



SAVE TIME AND SPEED UP IMAGE **PROCESSING AND ANALYSIS WITH** **ENVI SERVER**

August 11, 2020

Bill Okubo and Zach Norman

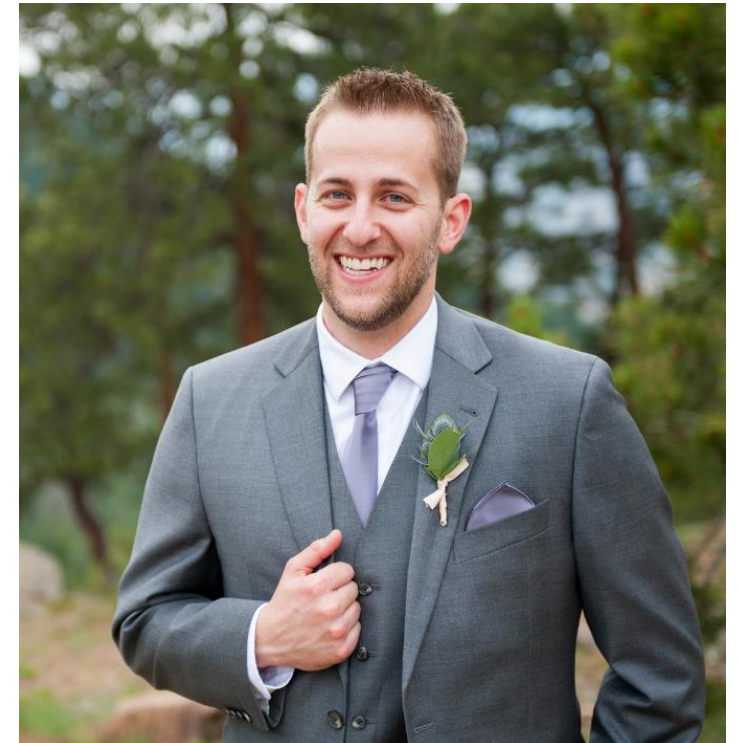
Contact Information and Introductions



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Agenda




Introduction

Today's ENVI Server Use Cases

Quick Overview of ENVI Server

Four Use Cases – Including Live Demo

Summary and Q+A Session



What's New in ENVI 5.6 and IDL 8.8

6/22/2020

ENVI 5.6 and IDL 8.8 introduce many new, exciting, and impactful features! Watch this webinar and get a full list of the updated features and to view demos.

[Read More >](#)

Check out the What's New in ENVI 5.6 and IDL 8.8 webinar for an overview of the other, exciting features in this new release

