Source: Unsplash

GeoAI Hack

LocustFinder

A GeoAI Powered Application that Predicts Desert Locust Breeding Zone

Presented by:

GeoTechAI Team

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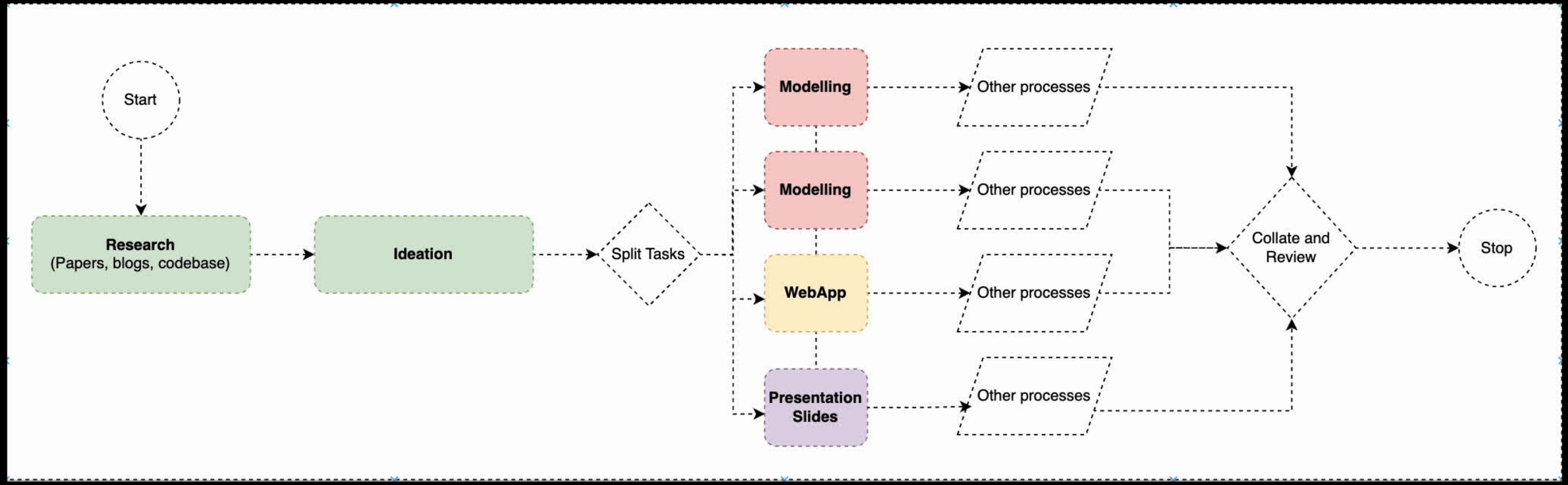
Background

- Desert locust
- Against the goal to acheiving food security (SDG2)

Objectives

- To develop a scalable and lightweight locust breeding ground prediction model with good performance.
- To develop a deployed web application that is ready for operational use.

Hackathon Approach



Process

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Dataset

Earth Observation: Harmonized Landsat and Sentinel-2 (HLS) multispectral data (NASA/USGS)

Sentinel-2 multispectral data (European Space Agency - ESA)

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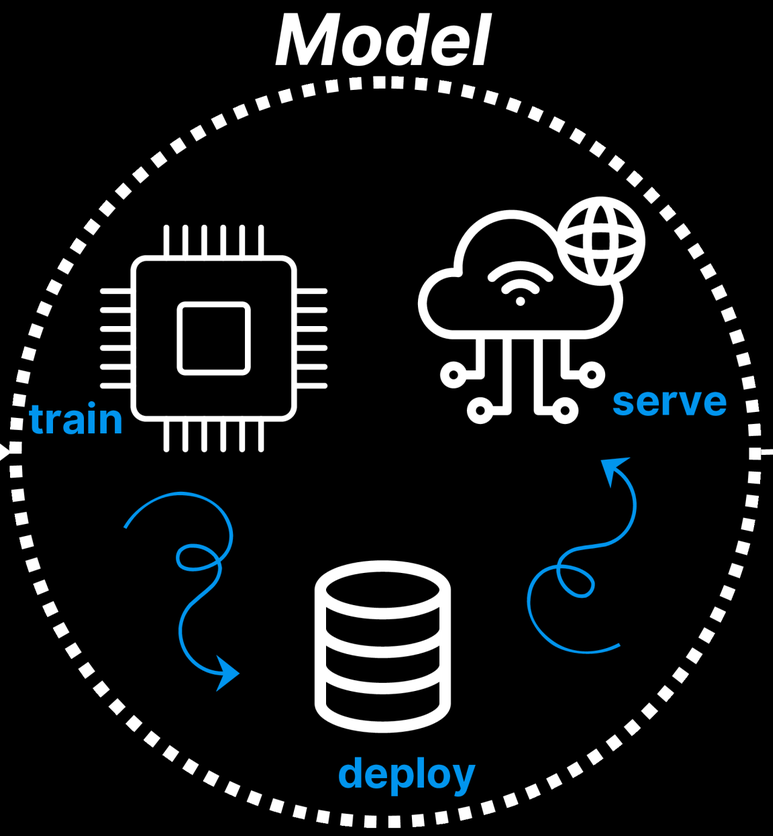
Model



