GeoAI Model Transformation

Team 6 (Team Awesome)

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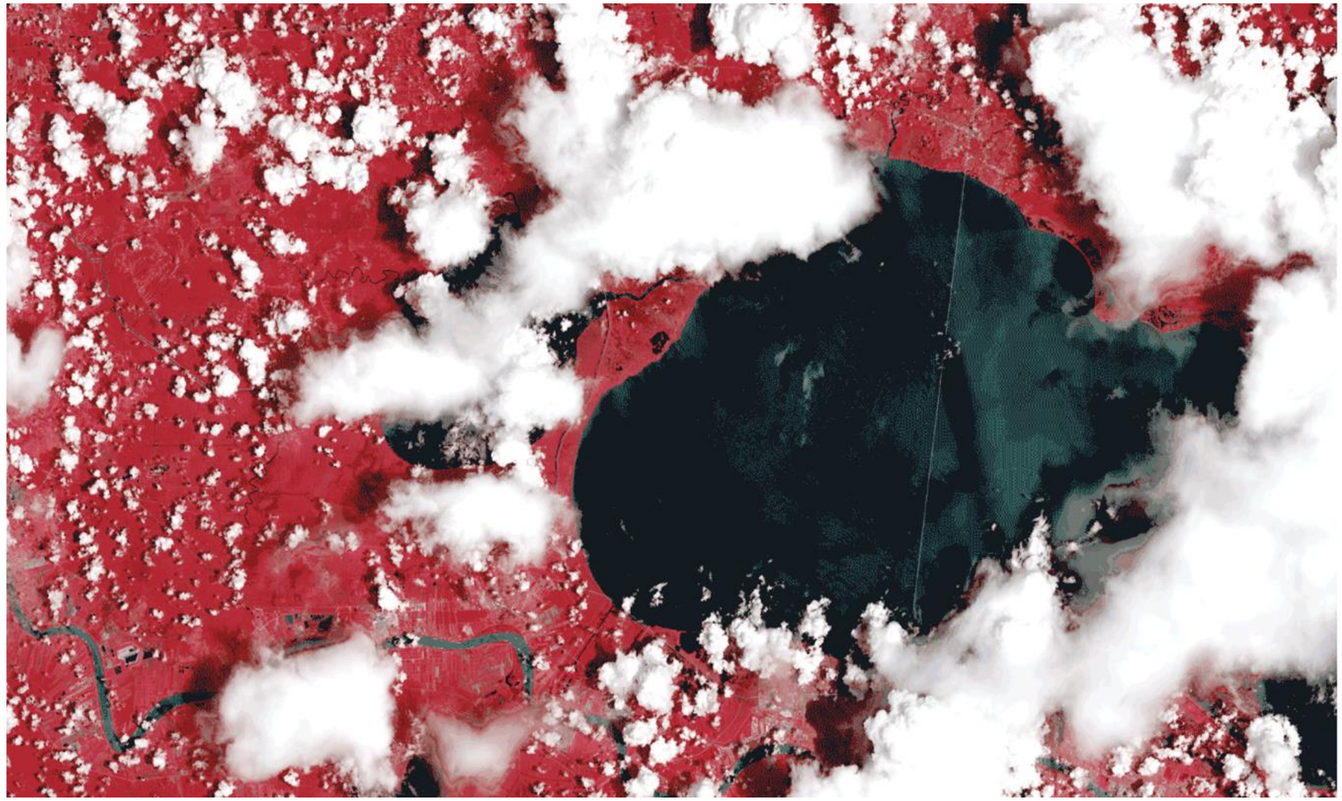
Team leaders