ENVI Server in 60 Seconds

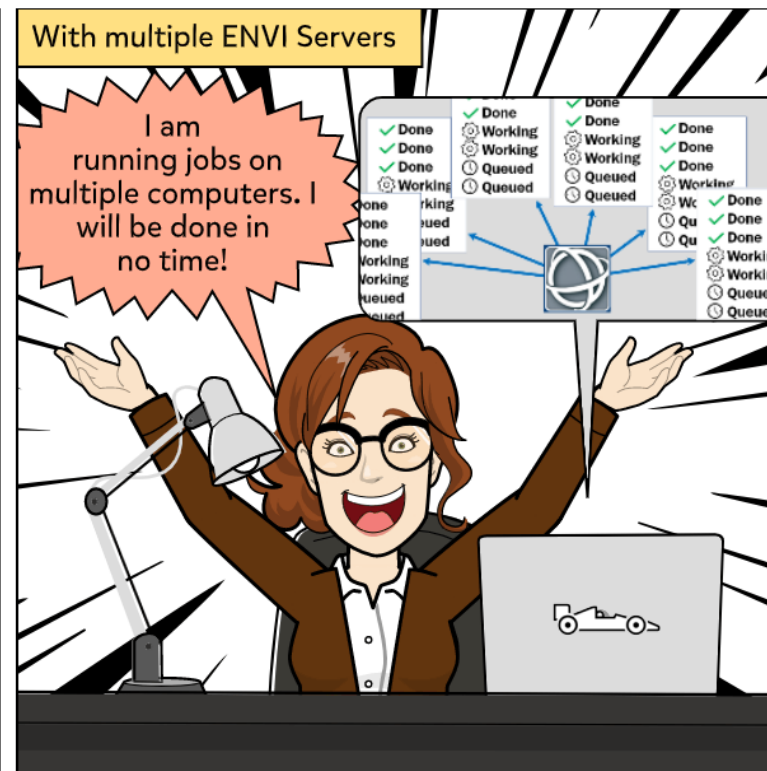
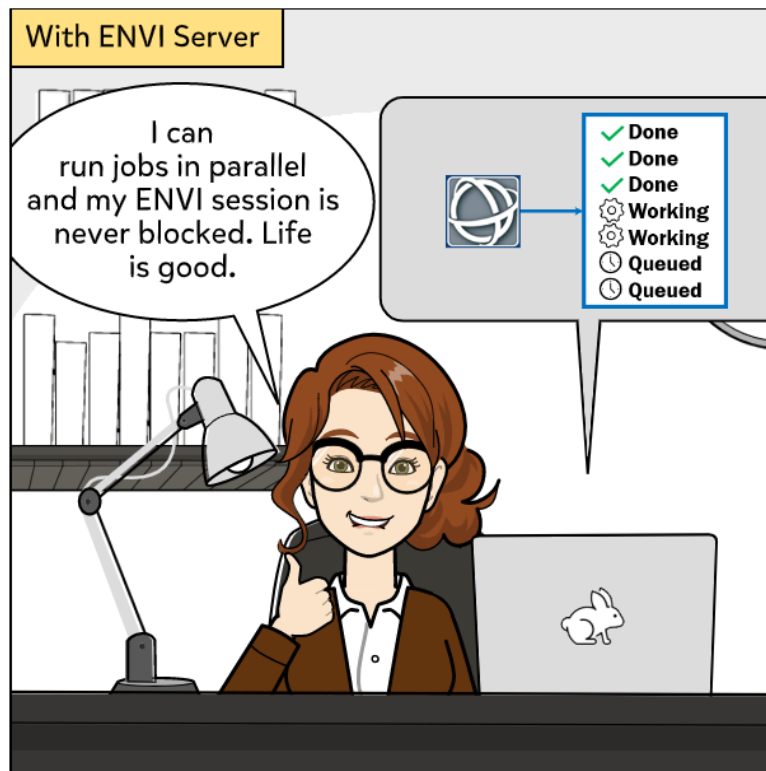
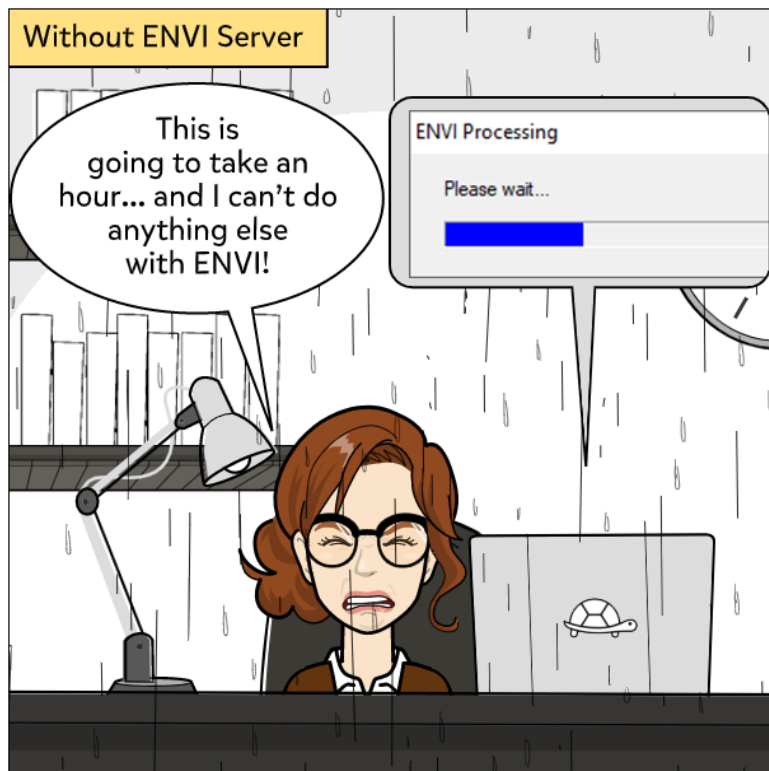


Take advantage of modern hardware

Save time by running processes in parallel

Run processes in the background in ENVI

Distribute processing to local servers with common data access



Today's ENVI Server Use Cases



Here are a few scenarios where ENVI Server can be used

ENVI MULTITASKER

Do you want to do more than one thing at a time with ENVI?

MANY, LARGE DATASETS

Do you have lots of data to process in ENVI?

ENVI PROGRAMMER

Do you use IDL and the ENVI API to do your processing?

