
Connect the Dots

Quantitative **I**sothermal **A**mplification **M**achine **L**earning

State of the art:

HOME BASED COLLECTION-PCR



Pixel by Labcorp COVID-19 Test Home Collection Kit

POC PCR



Cepheid GeneXpert

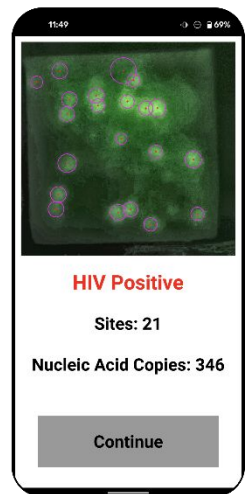
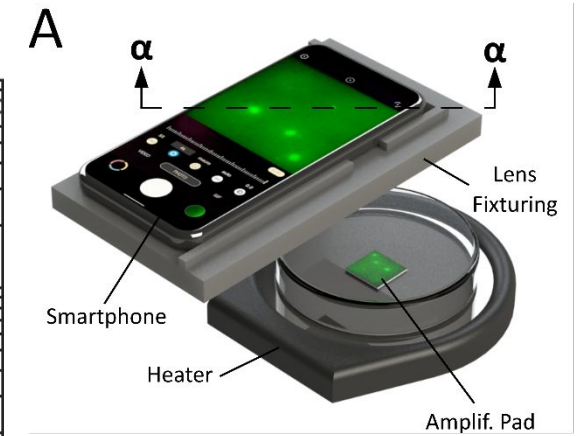
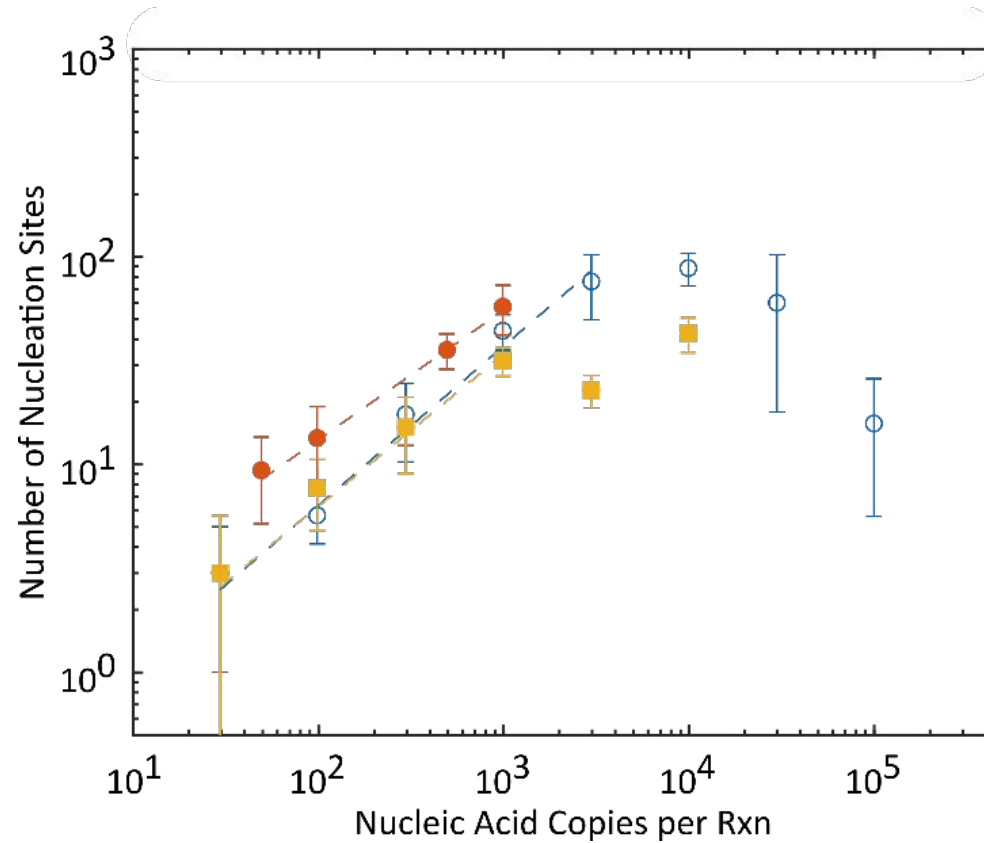
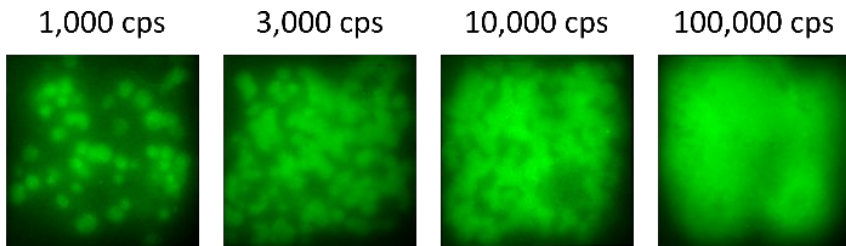
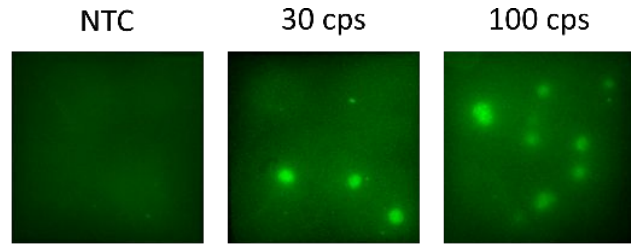
ISOTHERMAL ASSAY