Dr. Eric Shook & Dr. Diana Sinton

Background

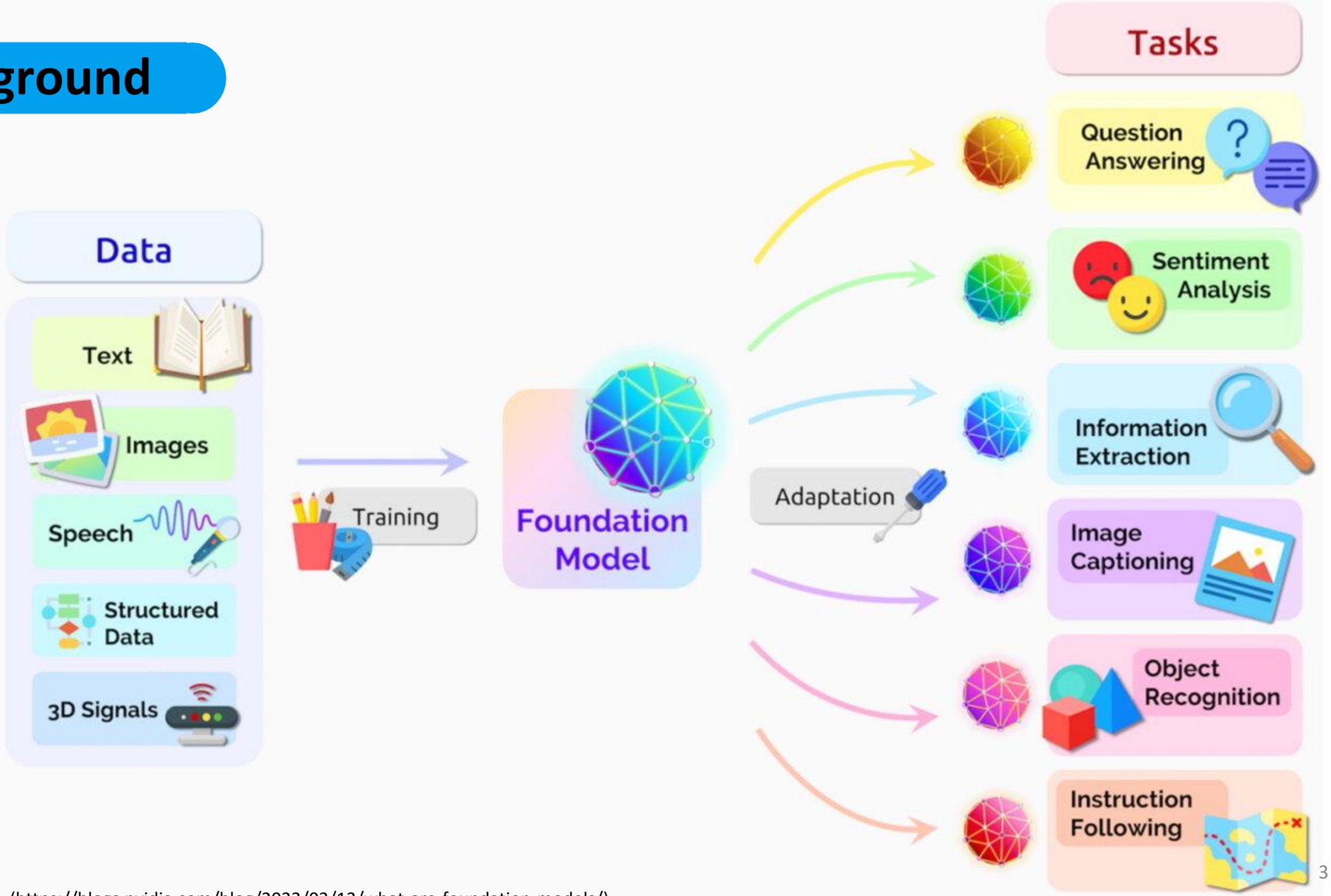
Gain **practical experience** in applying **deep learning techniques** to real-world spatial problems, at the **cutting edge of GeoAI**

- *"NASA's first open-source geospatial artificial intelligence (AI) foundation model for Earth observation data…is a **milestone in the application of AI for Earth science.**"*



(https://www.earthdata.nasa.gov/news/impact-ibm-hls-foundation-model)