DEEP LEARNING DATA PREPARATION

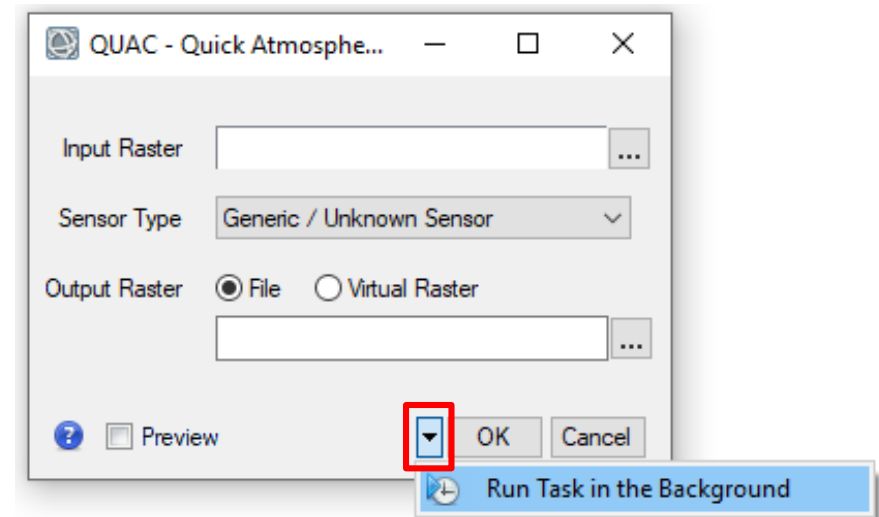
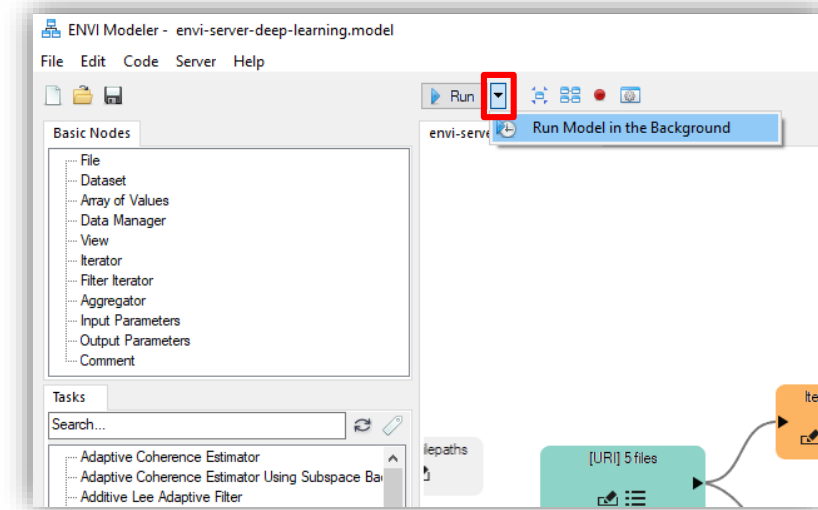
Do you have a lot of data that you need to prepare for deep learning?

Accessing ENVI Server from ENVI



You can run processing on ENVI Server through the ENVI Modeler or any ENVI Task dialog

The red boxes on the right show you where to run processing on ENVI Server



Viewing Results



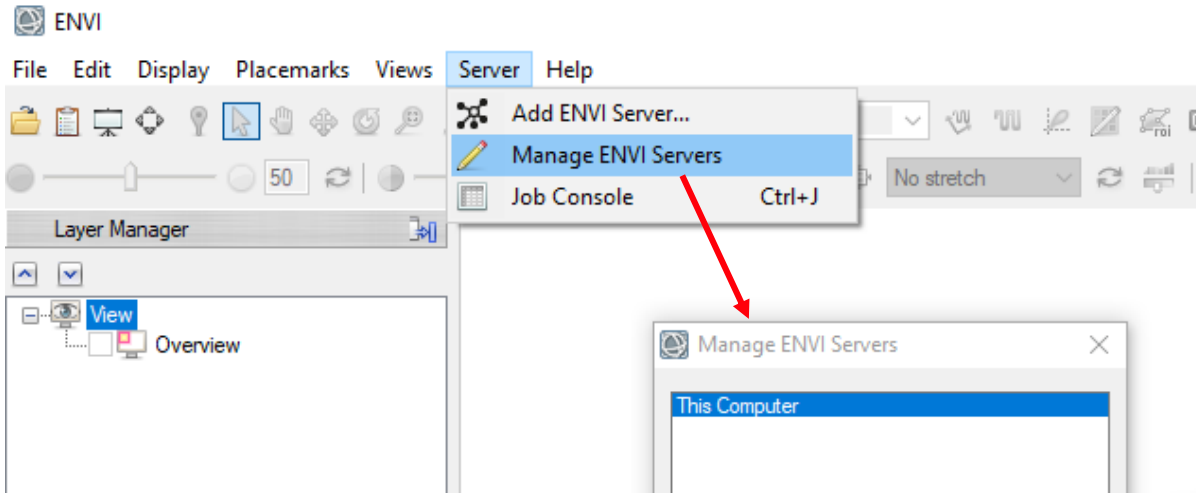
The screenshot shows the ENVI software interface. The 'Server' menu is open, highlighting 'Job Console' (Ctrl+J). A red arrow points from this menu item to the 'ENVI Server Job Console' window. The window displays a table of job results for 'This Computer'.

Job	Status	Name	Started	Duration	Actions
156	Completed	envi-server-example	July 15, 12:37	00:00:20	Display results
155	Completed	envi-server-example	July 15, 12:37	00:00:21	Display results
154	Completed	Untitled	June 17, 8:51	00:00:07	Display results
153	Completed	QUAC - Quick Atmospheric Correction	June 17, 8:48	00:00:07	Display results
152	Completed	QUAC - Quick Atmospheric Correction	June 16, 15:17	00:00:07	Display results
141	Completed	envi-server-deep-learning-classification	June 04, 8:16	00:00:51	Display results
140	Completed	envi-server-example	June 04, 8:14	00:00:07	Display results
139	Completed	envi-server-example	June 04, 8:14	00:00:07	Display results
138	Completed	envi-server-deep-learning-classification	June 04, 7:44	00:00:48	Display results
137	Completed	envi-server-deep-learning-classification	June 03, 16:08	00:00:48	Display results
126	Completed	envi-server-example	June 03, 14:34	00:00:08	Display results
125	Completed	envi-server-deep-learning	June 03, 14:24	00:10:56	Display results

