Microbiology and Machine Learning: Fungal Enumeration and Classification using ML Algorithms

Steven Clemens

Michael Stanley

Dr. Emmanuel Salifu

Dr. Andreas Spanias

Arizona State University SenSip Research Experience for Teachers

Project funded by NSF Award 1953745

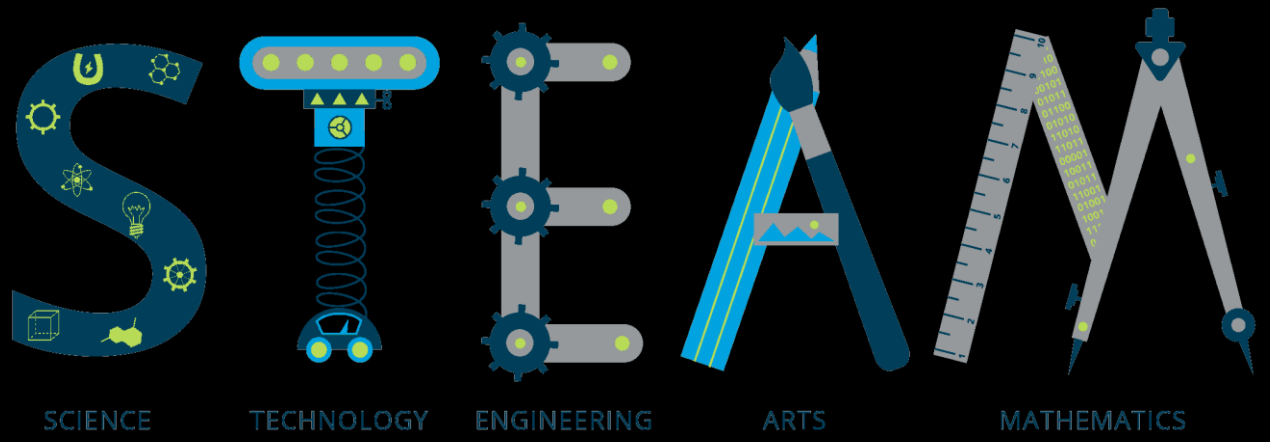
Arizona State University

SenSIP Sensor, Signal and Information Processing Center

DYSART Unified School District

NSF

Project Description



- Design a lesson to connect two or more STEAM disciplines with an introduction to machine learning that can be emulated in the high school classroom

- Use materials that are free/low cost or already available to most teachers within the stem disciplines.