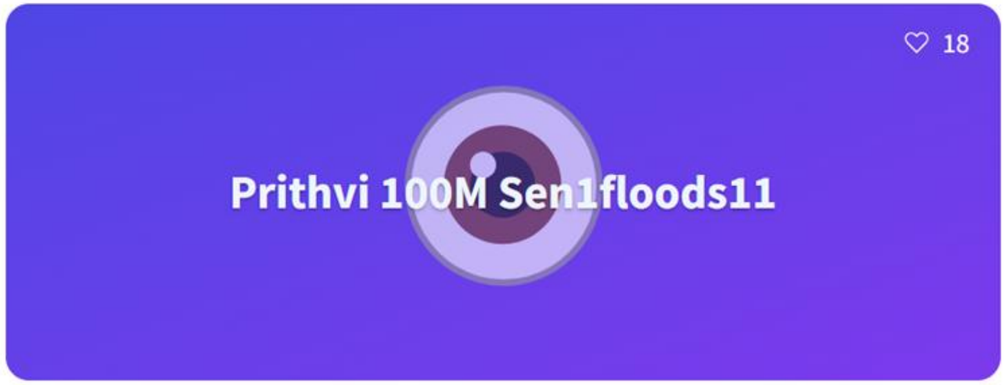
Background



(https://blogs.nvidia.com/blog/2023/03/13/what-are-foundation-models/)

Research Objectives

1. Deploy foundation model to the I-GUIDE Platform
2. Replicate model fine-tuning for flood, burn, and crop classification
3. Create our own fine-tuned model to detect built areas



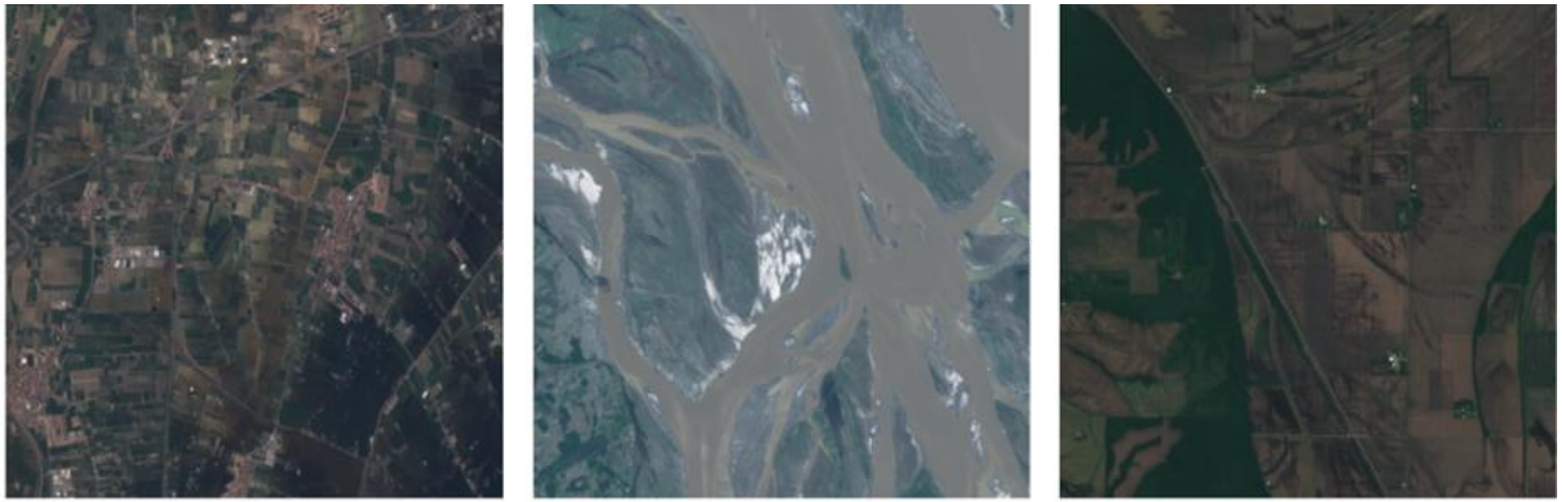
(https://huggingface.co/ibm-nasa-geospatial)