Lucira Check It COVID-19 Test

For COVID the FDA has provided emergency use authorization to 266 home-based collection and 3 isothermal assays for home based COVID diagnosis.

Our Project



Description of Software

- Can this data be utilized in a machine learning model to improve quantifiable range?
 - set out to produce a regression model
 - due to lack of data produced a 3 classification ML CNN
- User supplies an endpoint reaction picture picture
- Three classification CNN predicts input concentration based on High, Medium, and Low input copies
- The image is displayed with along with input copy prediction on interactive website.

Data Science Methods

- Image pre-processing using OpenCV
- Image data read-in to a tensorflow dataset
- sequential model
 - 2D convolution 8 neurons
 - flattening
 - Dense layers 16 neurons
- Optuna used to optimize hyperparameters
 - activation
 - optimizer
- Limited data size
 - 0 batch training
 - 50% validation split
- Visualized with Streamlit

Summary

Conclusion on Project

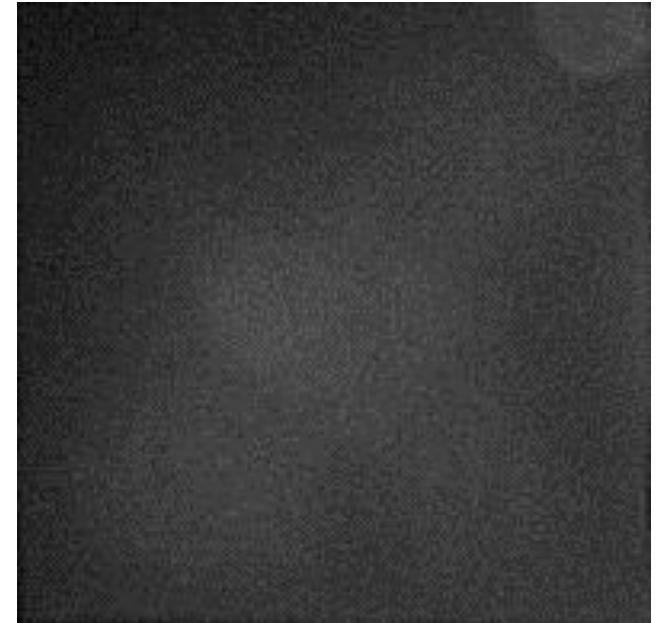
- Model trained on seven images had accuracy of ~40%
- Preliminary website design
- Project structures
- Proof of concept

What we learned

- Analyzing user cases
- Using Github for version control
- More practices with python

Next step

- Try to model with other methods
- Include time-dependent parameters
- Polish the website design
- More tests for functions



Questions?