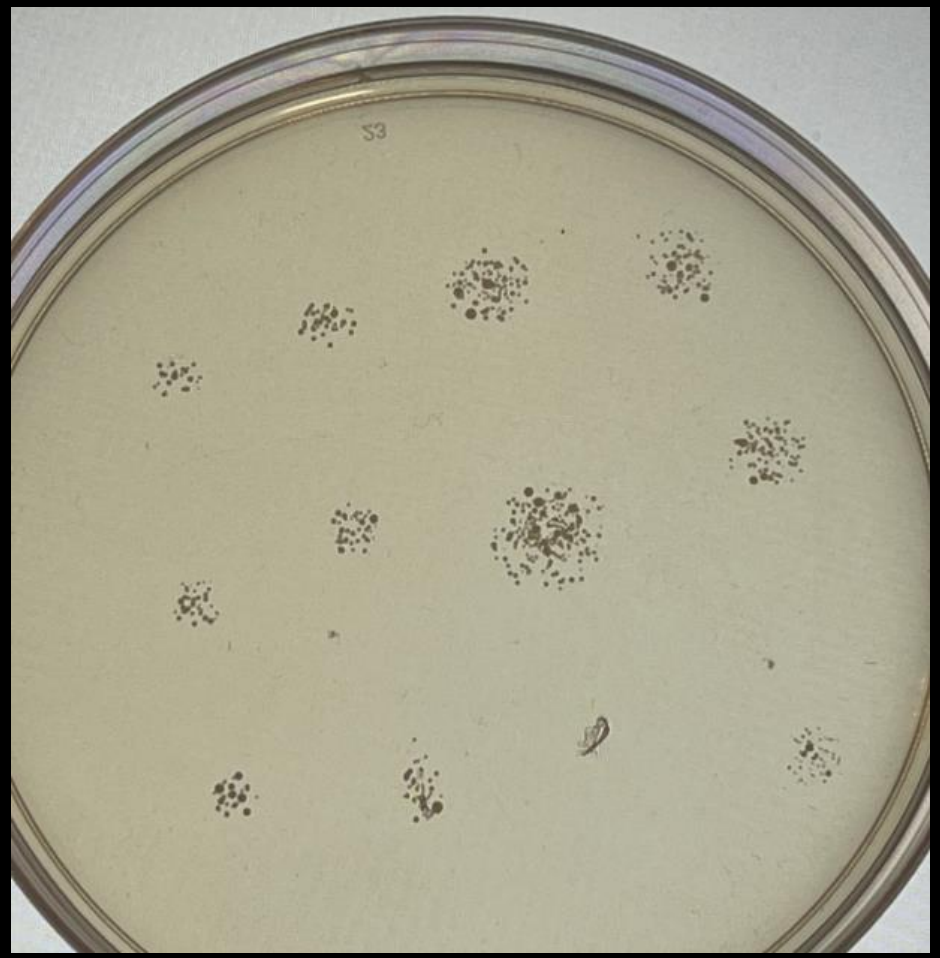
ASU Arizona State University

SenSIP Sensor, Signal and Information Processing Center

DYSART Unified School District

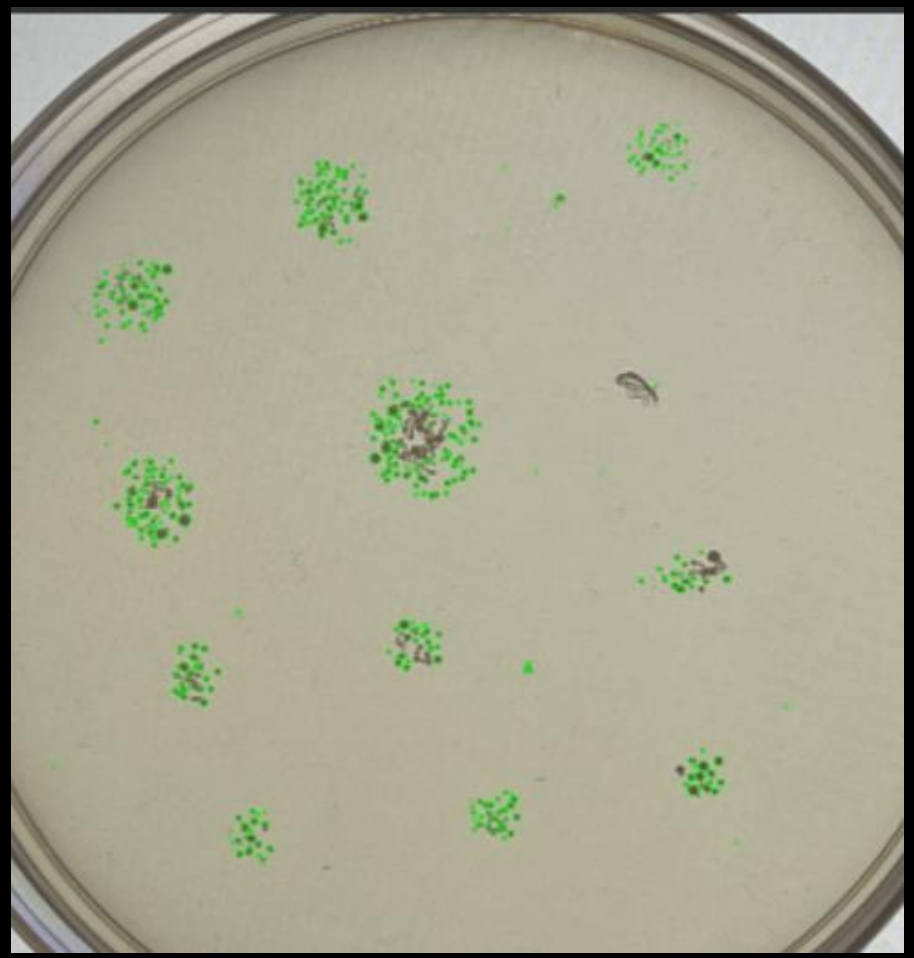
NSF

How many colonies can you see?