Use the ENVI Server Job Console to display results from ENVI Tasks or the ENVI Modeler

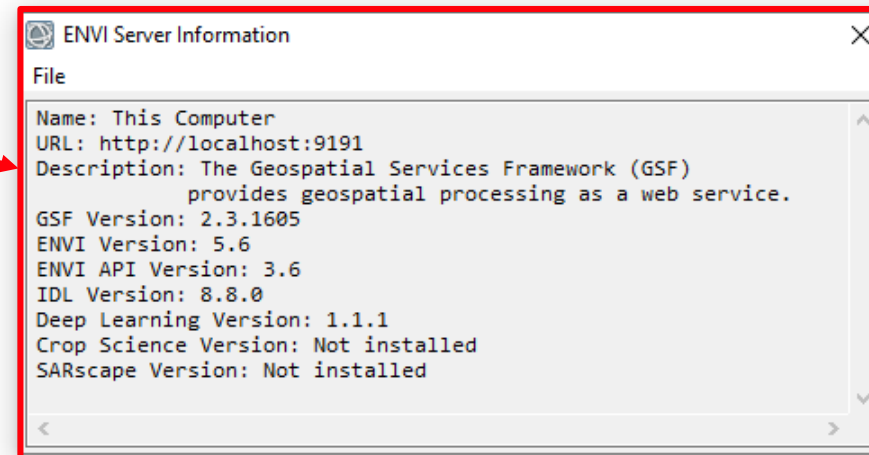
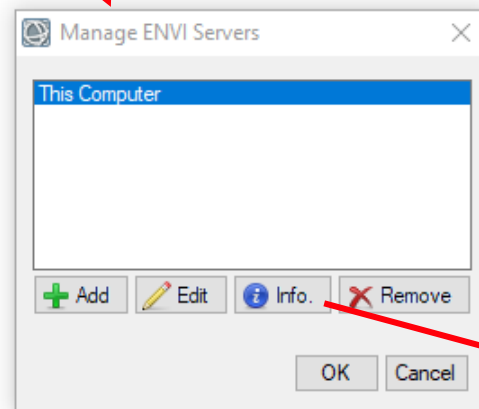
Pro-tip: To use this with the ENVI Modeler, you need to use the “Output Parameters” node in your workflows

ENVI Server Need-to-know



Make sure that your local system matches any remote ENVI Servers that you use

This includes any ENVI Modules



Today's ENVI Server Use Cases



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ENVI MULTITASKER

Do you want to do more than one thing at a time with ENVI?

- ENVI Server allows you to seamlessly run processing in the background while still interacting with the ENVI interface

MANY, LARGE DATASETS

Do you have lots of data to process in ENVI?

ENVI PROGRAMMER

Do you use IDL and the ENVI API to do your processing?

DEEP LEARNING DATA PREPARATION

Do you have a lot of data that you need to prepare for deep learning?

An aerial photograph of a river system, likely a reservoir or a large river with many tributaries. The water is colored in a deep blue, and the shoreline is highlighted with a bright yellow/orange color. The surrounding land is dark green, indicating dense forest. The text "ENVI Server Demo" is overlaid in the center of the image.

ENVI Server Demo

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Do you use IDL and the ENVI API to do your processing?

- Easily access ENVI Server through the ENVI API in IDL. This requires minor changes to existing programs using ENVI Tasks.

DEEP LEARNING DATA PREPARATION

Do you have a lot of data that you need to prepare for deep learning?

ENVI Server for Programmers



Simple-to-use ENVI Server API to send processing to the background

Pre-ENVI 5.6

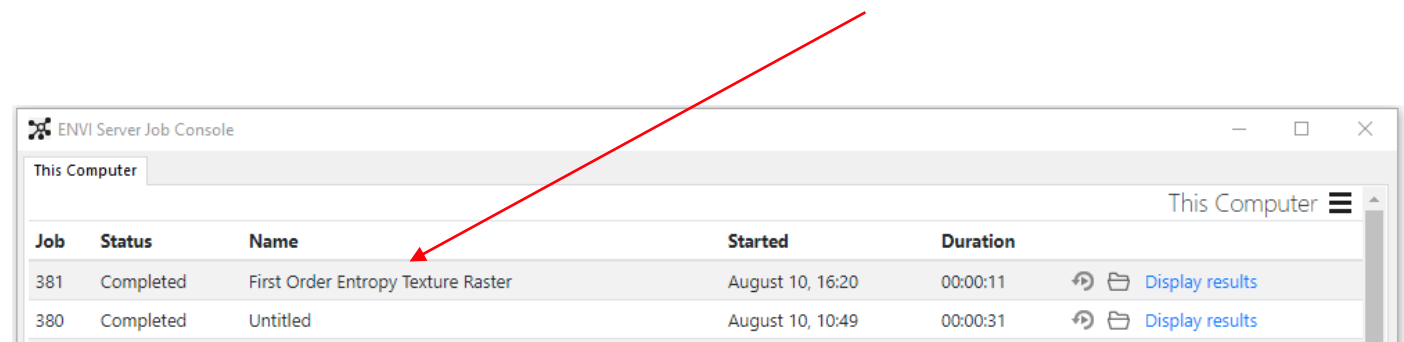
```
textureTask = ENVITask('FirstOrderEntropyTexture')
textureTask.INPUT_RASTER = Raster
textureTask.Execute
```

