

Visualizing NASA OPERA Datasets with Leafmap

Qiusheng Wu

Associate Professor

Department of Geography & Sustainability

University of Tennessee, Knoxville

<https://gishub.org>



NASA OPERA 5th Stakeholder Engagement Workshop

Slides: <https://tinyurl.com/OPERA-Leafmap>



slides

Outline

- Introduction to Leafmap
- Data Visualization
- Data Analysis
- Additional Resources
- Q&A



Leafmap

- GitHub: <https://github.com/opengeos/leafmap>
- Website: <https://leafmap.org>

opengeos / leafmap

Unwatch 58

Fork 414

Star 3.4k

Open Studio Lab Open in Colab launch binder pypi v0.38.16 downloads 879k recipe leafmap conda-forge v0.38.16

downloads 203k docs passing Linux build passing pre-commit.ci passed License MIT YouTube Channel

JOSS 10.21105/joss.03414

A Python package for geospatial analysis and interactive mapping in a Jupyter environment.

- GitHub repo: <https://github.com/opengeos/leafmap>
- Documentation: <https://leafmap.org>
- PyPI: <https://pypi.org/project/leafmap>
- Conda-forge: <https://anaconda.org/conda-forge/leafmap>
- Leafmap tutorials on YouTube: <https://youtube.com/@giswqs>
- Free software: [MIT license](#)



Used by 2.3k



Contributors 39



[+ 25 contributors](#)

3D Visualization

[Notebooks](#)

[Web App](#)



Searching for OPERA Data Interactively

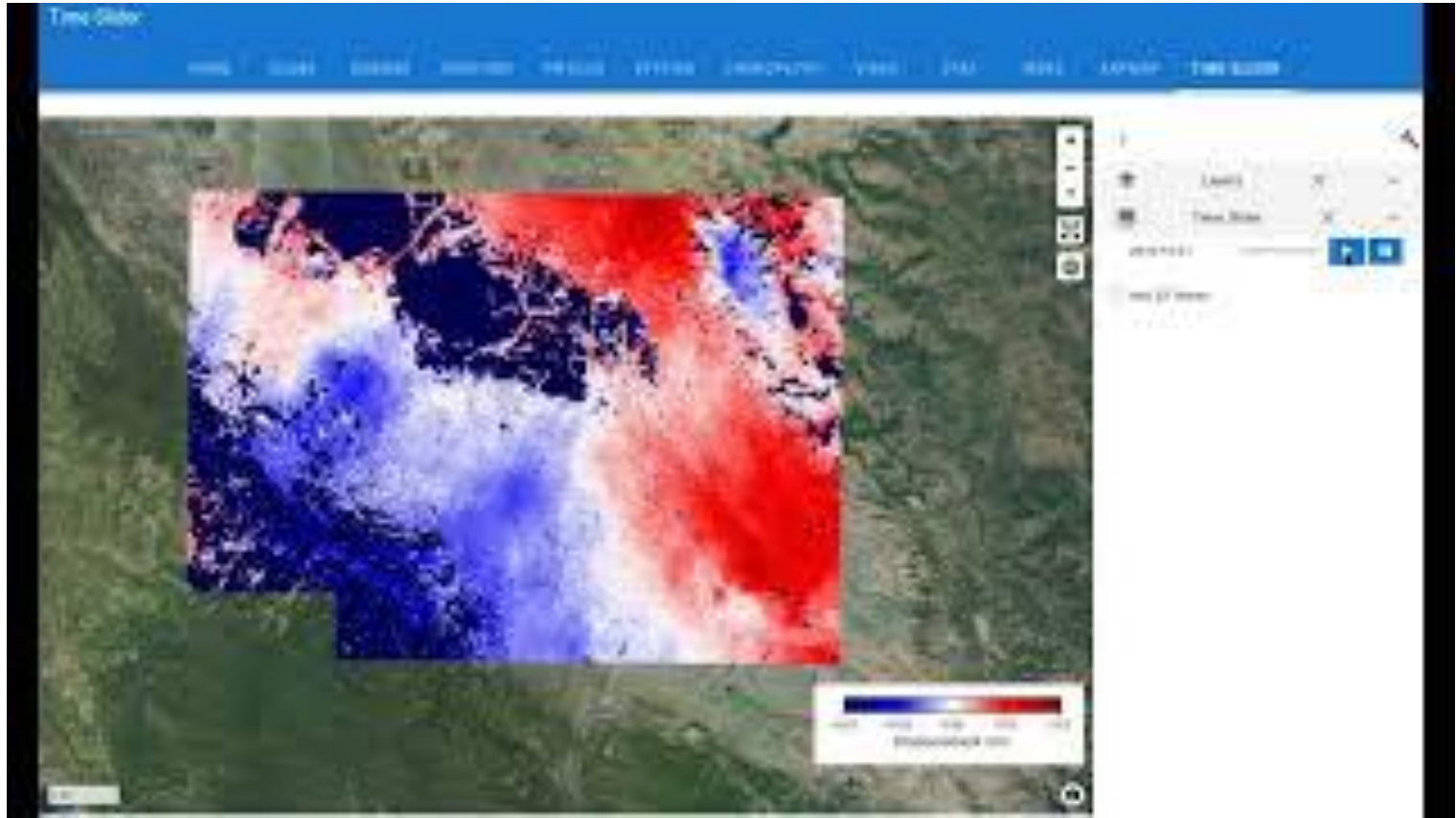
[Notebook](#)



