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

August 11, 2020

Bill Okubo and Zach Norman
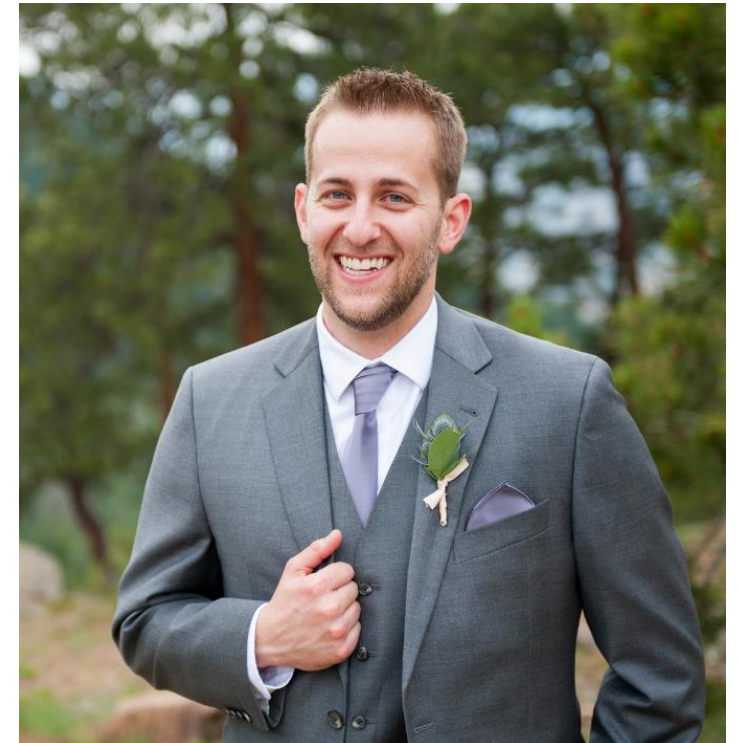
Contact Information and Introductions

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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
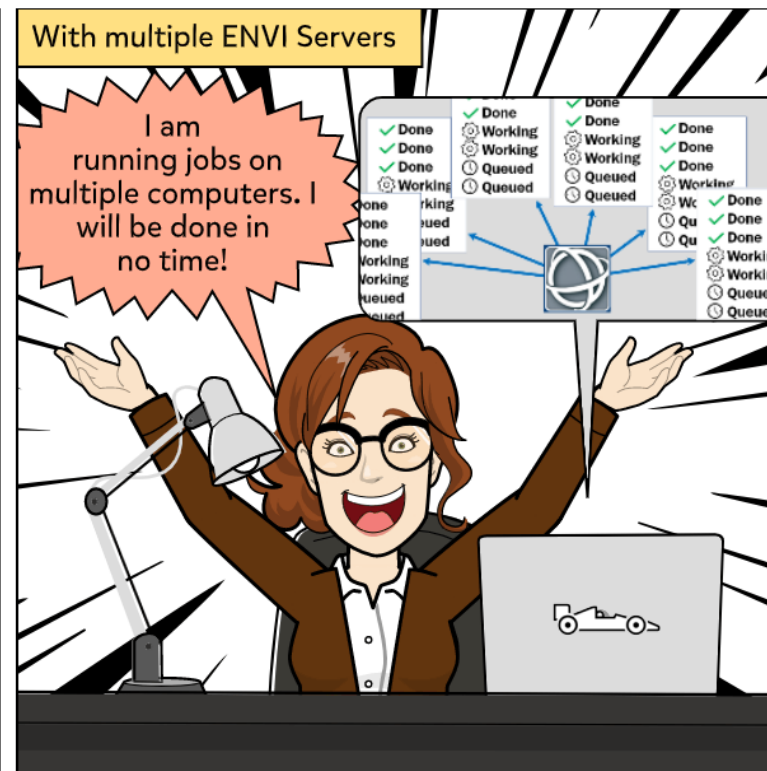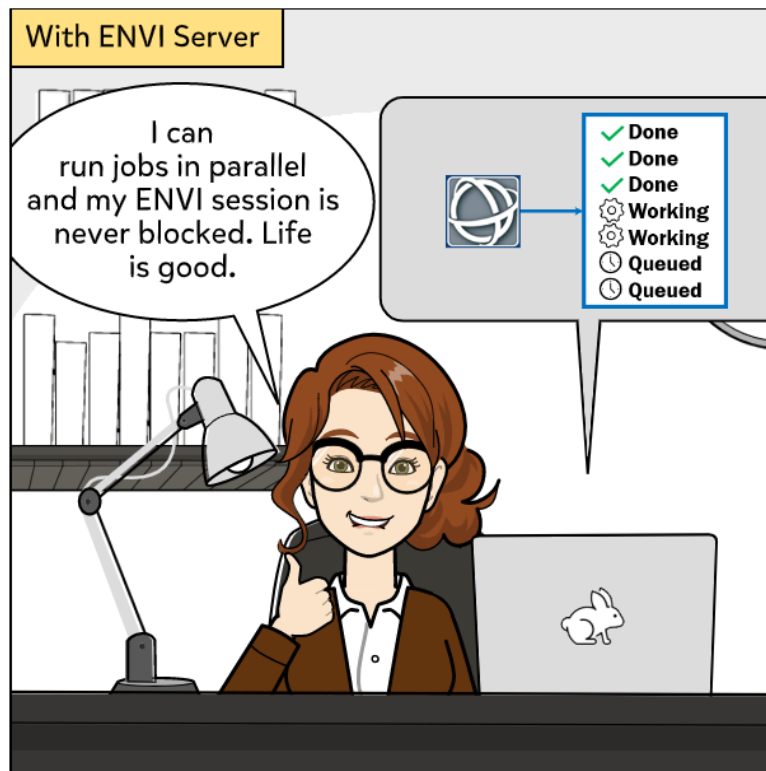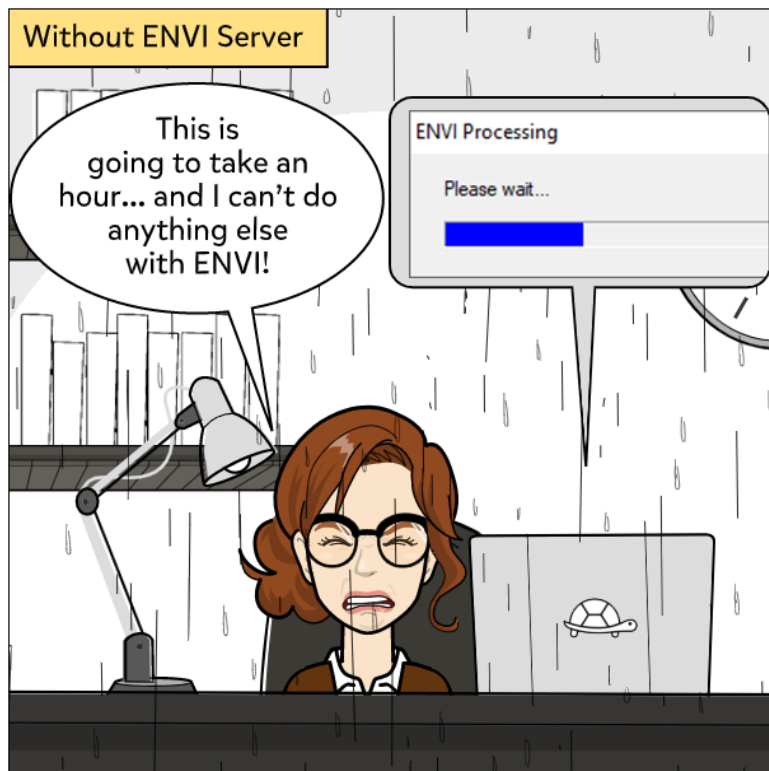
ENVI Server in 60 Seconds