Fine-tuning: Flooding

No water

Water / Flood

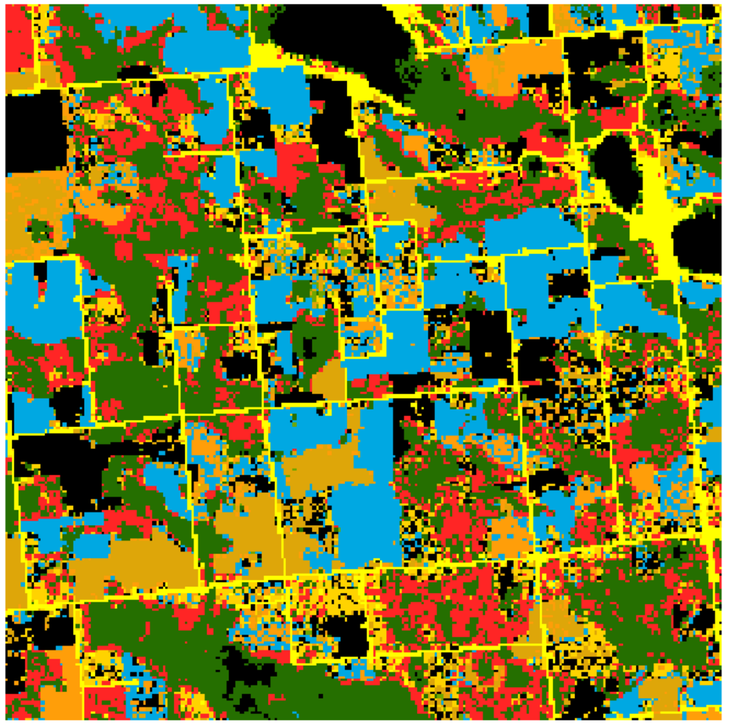
Inputs
(Raw Imagery)



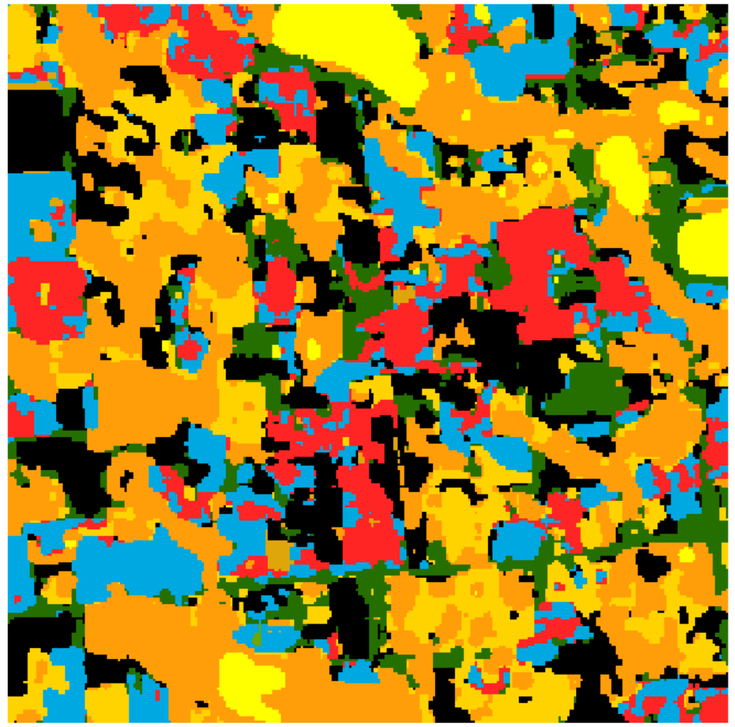
Outputs
(Binary
Classification)

Fine-tuning: Crop Classification

Input (Multi-Temporal Imagery)



