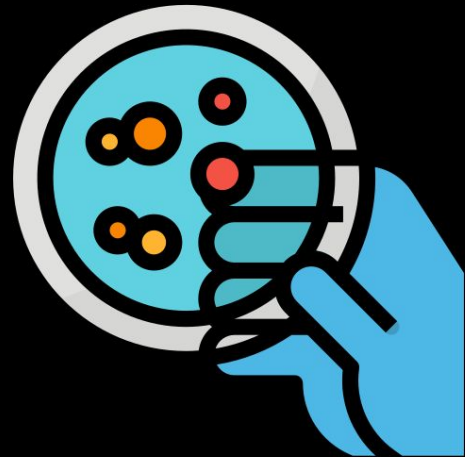


Bacteria Object Detection on Agar: A proof of concept

—
By Dietrich Nigh

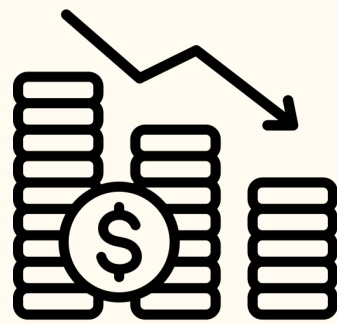


Team



Dietrich Nigh
B.A. Biology, University of Pennsylvania
Data Science Certification, Flatiron School

Manual
Classification is
time and resource
intensive



Agenda



Business Problem



Data Overview



The Model



Future Steps

The Business Problem

—

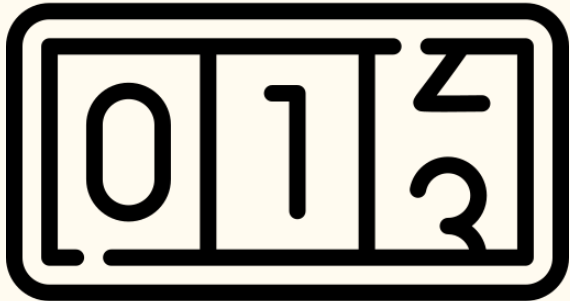
Agar Plates are a staple of the lab

- Invented 1880s
- Used for culturing and isolation
 - Bacteria and Fungi
- 85 millions used annually
- Wide range of applications



Laborious

- Hand Counts
 - 30 to 300
- Easy to over or under seed
- Verification counts needed



Time intensive

- Years of training
- 4 to 24 hours
- Making the plates



How can bacteria
classification be
more accurate,
yet require less
training?



Automation!!!

- Several steps already automatized
- Pretrained model
- Less counting
- Fast, accurate classification



