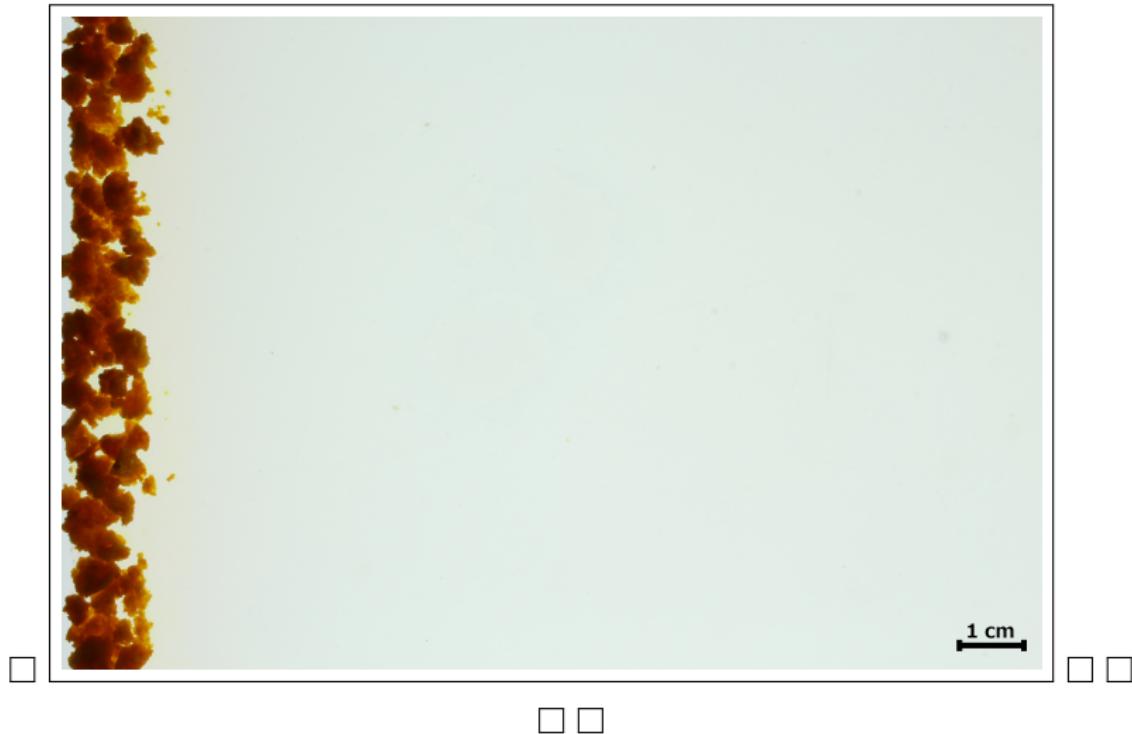


## Part II: Studying the networks formed by *P. polycephalum*

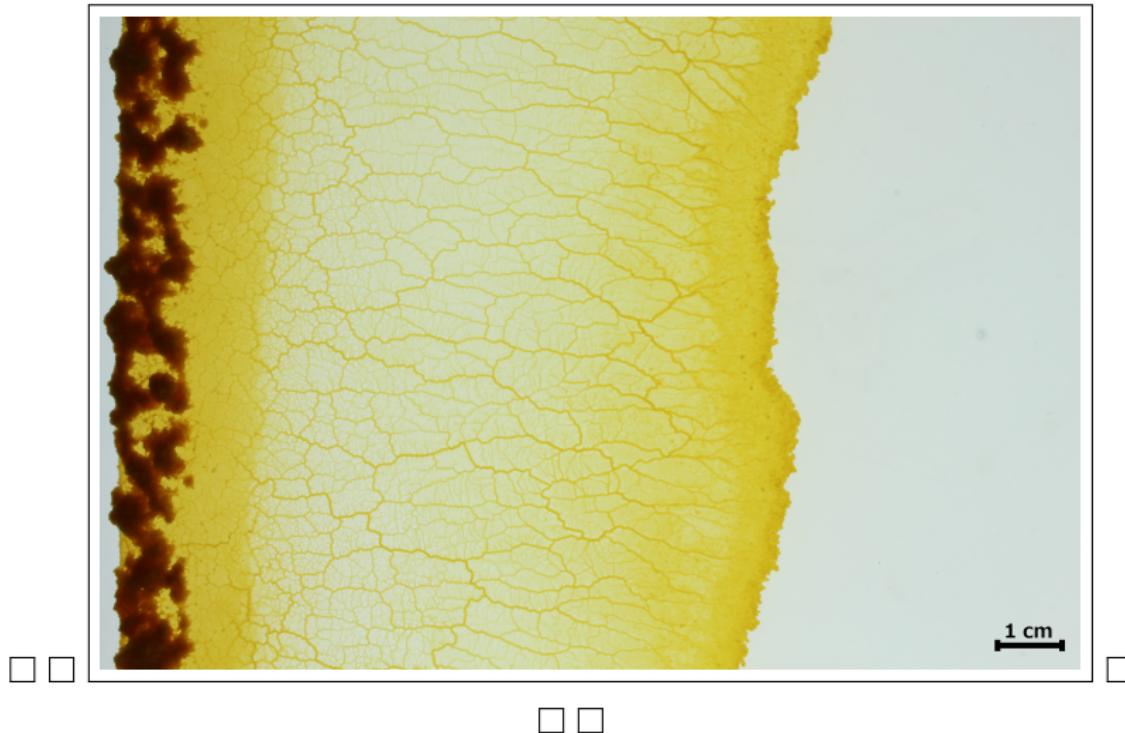
# Experiments



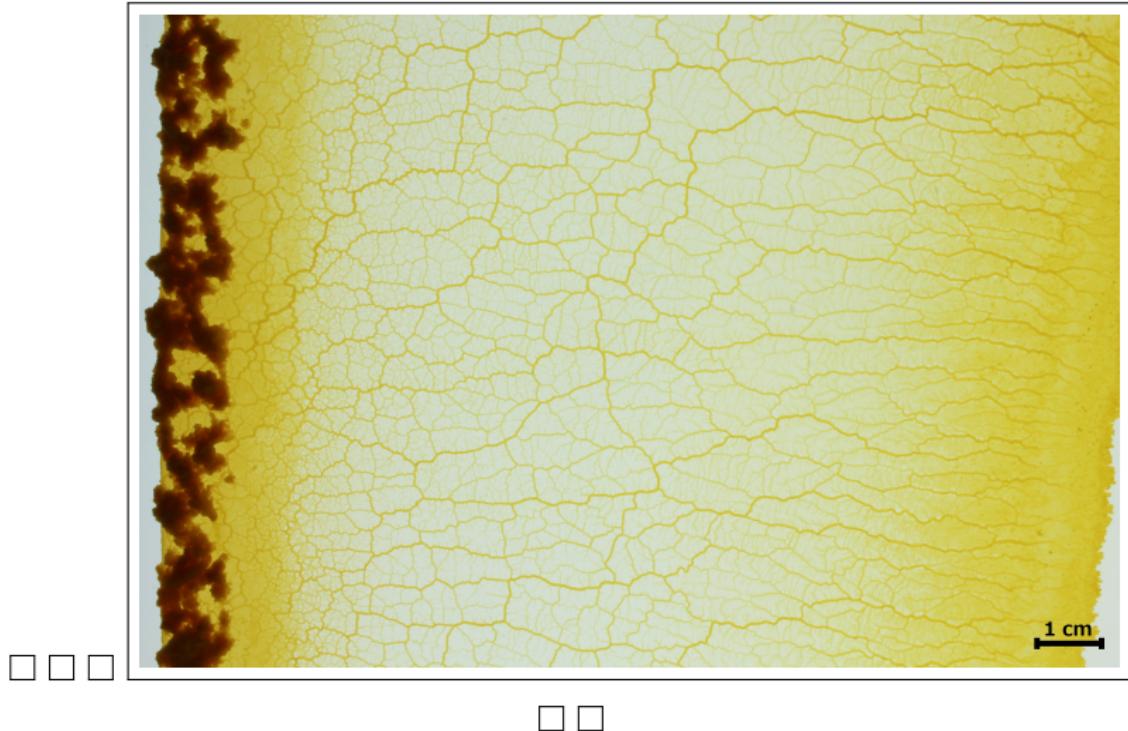