Visualizing OPERA Time-Series Data

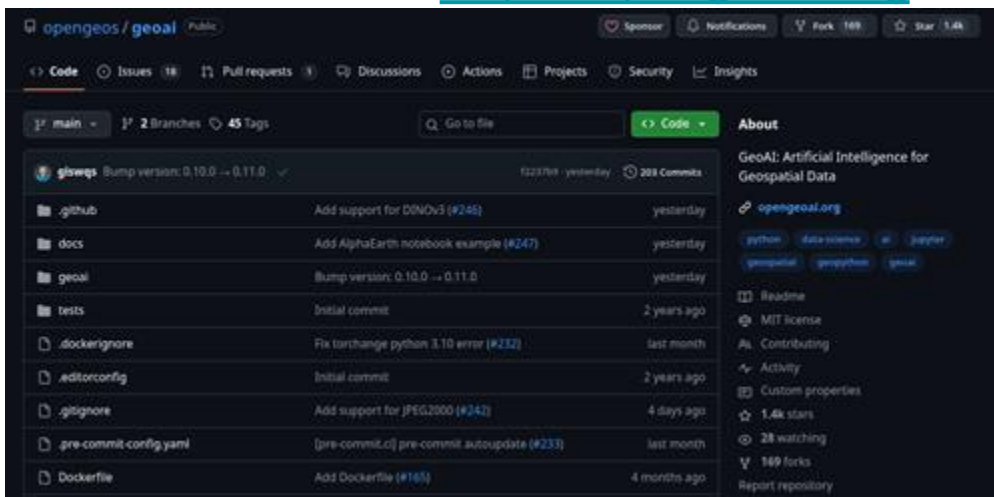
[Notebook](#)

[Web App](#)