ENVI 5.6

```
; connect to our local ENVI Server
server = ENVIServer('localhost')

textureTask = ENVITask('FirstOrderEntropyTexture')
textureTask.INPUT_RASTER = Raster

; submit our task, registering it with the job console in ENVI
jobId = server.submitTask(textureTask, /REGISTER)
```



Job	Status	Name	Started	Duration	
381	Completed	First Order Entropy Texture Raster	August 10, 16:20	00:00:11	Display results
380	Completed	Untitled	August 10, 10:49	00:00:31	Display results

Advanced Usage of ENVI Server



Use the ENVI Server API to run ENVI Tasks and then wait for them to finish before moving on.

```
; start ENVI
e = envi(/HEADLESS)

; Define a task and populate input parameters
File = filepath('qb_boulder_msi', Subdir=['data'], $
    Root_Dir=e.Root_Dir)
Raster = e.openRaster(File)

; specify our task to run
Task = ENVITask('ISODATAClassification')
Task.INPUT_RASTER = Raster

; connect to the ENVI Server running on our machine
server = ENVIServer('localhost')

; submit our ENVI Task for processing
jobId = server.SubmitTask(Task)

; wait for our job to finish
while !true do begin
    ; get the status of our job
    status = server.getJobStatus(jobId)

    ; check if we are finished
    if (status eq 'Completed') OR (status eq 'Failed') then break

    ; pause before checking again
    wait, 1.0 ; seconds
endwhile
```

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MANY, LARGE DATASETS

Do you have lots of data to process in ENVI?

- ENVI Server lets you run multiple jobs in parallel to get through large volumes of data faster. This allows you to take advantage of modern hardware with many CPUs and Solid State Drives (SSDs)

ENVI PROGRAMMER

Do you use IDL and the ENVI API to do your processing?

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Sentinel 2 Time Series: Background



BACKGROUND

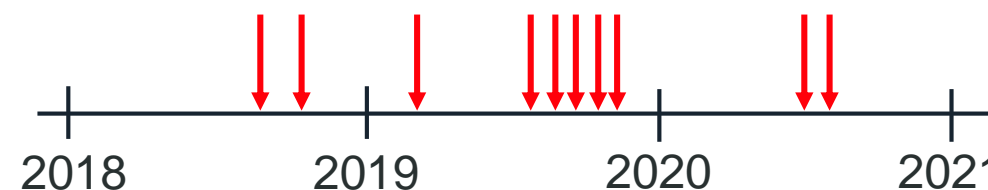
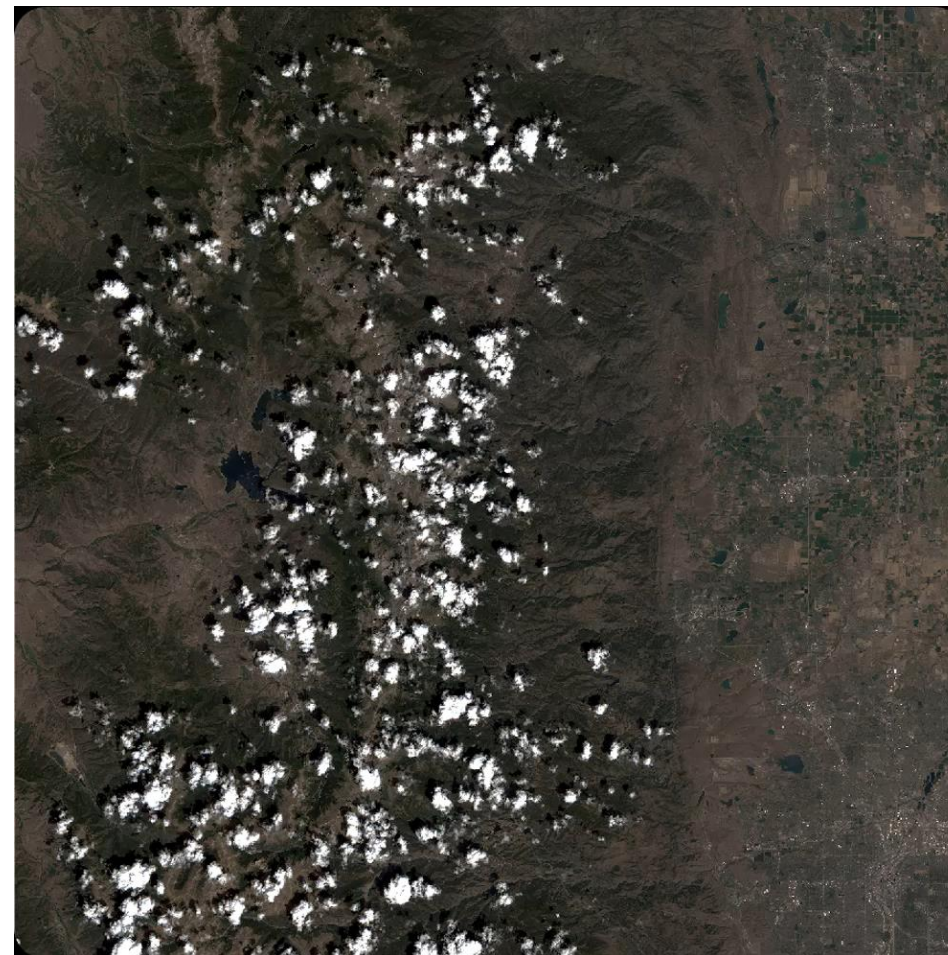
We have 10 Sentinel 2 scenes over Boulder, Colorado