# Experiments



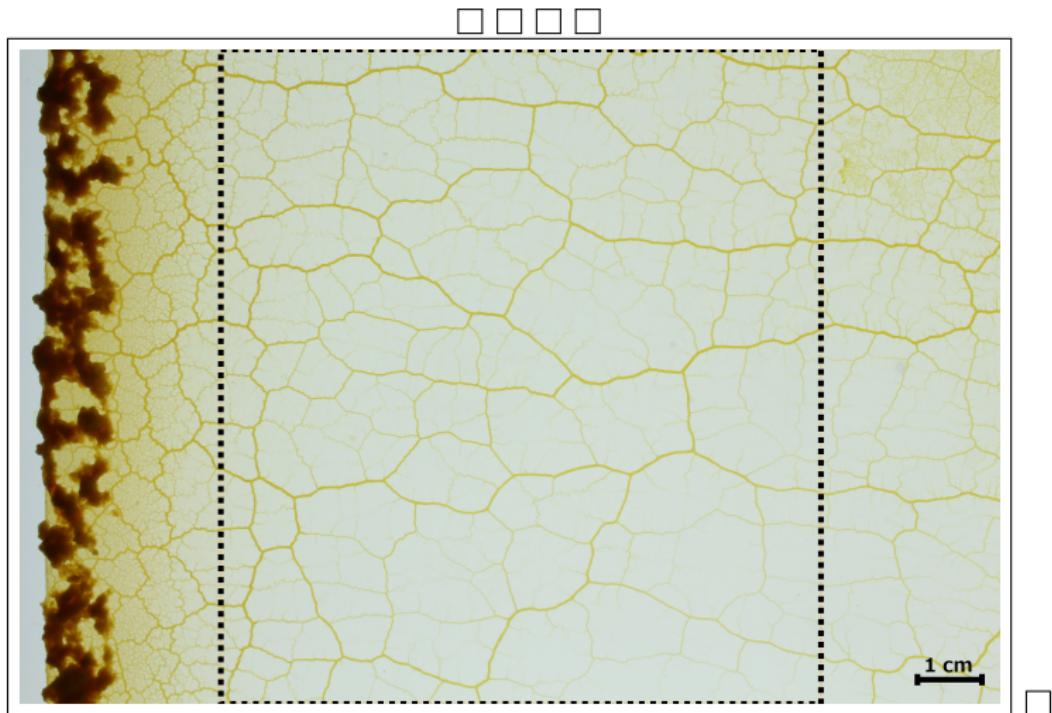
# Experiments



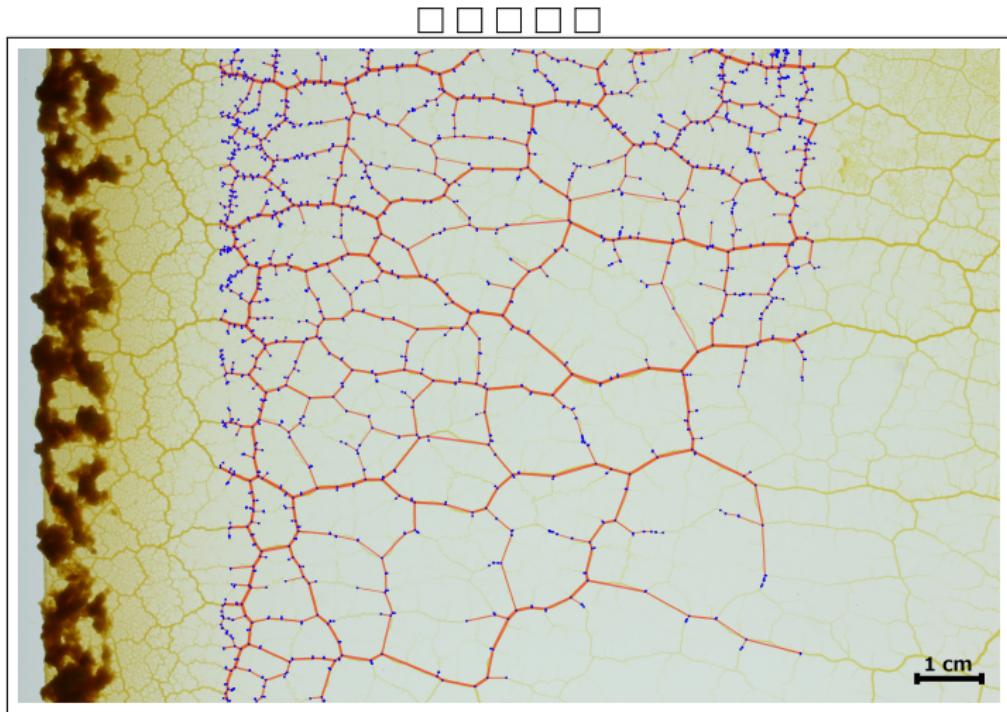
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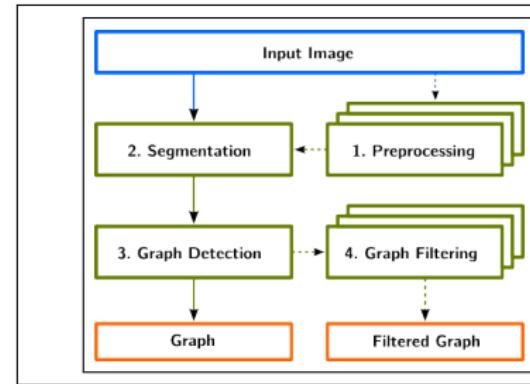
# Experiments



# Network Extraction From Images

## NEFI:

- ▶ Input: High quality image of a network
- ▶ Output: Graph representation of depicted structure



## Design goals:

- ▶ Combine well-known algorithms from Computer Vision, Image Processing and Graph Theory to obtain a new modular tool.
- ▶ Make it such that non-experts can use it.