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?

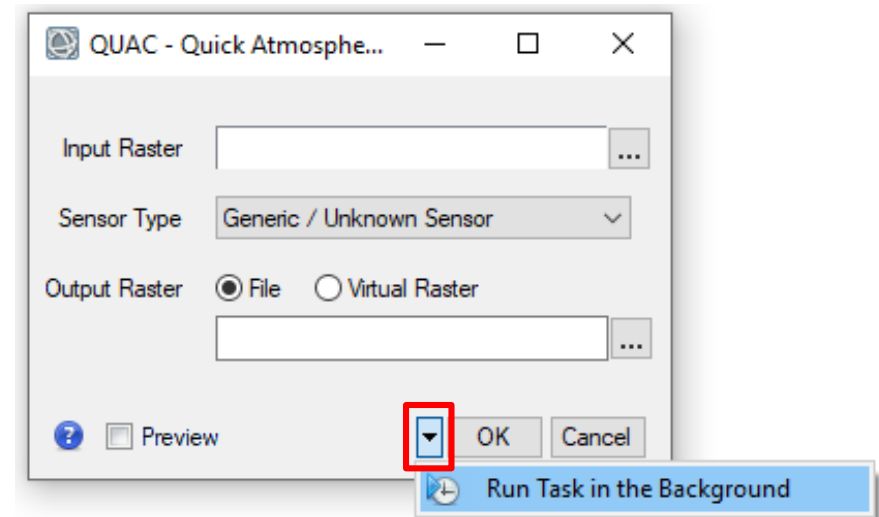| ENVI PROGRAMMER |
|---|
| *Do you use IDL and the ENVI API to do your processing?* |