Multi-classification



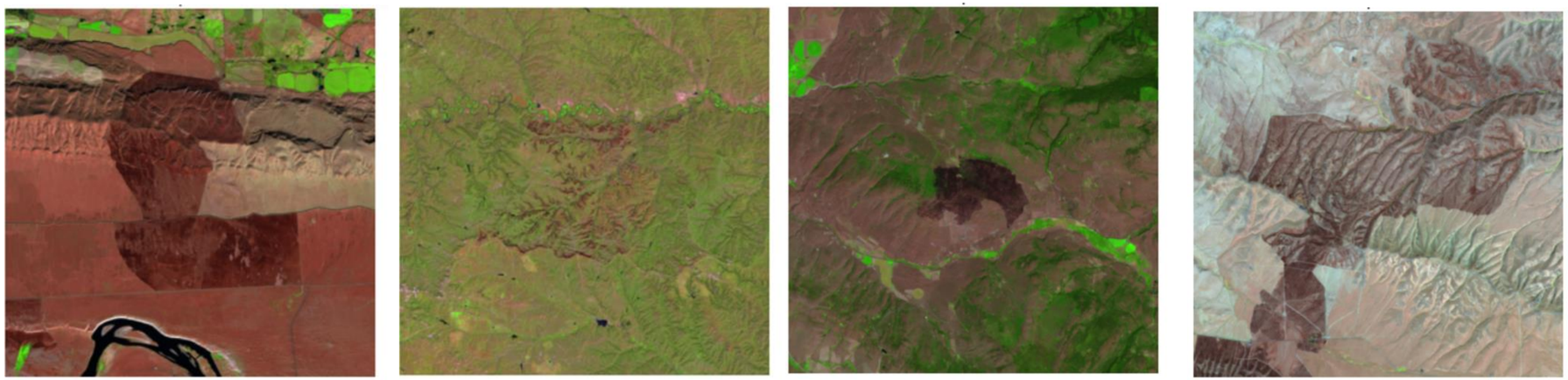
Model Prediction

Fine-tuning: Burn scar

Unburnt land

Burn scar

Inputs
(Raw Imagery)



Outputs
(Binary
Classification)

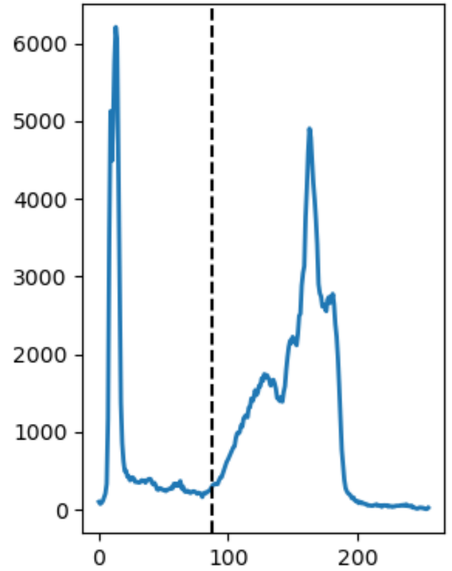
Fine-tuning Model for Our Novel Application

Normalized Difference Built-Up Index (**NDBI) for Urban Mapping** (Zha et al., 2003)