Correct Answer

462



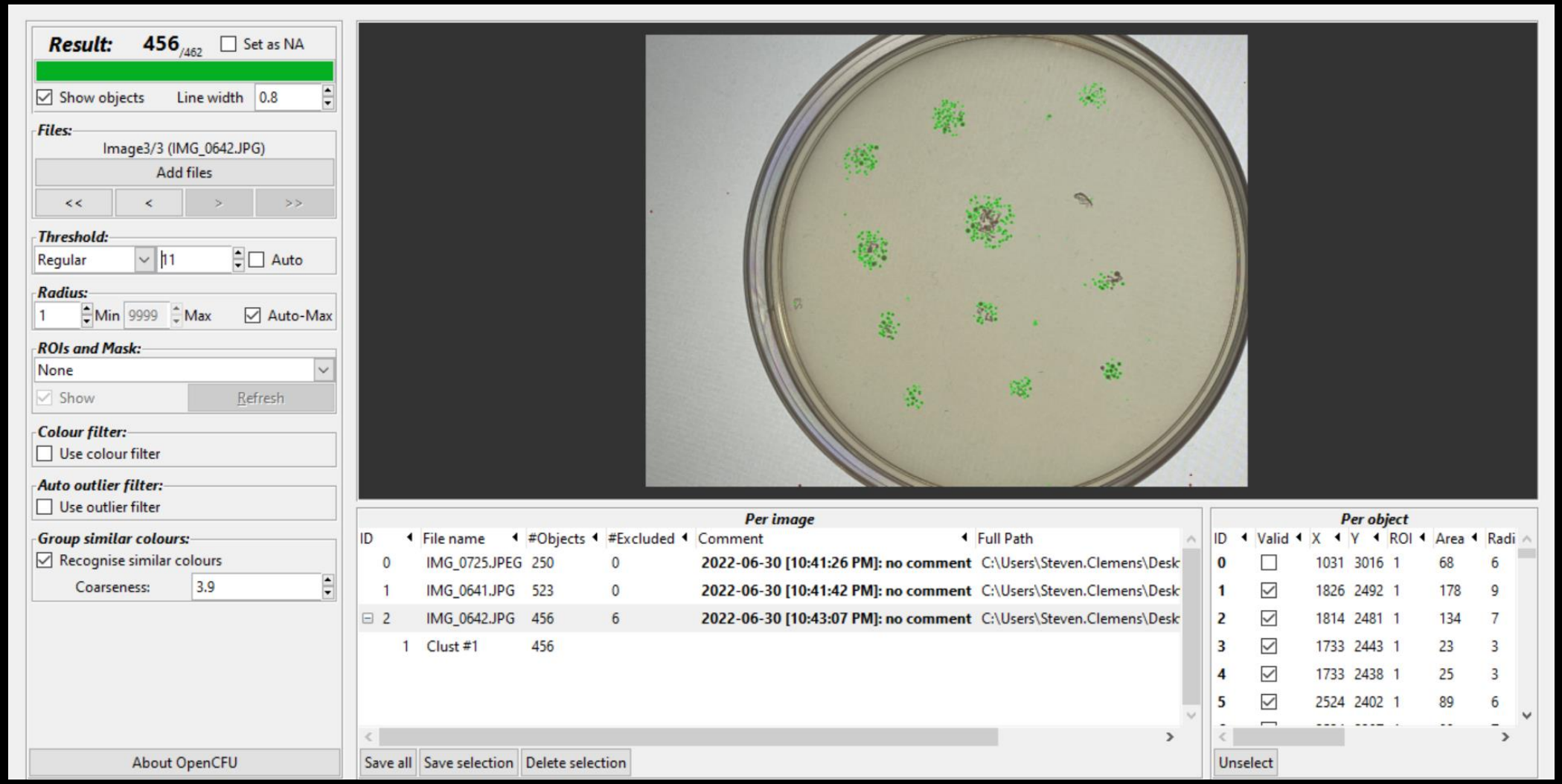
Arizona State University

SenSIP
Sensor, Signal and Information Processing Center

DYSART Unified School District

NSF

Open CFU (colony forming unit)