We want to calculate four spectral indices for each scene

It takes about 5 minutes to process each dataset and we want to get our results faster

Data summary:

- 9 GB of JP2000 compressed source data
- 18 GB of ENVI formatted output files



Sentinel 2 Time Series: Results



RESULTS

2980 seconds (50 minutes) of processing without ENVI Server

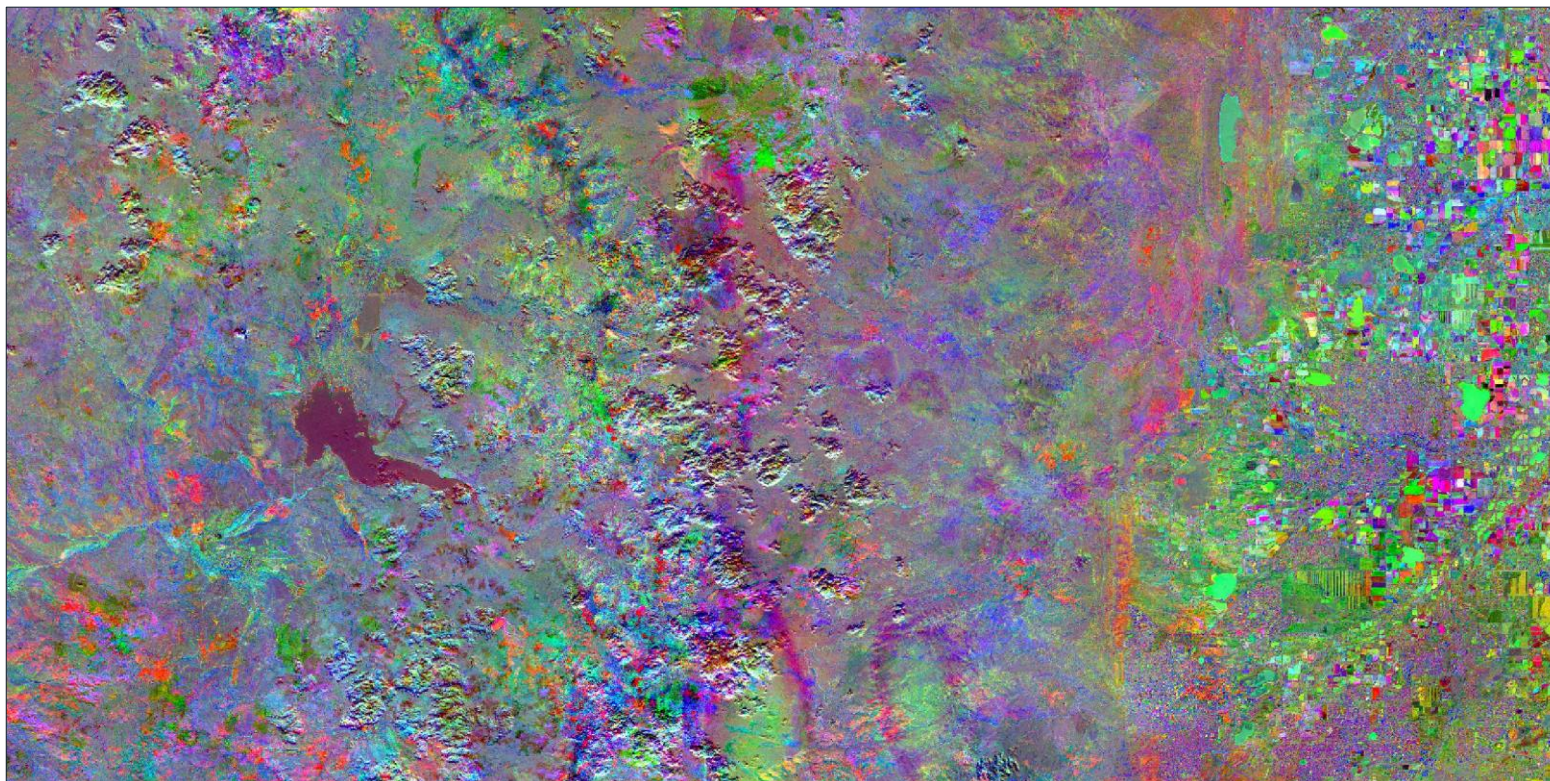
1060 seconds (17.5 minutes) of processing with ENVI Server

Reduced time by **65%**

ENVI Server Setup:

- Four concurrent processes
- 12 CPUs
- SSD

If we had 12 scenes, we would have reduced our time by almost 75% because we would have been a multiple of the number of concurrent processes



RGB representation of the Minimum Noise Fraction (MNF)
Transform of our output rasters

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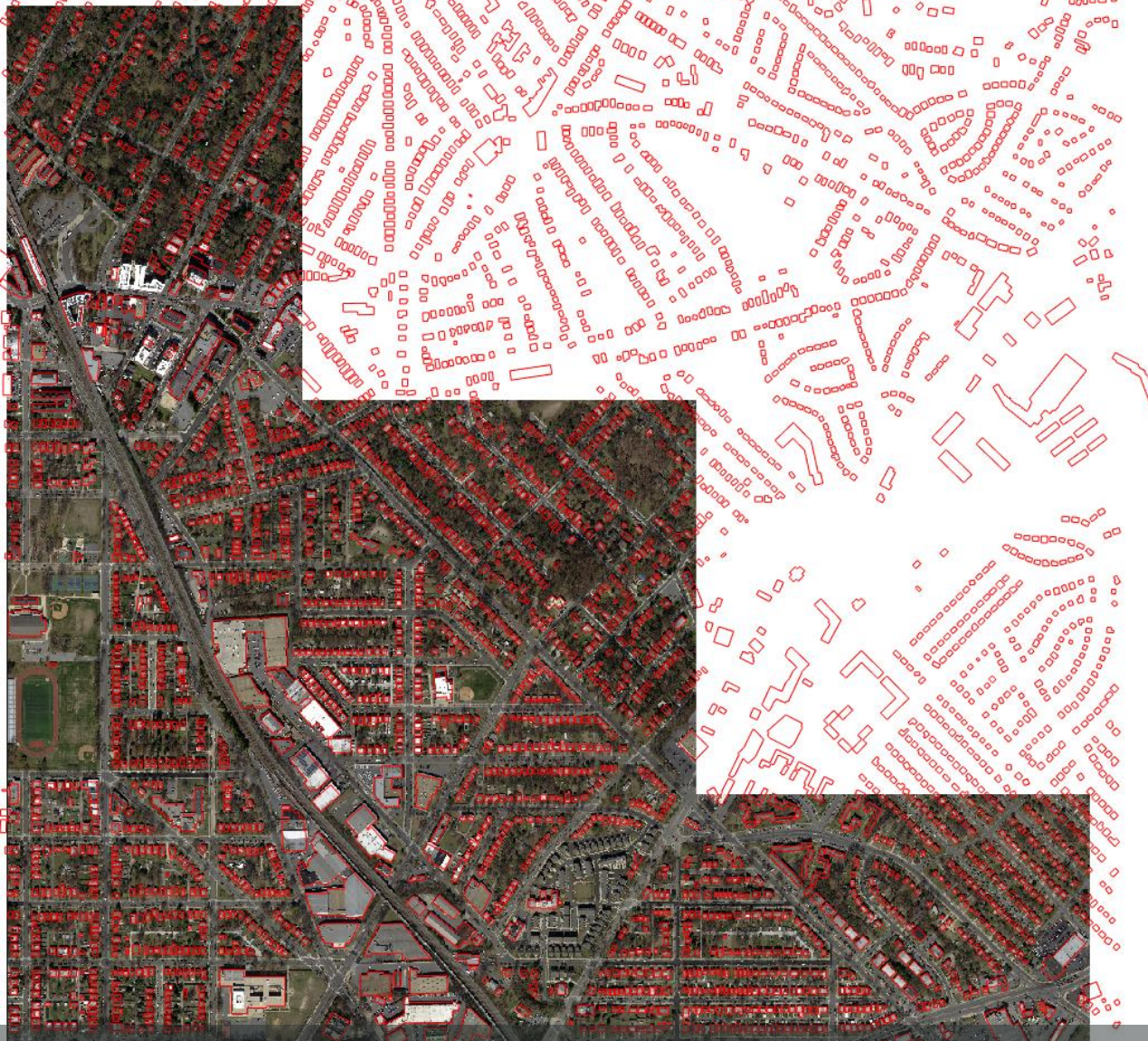
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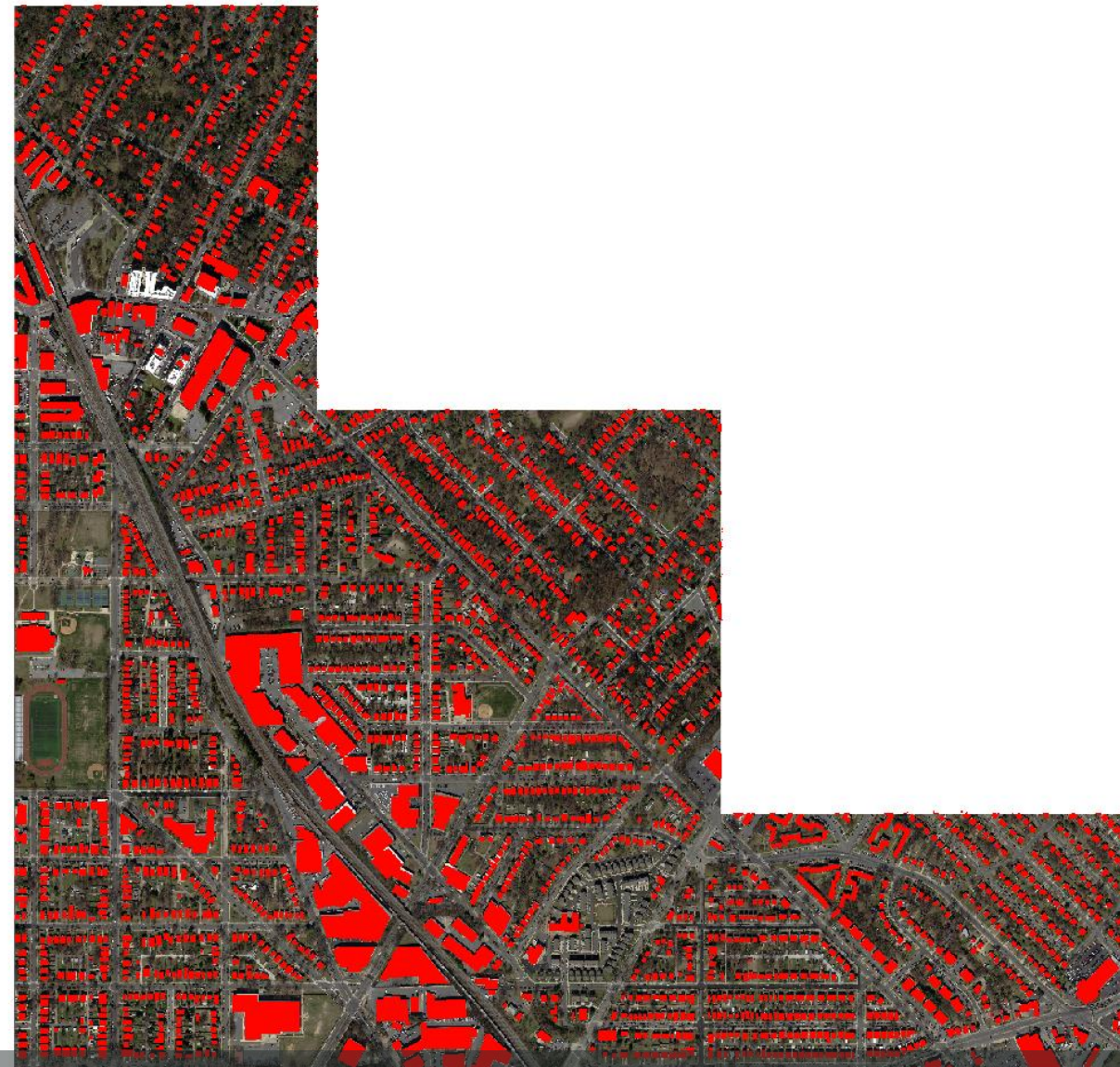
Do you have a lot of data that you need to prepare for deep learning?