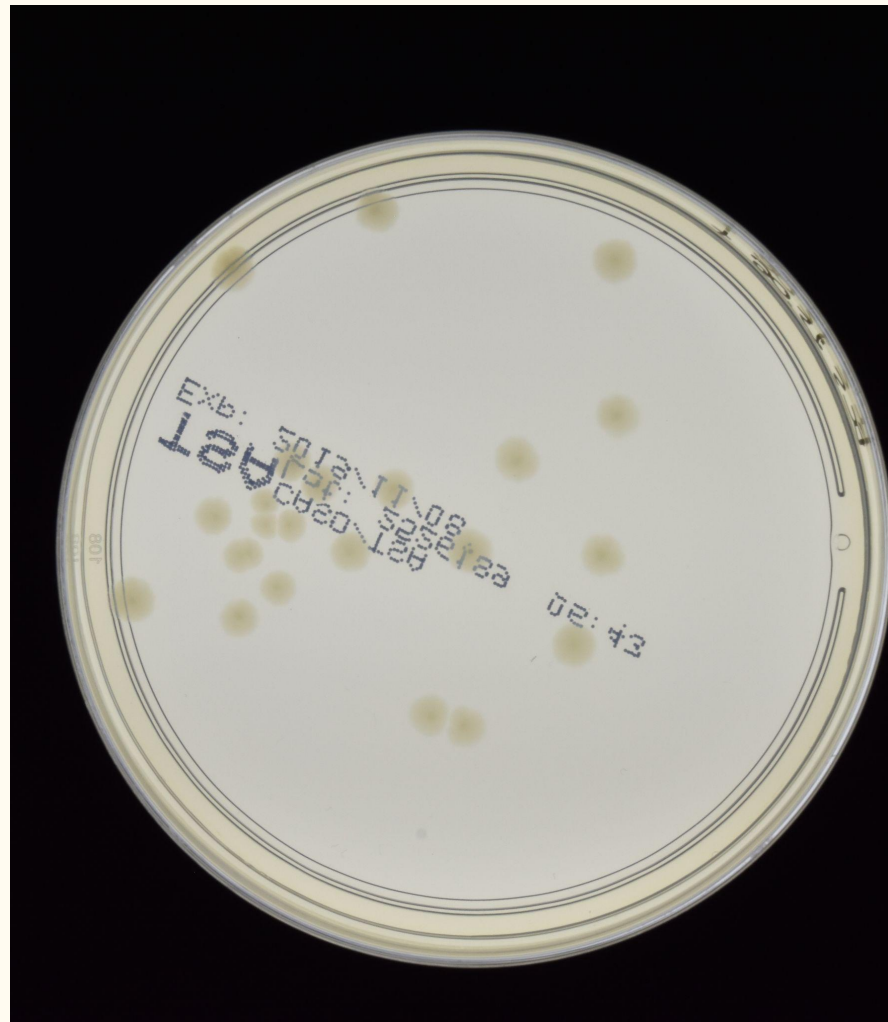
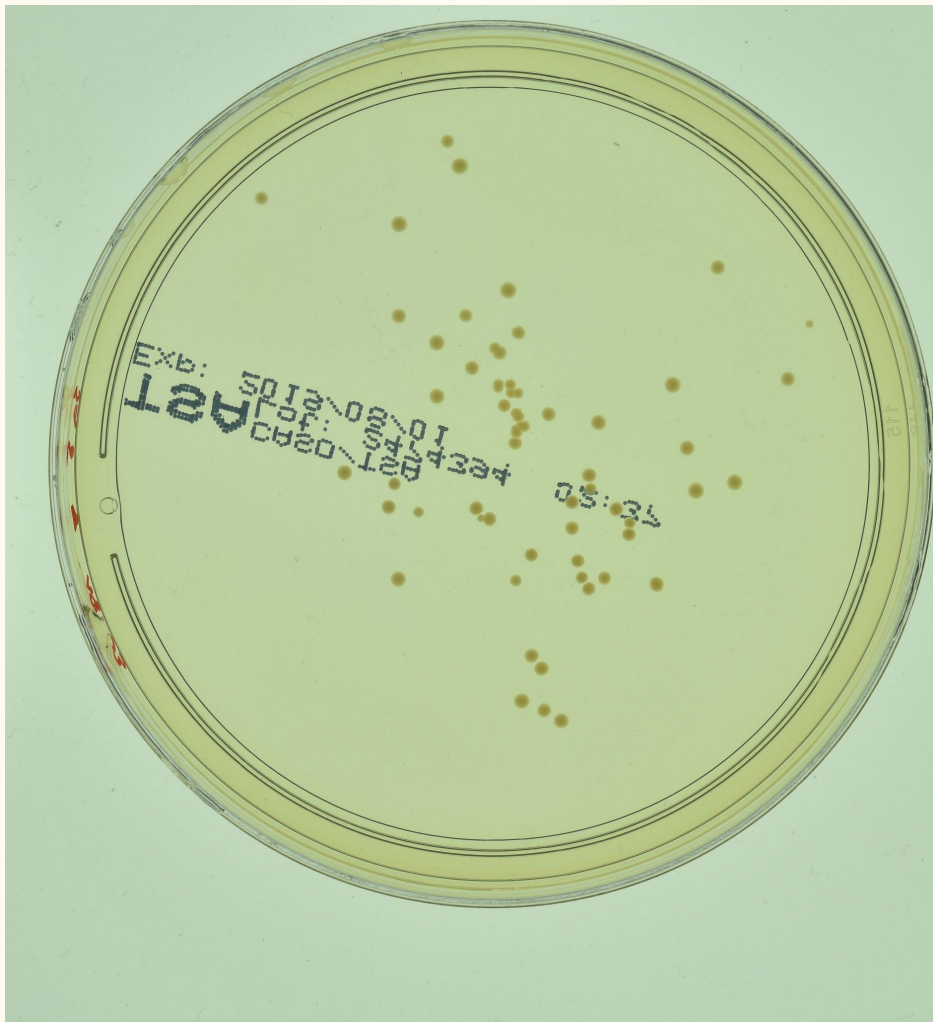
Data Overview