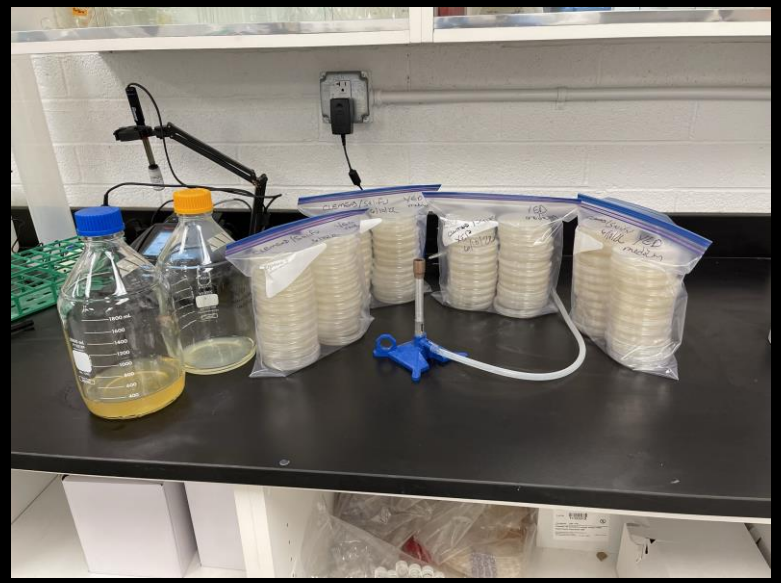
Arizona State University

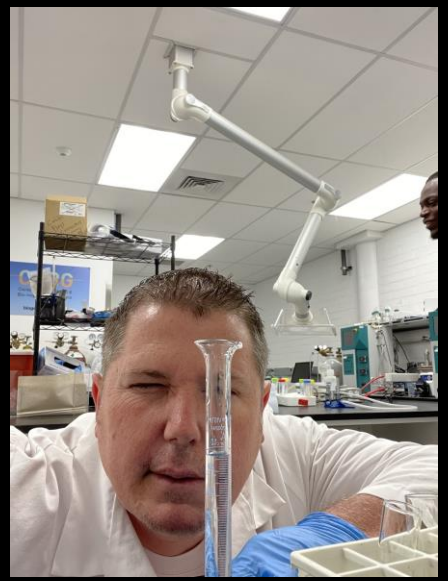
SenSIP Sensor, Signal and Information Processing Center

DYSART Unified School District

NSF

Microbiology





BE
PRECISE!