Experiment & Learn

Actionable Insight

Live use cases

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Train

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Model Backbone

Prithvi

Hyperparameter tuning:

Weight decay , Data augmentation , Mean Std , Hit and Trial

0.1, 20 epoch, 70% accuracy

0.01, 60 epoch, 67% accuracy

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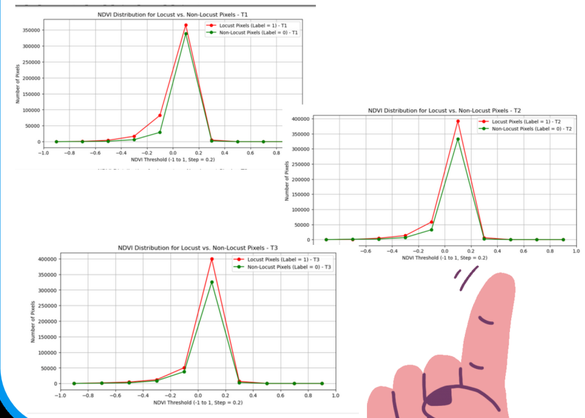
Other attempts

Clay foundation model

Classical Machine Learning model (LightGBM)

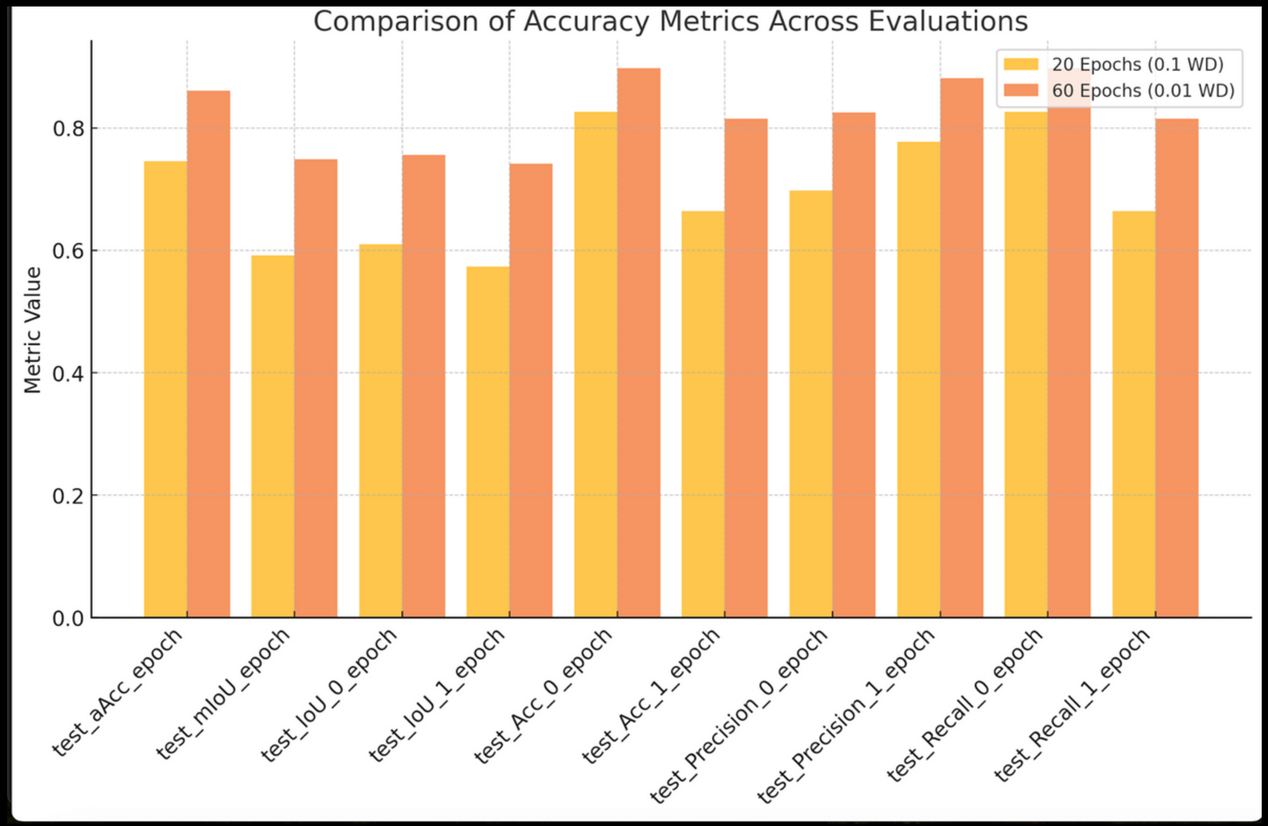
Other attempts

Computed NDVI as an additional band



Accuracy

	Metrics	20 Epochs (0.1 WD)	60 Epochs (0.01
1	test_aAcc_epoch	0.7456	0.8613
2	test_mIoU_epoch	0.5912	0.7486
3	test_IoU_0_epoch	0.6096	0.7555
4	test_IoU_1_epoch	0.5729	0.7417
5	test_Acc_0_epoch	0.8266	0.8976
6	test_Acc_1_epoch	0.6638	0.8148
7	test_Precision_0_epoch	0.6978	0.8256
8	test_Precision_1_epoch	0.7772	0.8814
9	test_Recall_0_epoch	0.8266	0.8976
10	test_Recall_1_epoch	0.6638	0.8148