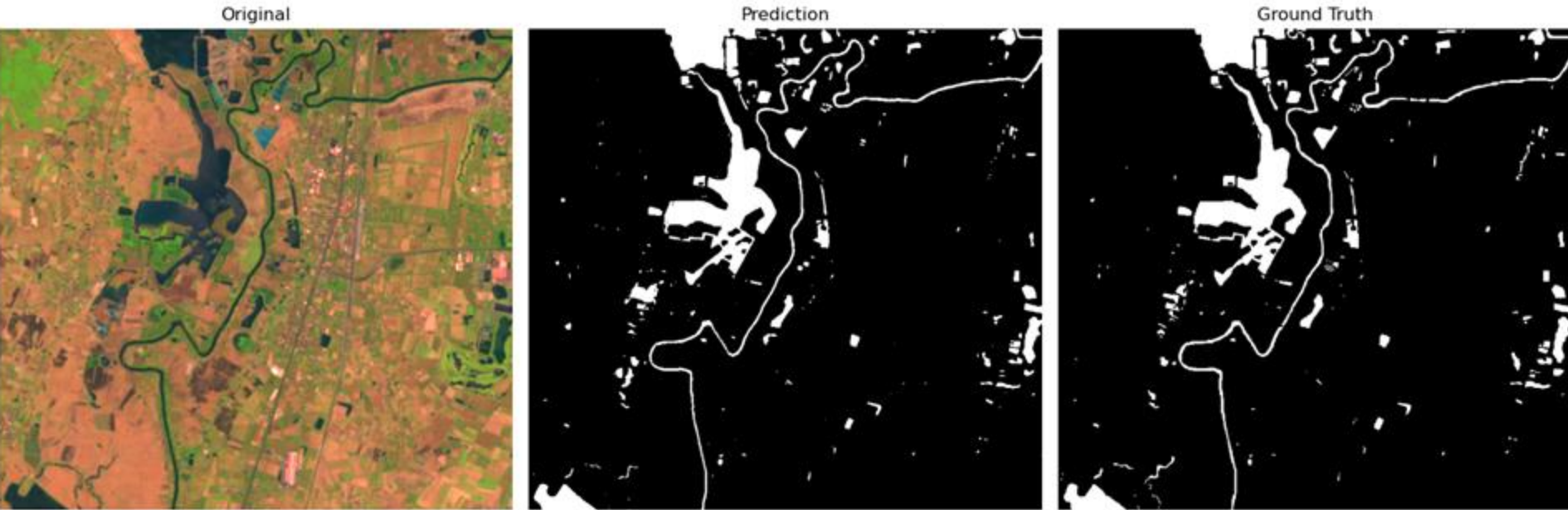
GeoAI

- A powerful Python package for integrating Artificial Intelligence with geospatial data analysis and visualization
- GitHub: <https://github.com/opengeos/geoai>
- Documentation: <https://opengeoai.org>



Surface Water Mapping with Sentinel-2 Imagery

[notebook](#)



Surface Water Mapping with NAIP Imagery

[notebook](#)