Arizona State University

SenSIP
Sensor, Signal and Information Processing Center

DYSART Unified School District

NSF

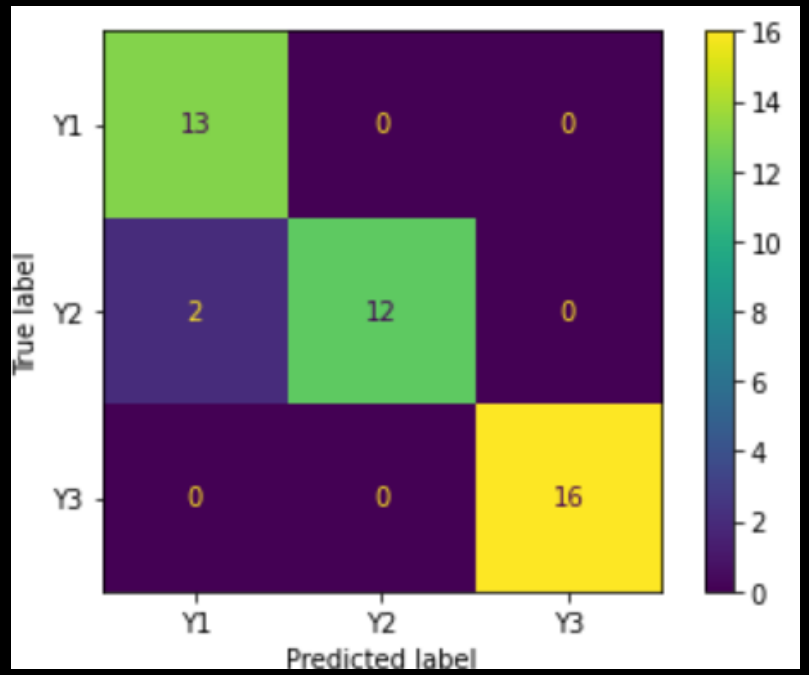
Machine Learning

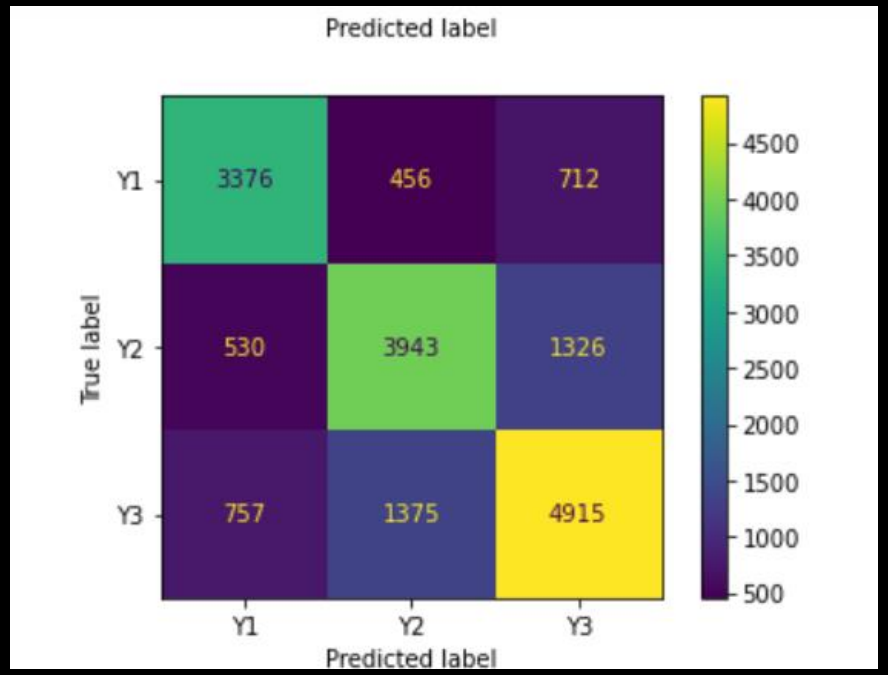
ANACONDA.

python™

colab

Classification – Decision Tree Classifier





Arizona State University

SenSIP
Sensor, Signal and Information Processing Center

DYSART Unified School District

NSF

Classroom Implementation

- Teachers have two choices of implementing the lesson, with and without the microbiology portion. Also teachers can choose to use new data or the included data from my samples.

- Lesson can be completed in one class setting or can be divided over several class periods. Multiple classrooms can be involved with the lesson emulating the work of a research center

- Little to no cost to teacher

- Students will gain an understanding of what machine learning is by the hands on ML tools and how ML can help to solve problem.

ASU Arizona State University

SenSIP Sensor, Signal and Information Processing Center

DYSART Unified School District

NSF