Deploy

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Backend

FastAPI

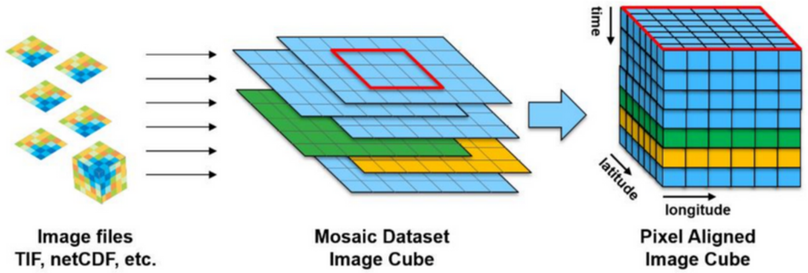
Front end

React and MapLibre GL JS

Running Model

InstaGeo Python Package

Data cube approach to fetch multi-temporal data and compute across time dimension for web application



VirtuGhan

a virtual **datacube** to fetch sentinel 2 data

Script to fit downloaded sentinel 2 images into tiles for inference

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Serve

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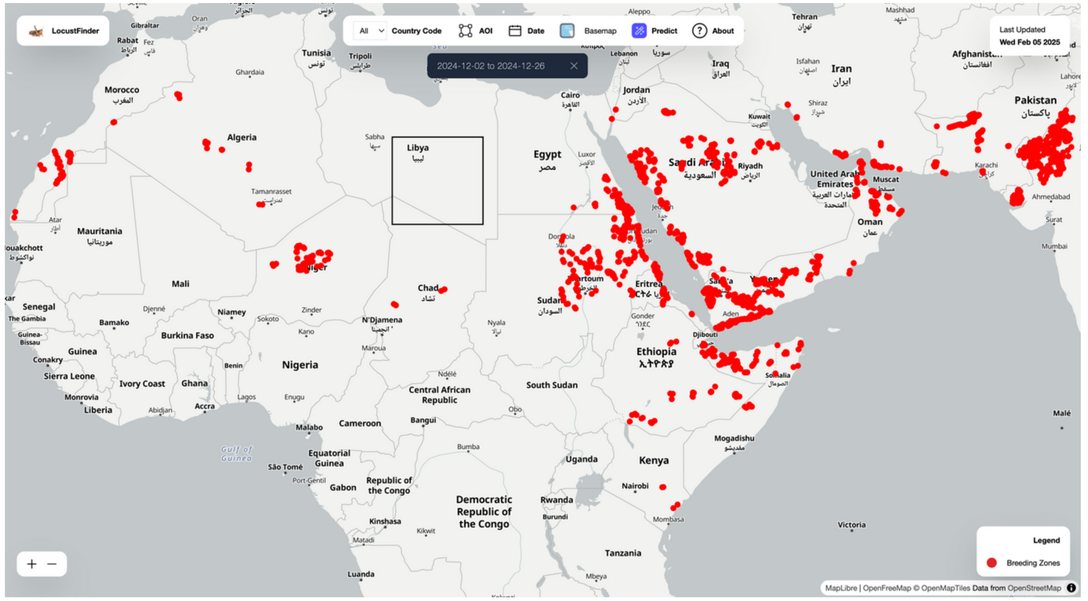
What can users do

Define Bounding Box

Pick time of interest (monthly, weekly) for anytime.

See live prediction

The final web application product can run **live prediction with pre-trained model** in **any area of interest** based on **user's demand**



innovative, scalable, efficient

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Actionable Insights

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Demo

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Summary and Next Steps

Summary

- **Efficient:** Fast prediction across multiple locations
- Scalable: Live prediction anywhere, anytime. Works on new imagery

Next Steps

- Fine tune prithvi and clay with more epochs and hyper tuning adding arbitary bands such as NDVI for better accuracy
- Dockerizing application and making it production ready

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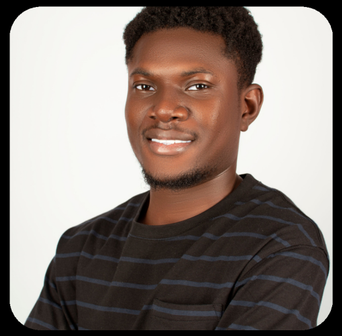
Thank you for listening!



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