# Analysis of *P. polycephalum* networks

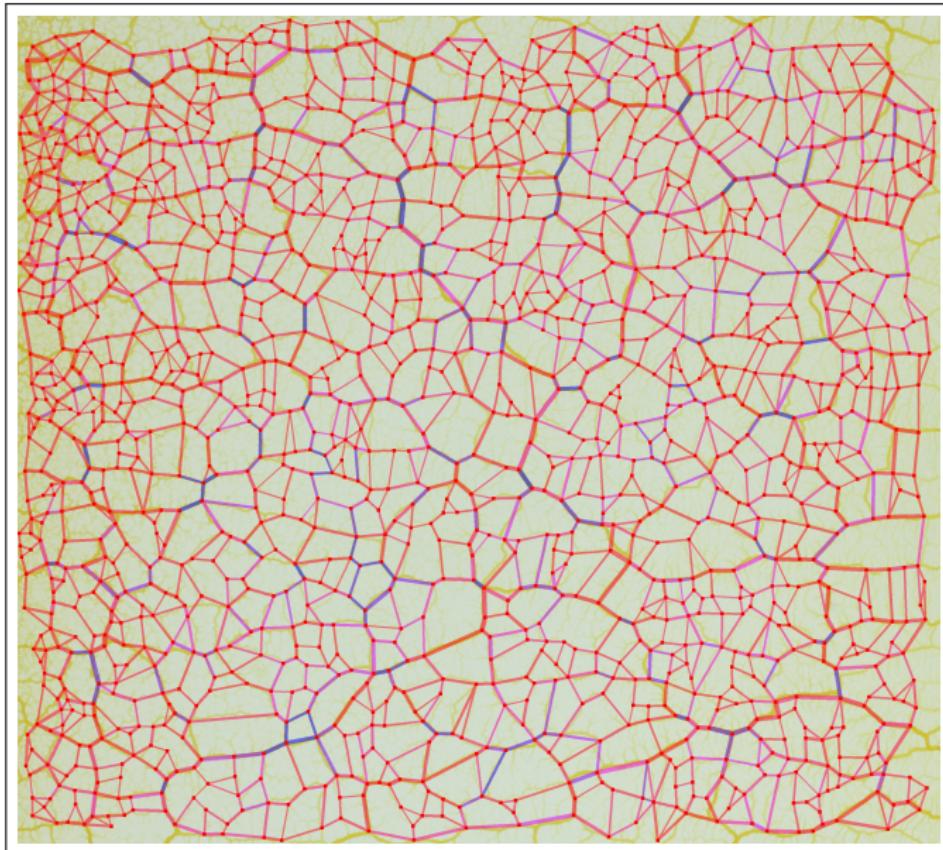
Dataset: Ca. 38 time series of graphs. A total of 1998 weighted cubic planar graphs.

Goal: Obtain a catalogue of Observables that describes various aspects of *P. polycephalum* networks.

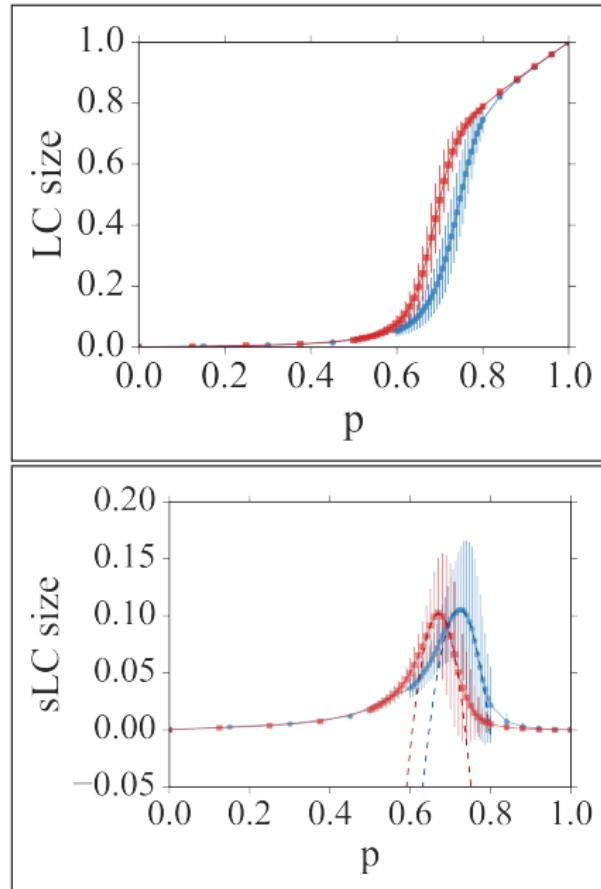
## Key components:

- ▶ Distributions of observables and their time development.
- ▶ Examples: Edge lengths/widths, Face area/circumference and various other properties

# Robustness of *P. polycephalum* networks



# Robustness of *P. polycephalum* networks



# SMGR: Sharing is caring

## Slime Mold Graph Repository:

Collects raw experimental data, graphs, results and useful tools

## Motivation:

- ▶ Facilitates exchange and reuse of data
- ▶ Makes data available to everyone

Important Use Case: Guiding and evaluating various modelling attempts.