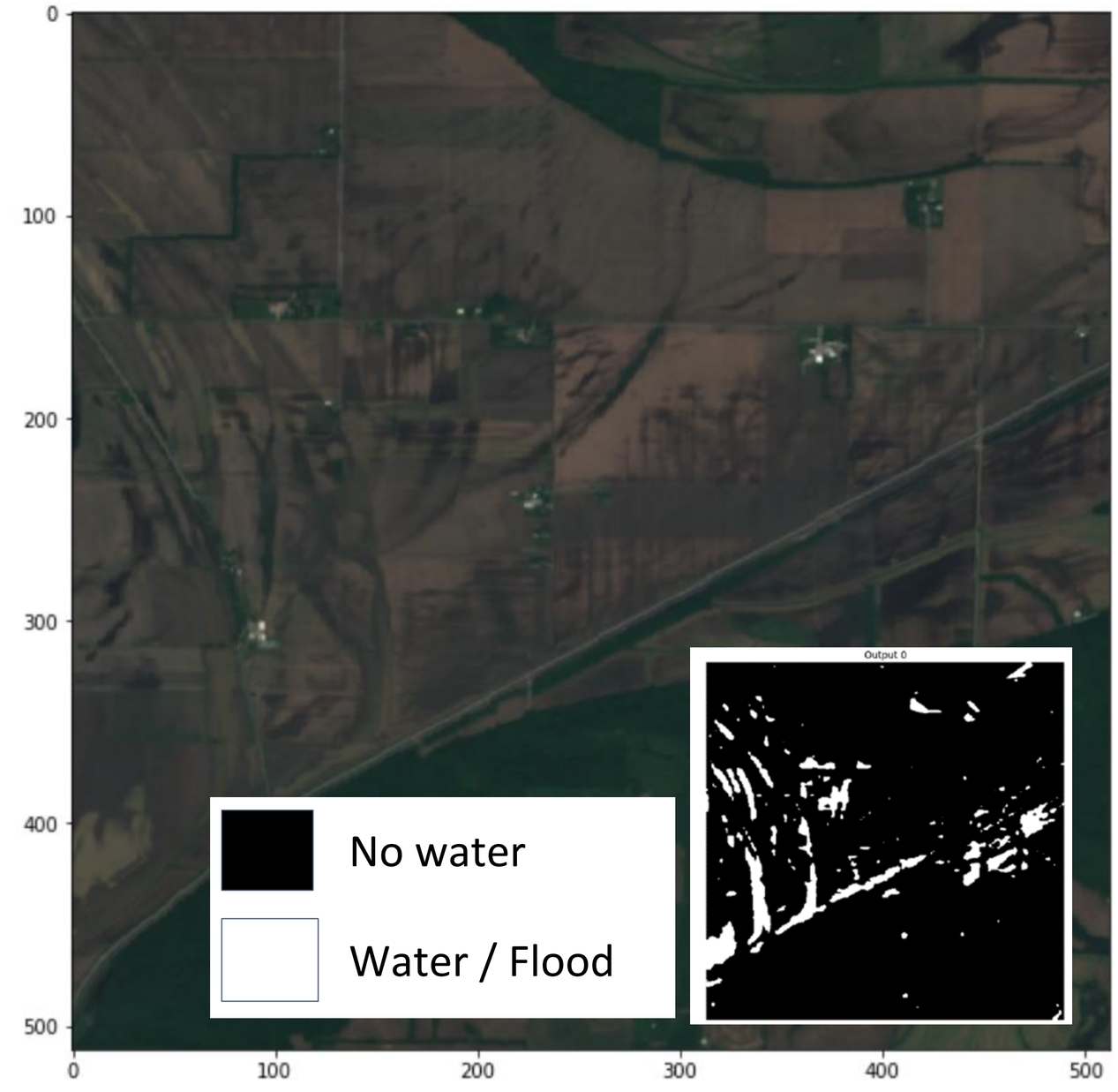
$$NDBI = \frac{SWIR - NIR}{SWIR + NIR}$$