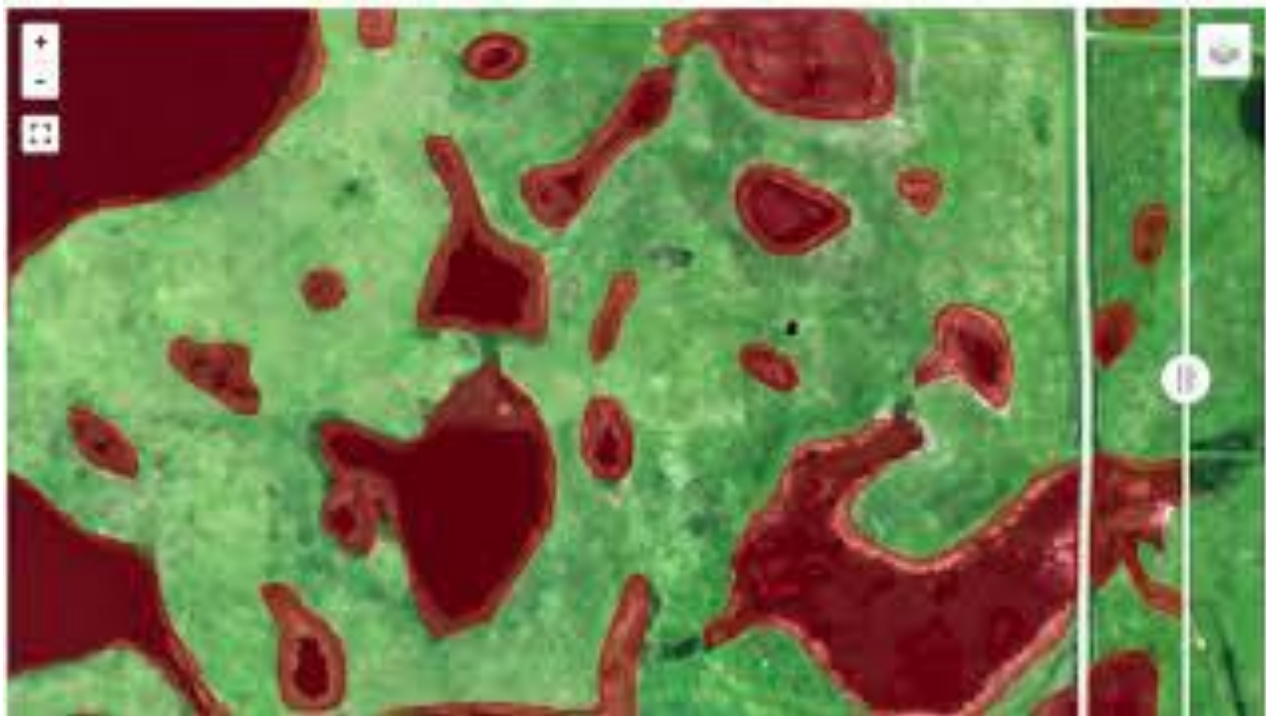
```
1 import geoai
2
3 raster_path = "/path/to/your/image.tif"
4 masks_path = "prediction.tif"
5 model_path = "water_detection.pth"
6 geoai.object_detection(
7     raster_path,
8     masks_path,
9     model_path,
10    window_size=512,
11    overlap=256,
12    confidence_threshold=0.5,
13    batch_size=4,
14    num_channels=3,
15 )
```