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Data Used

- NeuroSYS Research data
 - academic license.
- 13000 images
- Five different microorganisms
 - S.aureus - Skin Infection
 - B.subtilis - Food Poisoning
 - P.aeruginosa - Pneumonia, Other infections
 - E.coli - Food Poisoning, UTIs
 - C.albicans - Thrush, Yeast Infections
- Limitations



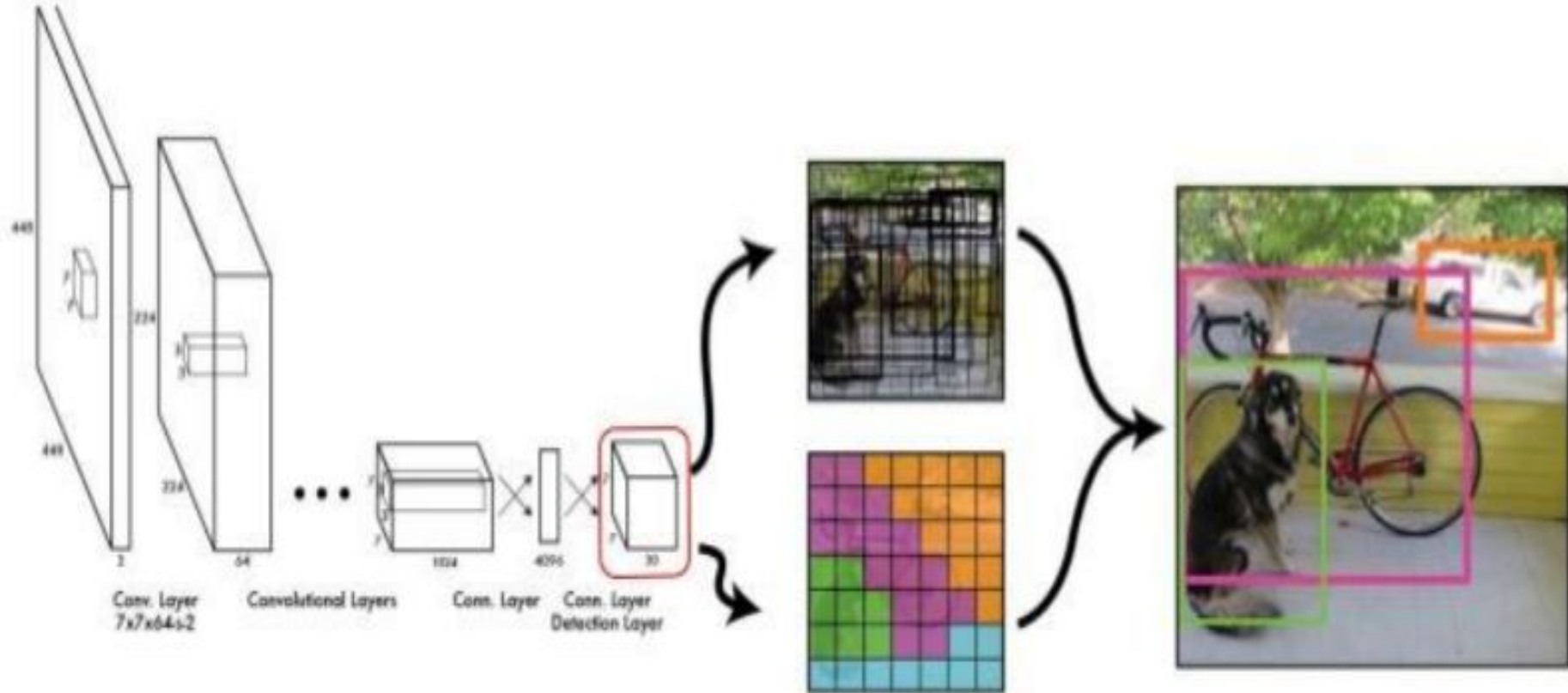


The Model

—

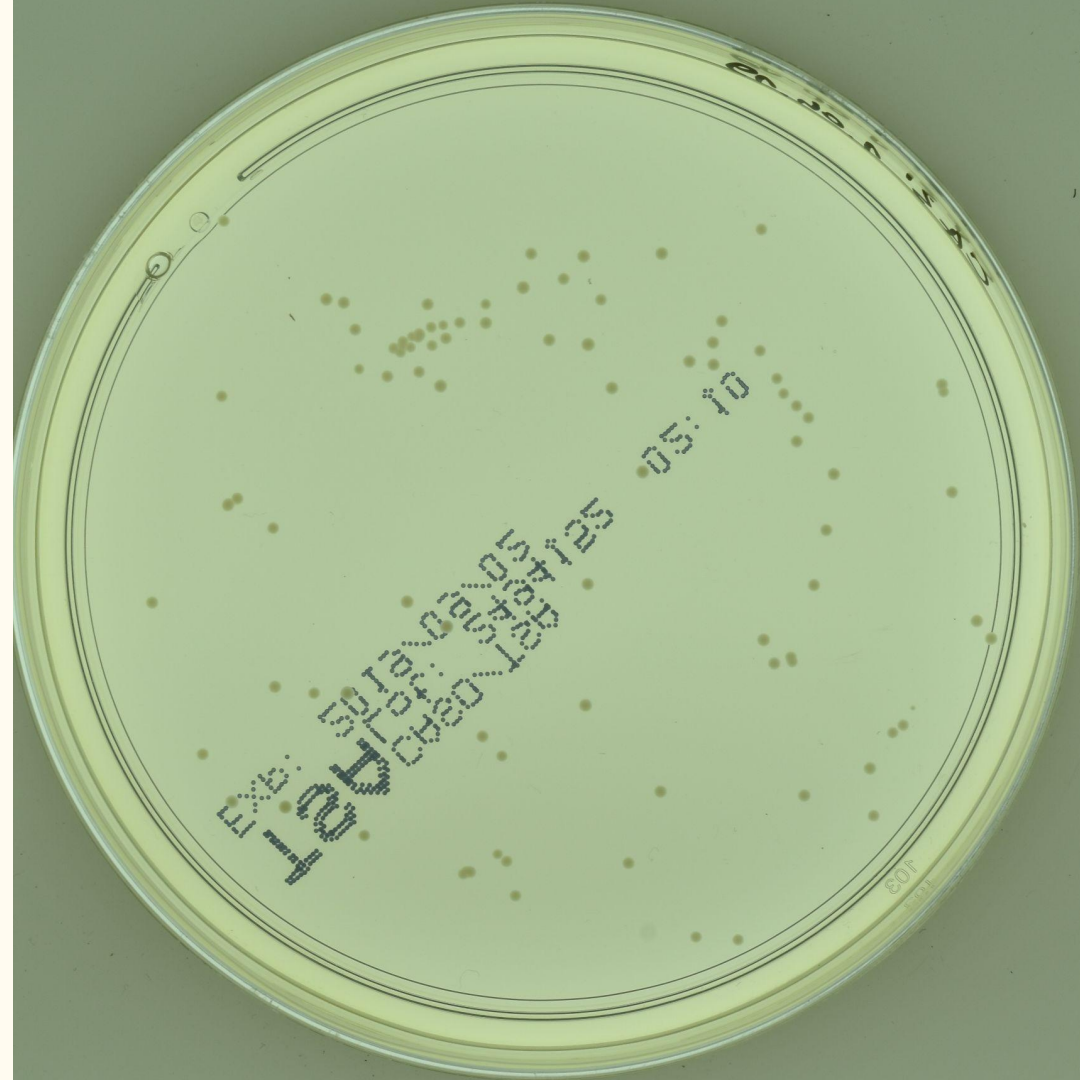
YOLO: You Only Look Once

mAP50: 97%
mAP50-95: 70 %
Precision: 97 %



Example:

- 91 *C. Albicans* colonies

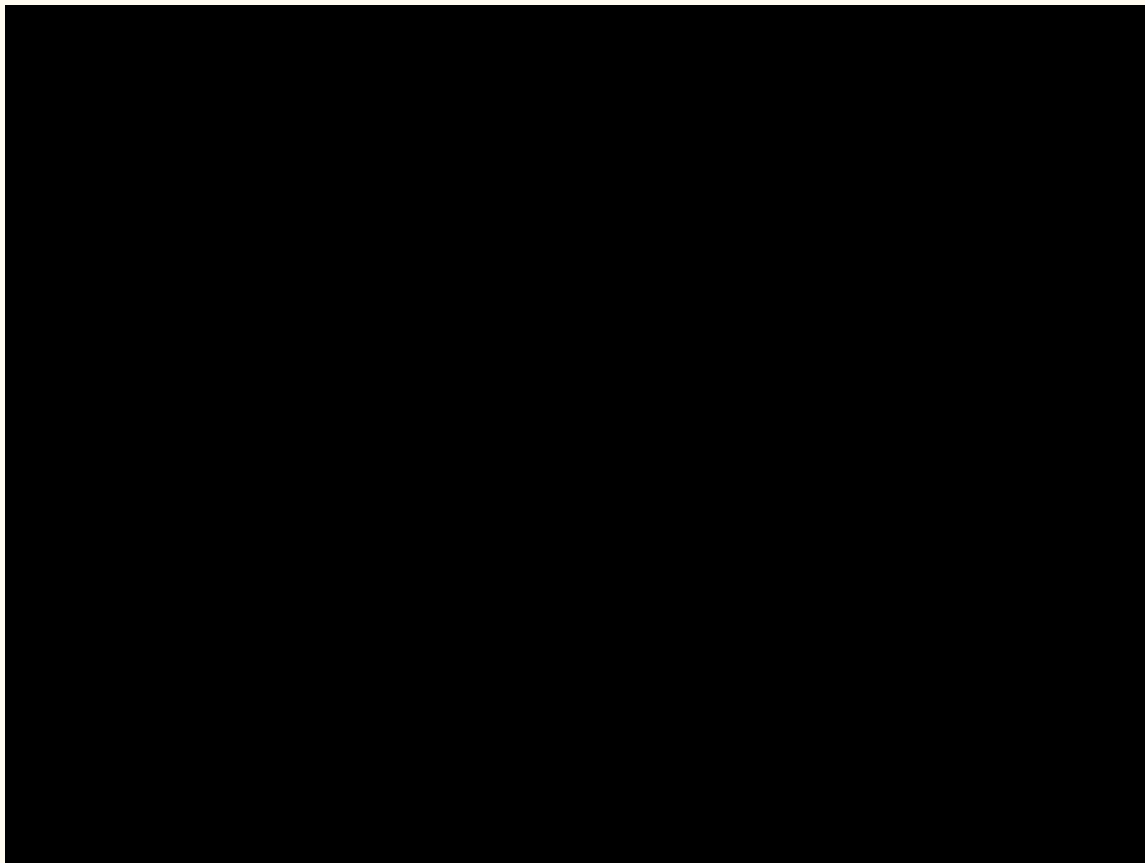


Example:

- 91 *C. Albicans* colonies
- Returns label colonies and count
- Less than 2 seconds

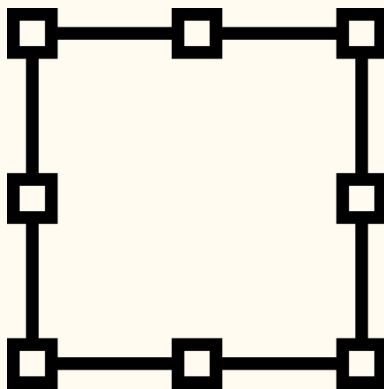
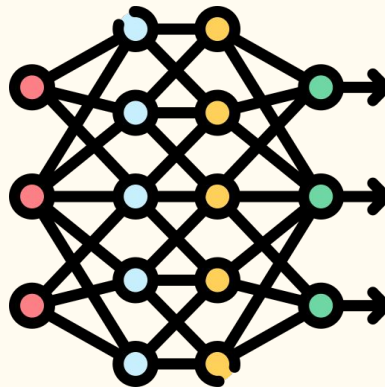
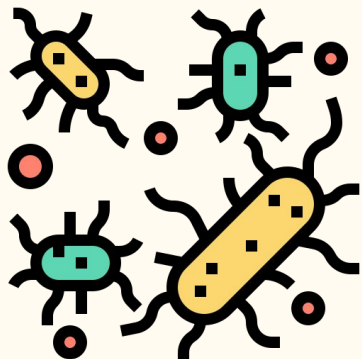


Demo Deployment: < 45 seconds



Future Steps

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Thank you

Any Questions?