where SWIR is the mid-infrared and NIR is the near-infrared band

Otsu's thresholding method



Fine-tuning results of our model



Contributions

Data Card

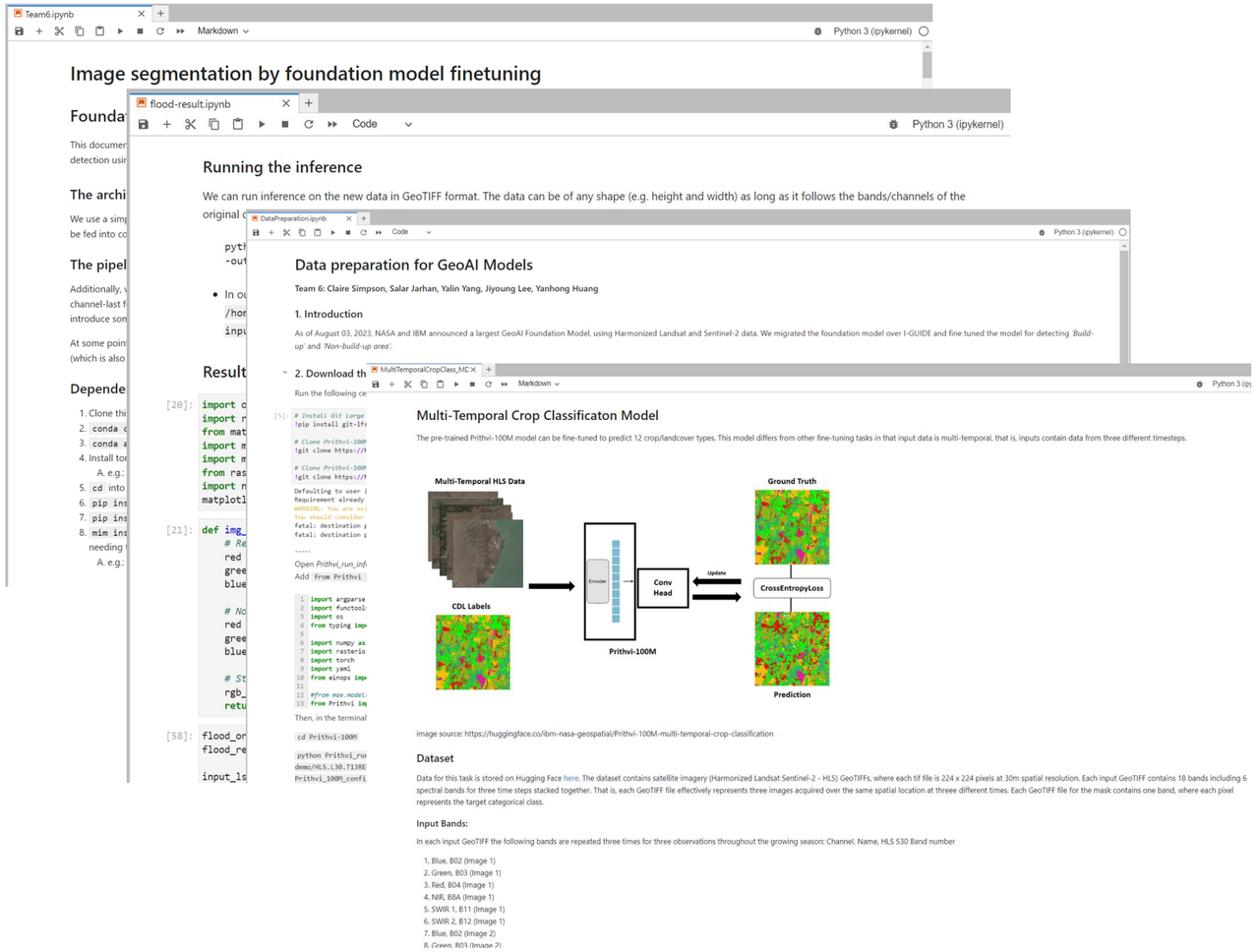
I-GUIDE

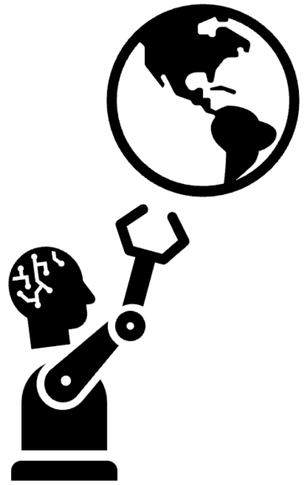
ABRIDGED VERSION PRODUCED FOR I-GUIDE SUMMER SCHOOL, August 2023

Team 6 dataset	Write a short summary describing your dataset (limit 200 words). Include information about the content and topic of the data, sources and motivations for the dataset, benefits, and the problems or use cases it is suitable for. The dataset utilized in this project contains temporal Harmonized Landsat-Sentinel imagery of diverse land cover and crop type classes across the Contiguous United States for the year 2022. The data card is right here https://huggingface.co/datasets/ibm-nasa-geospatial/multi-temporal-crop-classification. The primary motivation behind this dataset was to use a model capable of generating masked datasets for specific classification, leveraging training datasets for model training and validation. The resultant dataset showcases prediction results that could be vital for urban planning, environmental studies, disaster management, and other relevant fields. The process's benefits include the ability to monitor land use changes, understand urban expansion, and contribute to sustainable development practices. This dataset is particularly suitable for applications that require a detailed understanding of land use patterns, where quality spatial information about built-up areas is essential. Its utilization promises to enhance the understanding and management of urban landscapes, catering to both scientific research and practical applications in various domains.
DATASET LINK	DATA CARD AUTHOR(S)
Provide a link to the dataset:	*Select **one role per** Data Card Author:* *(Usage Note: Select the most appropriate choice to describe the author's role in creating the Data Card.)*
Dataset Link https://huggingface.co/datasets/ibm-nasa-geospatial/multi-temporal-crop-classification/tree/main	**Claire Simpson, Team 6:** (Contributor) **Salar Jarhan, Team 6:** (Contributor) **Yalin Yang, Team 6:** (Contributor)

Contributions

- Advance Geo AI research based on **reproducibility** and **collaboration**
- Guide for you to execute your own tasks





Thank you!
Awesome Geo AI
Awesome I-GUIDE
Awesome Summer School