Wetland Mapping with NAIP Imagery

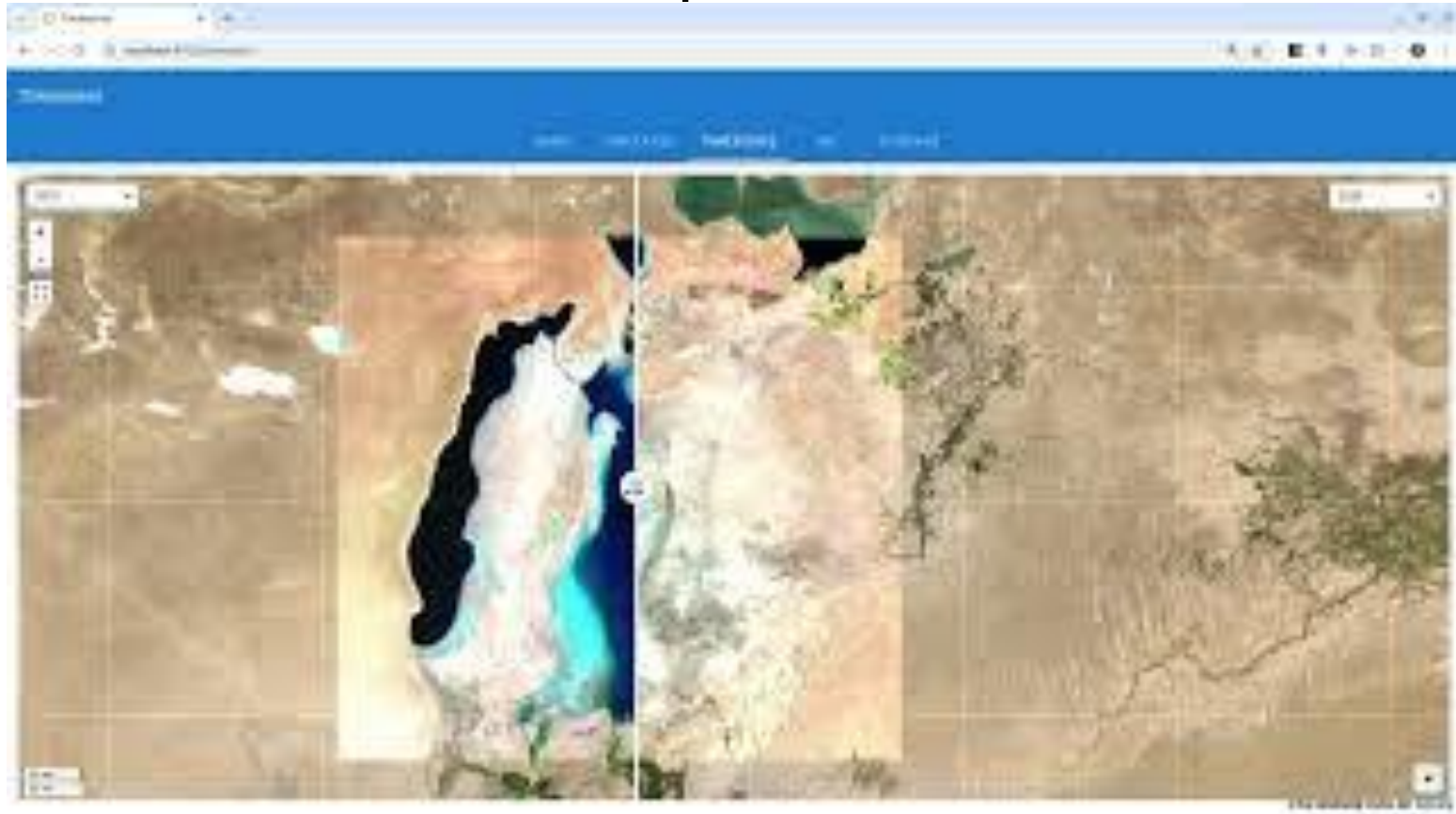
[notebook](#)

```
1 import geoai
2
3 raster_path = "/path/to/your/image.tif"
4 masks_path = "prediction.tif"
5 model_path = "wetland_detection.pth"
6 geoai.object_detection(
7     raster_path,
8     masks_path,
9     model_path,
10    window_size=512,
11    overlap=256,
12    confidence_threshold=0.5,
13    batch_size=4,
14    num_channels=3,
15 )
16
```



Global Surface Water Explorer

[Web App](#)

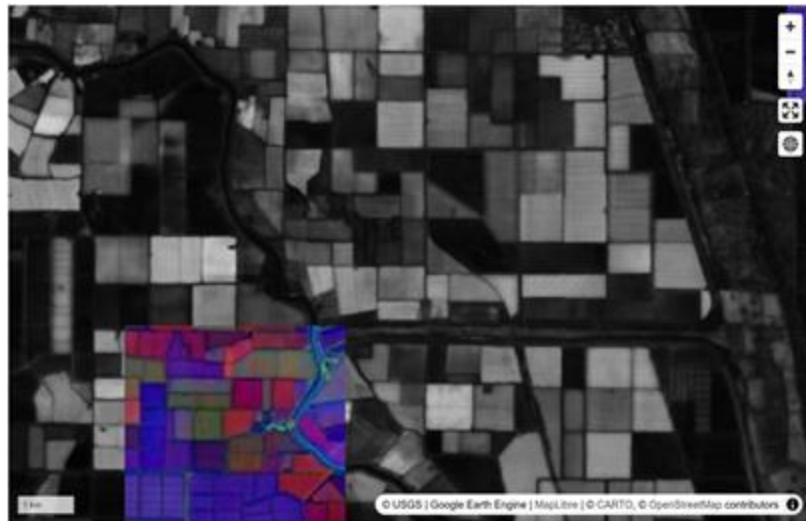
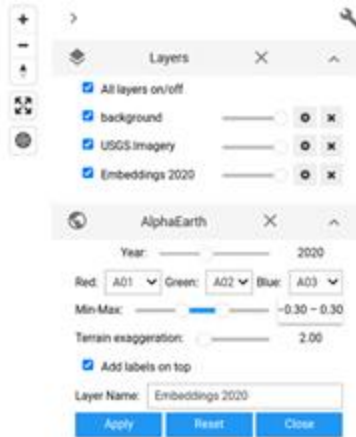
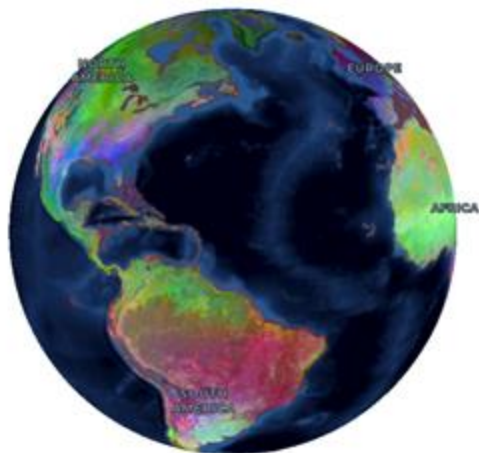