- Create customized data preprocessing pipelines for ENVI Deep Learning to spend less time preparing data and more time training classifiers

ENVI Server and Deep Learning



Original Image and Training Data



Prepared Image and Training Data



Deep Learning Use Case: About



DATA

72 aerial images – 10.2 GB of data

- Resolution between 35 and 50 cm
- Data from Colorado, Illinois, and Washington D.C.
- Different sensors, times of year, and data compression

Pre-existing building footprints

- Full-US Coverage from Microsoft
- <https://github.com/microsoft/USBuildingFootprints>

VECTOR PREPROCESSING

- Automatically download building footprints
- Unzip
- Convert GeoJSON to Shapefile
- Generate vector pyramids for quick subsetting

RASTER PREPROCESSING

- Find US States that overlap with scene
- Subset corresponding vectors
- Conflate building footprints
- Convert to ENVI ROI file
- Convert ENVI ROI to classification image
- Mask classification image by valid raster pixels
- Stack classification image with source data to create our training images

Deep Learning Use Case: Results



RESULTS

Overall:

- **1780 seconds** (30 minutes) without ENVI Server
- **700 seconds** (11.5 minutes) with ENVI Server

Vector Processing:

- **550 seconds** (9 minutes) without ENVI Server
- **290 seconds** (5 minutes) with ENVI Server

Raster Processing:

- **1230 seconds** (20.5 minutes) without ENVI Server
- **415 seconds** (7 minutes) with ENVI Server

ENVI Server Setup:

- Six concurrent processes
- 12 CPUs
- SSD



Sample building detections after training on a subset of our data for 4 fours

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Virtual ENVI Analytics Symposium!



Learn more and register at: www.l3harrisgeospatial.com/EAS



2020 THEME

The theme of the 2020 EAS is “The Geospatial Vision for the Next Decade.” Collecting, analyzing and applying geospatial data is evolving at a rapid pace. EAS provides the premiere thought leadership venue for the community of geospatial users, analysts, scientists, and vendors to connect and explore the new trends and solutions transforming this dynamic ecosystem.

WHAT WILL ATTENDEES WALK AWAY WITH?



Questions and Discussion

Release details: <https://www.l3harrisgeospatial.com/Support/Maintenance>

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