Visualize AlphaEarth satellite embeddings in 3D

[Notebook](#)

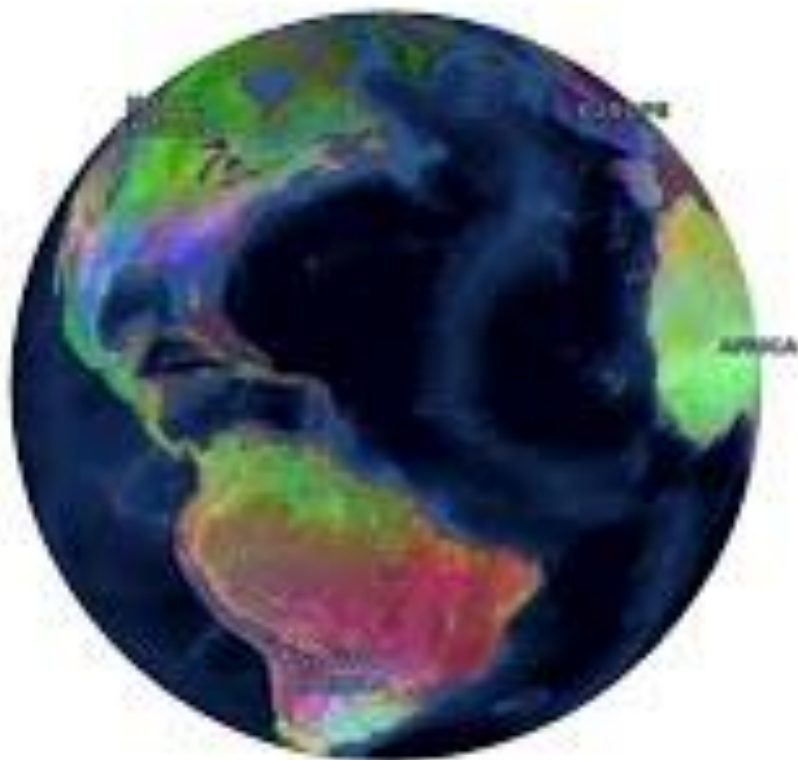
- 64-dimensional “embedding” vector
- Annual image from 2017 to 2024
- 10-m resolution

```
1 import ee
2 import leafmap.maplibregl as leafmap
3
4 ee.Initialize(project="your-ee-project")
5
6 m = leafmap.Map(projection="globe", sidebar_visible=True)
7 m.add_basemap("USGS.Imagery")
8 m.add_alphaearth_gui()
9 m
```



Visualize AlphaEarth satellite embeddings in 3D

[Notebook](#)



3D visualization interface for AlphaEarth satellite embeddings.

Layers

- ☒ all layers on/off
- ☒ background
- ☒ eROS images
- ☒ Embeddings 2020

AlphaEarth

Year: 2020

Aut: All | Select: Add | Blue: Add

Min/Max: 0.00 - 0.00

Tensor visualization: 2.00

☒ AutoLabels on/off

Layer Name: Embeddings 2020

Buttons: Apply, Reset, Close

Additional Resources

Introduction to GIS Programming

<https://gispro.gishub.org/>



The screenshot shows a dark-themed website for the 'Introduction to GIS Programming' course. On the left is a sidebar with a logo (a globe with a Python snake) and navigation links under 'About' (Instructor, Syllabus, Schedule, Textbooks, Videos, Acknowledgments) and 'Software' (Overview, Miniconda, Visual Studio Code, Git, Google Colab, JupyterLab). The main content area has the title 'Introduction to GIS Programming', a welcome message, a 'Course Overview' section, and a 'What You'll Learn' section with three bullet points.

Introduction to GIS Programming

Welcome to the official course website for "Introduction to GIS Programming," offered at the University of Tennessee, Knoxville, during Fall 2024.

Course Overview

This course offers a comprehensive exploration of GIS programming, centered around the Python language. Throughout the semester, students will master the use of Python libraries and frameworks for processing, analyzing, and visualizing geospatial data.

What You'll Learn

- **Fundamentals of Python:** Start with the basics—variables, data types, data structures, string looping, and control statements. Progress to more advanced topics, including functions, class handling, and exception handling.
- **Geospatial Applications:** Delve into Python's application in the geospatial realm. Learn to create interactive web maps using Leafmap, visualize vector and raster data, and explore 3D mapping with MapLibre. You'll also get hands-on experience with a number of specialized geospatial libraries: GeoPandas, Rasterio, WhiteboxTools, Geemap, SAMGeo, HyperCoast, DuckDB, Xarray, and more.
- **Hands-On Experience:** Engage in practical labs and projects designed to reinforce the concepts in lectures. These activities culminate in a final project where you'll apply your skills to a real-world geospatial problem.

By the end of the course, you will have a robust understanding of Python programming, specifically for geospatial analysis and visualization, empowering you to confidently tackle various geospatial challenges.

Introduction to GIS Programming

A Practical Python Guide to Open Source Geospatial Tools

Qiusheng Wu



YouTube



<https://youtube.com/@giswqs>

S



Open Geospatial Solutions

@giswqs · 52.3K subscribers · 867 videos

Dr. Qisheng Wu is an Associate Professor and the Director of Graduate Studies in the ...more

twitter.com/giswqs and 5 more links

Subscribe



Open Science Workshop
Mondays, 10-11 AM ET, March 10 - April 22

1. Open Code
2. Open Data
3. Open-Access Funding
4. Open Results
5. Open Publishing

5 videos

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GeoAI Tutorials
Geospatial Artificial Intelligence for Geospatial Data

18 videos

GeoAI Tutorials

Updated 3 days ago

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Geospatial YouTube Shorts

1 video

Geospatial YouTube Shorts

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TorchGeo Experiments EP 1

Live Streaming

4 videos

Live Streaming

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8 videos

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8 videos

Deepseek and Open WebUI Tutorials

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Geographic Software Design

29 videos

Geographic Software Design

Updated 2 days ago

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Population Dynamics Foundation Model (PDFM)
Visualize PDFM Features and Predicted Home Values

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Drone Imagery Data Processing and Visualization

3 videos

Drone Imagery Data Processing and Visualization

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Adding Overture Maps Data to QGIS

Global Building Dataset

3 videos

QGIS Tutorials

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Introduction to GIS Programming

30 videos

Introduction to GIS Programming

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3D Mapping with MapLibre and Leafmap

17 videos

3D Mapping with MapLibre and Leafmap

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Thank you!
Any questions



Qiusheng Wu
<https://gishub.org>