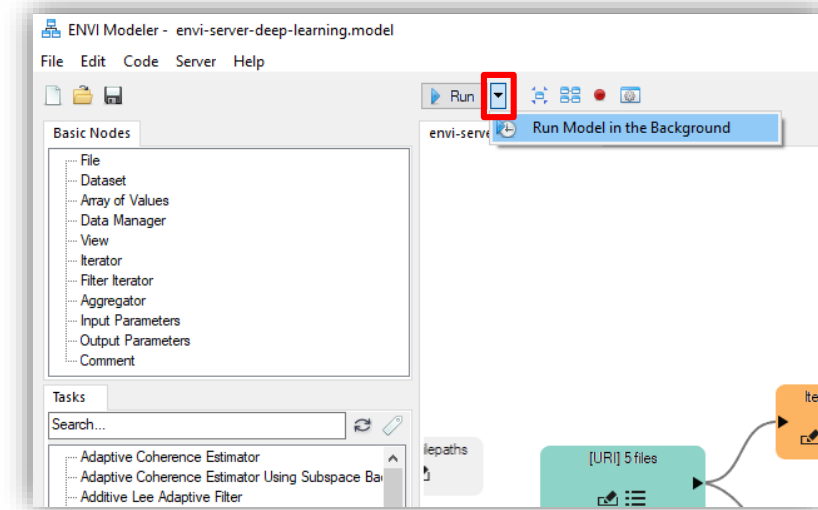| DEEP LEARNING DATA PREPARATION |
|---|
| *Do you have a lot of data that you need to prepare for deep learning?* |

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

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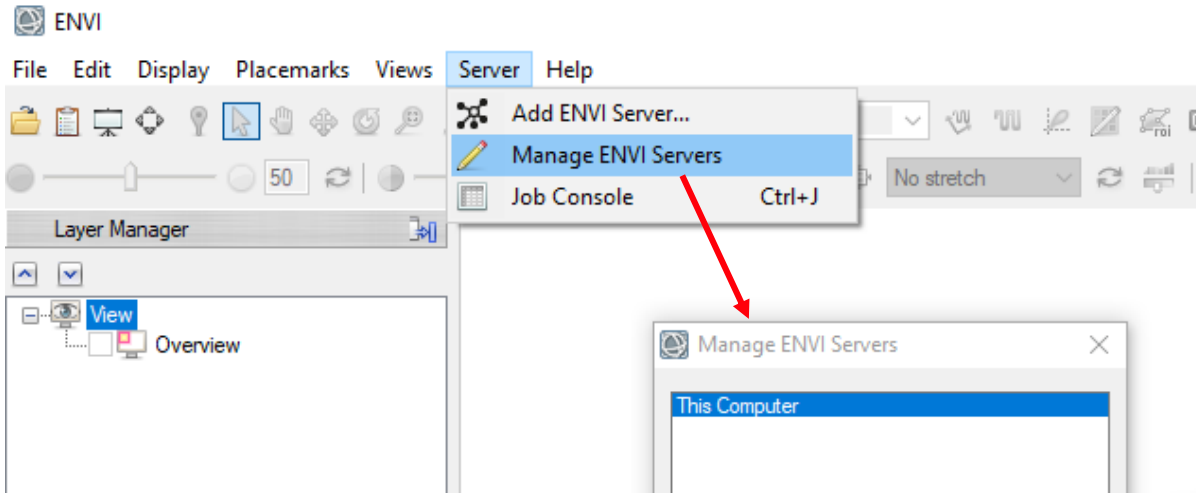
Make sure that your local system matches any remote ENVI Servers that you use

This includes any ENVI Modules

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ENVI Server Demo

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ENVI Server for Programmers

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

Pre-ENVI 5.6
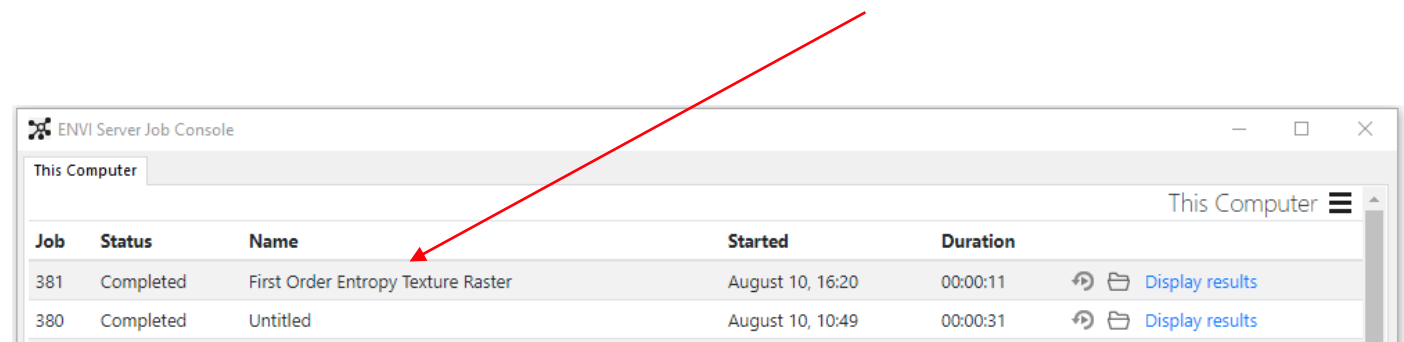
```
textureTask = ENVITask('FirstOrderEntropyTexture')
textureTask.INPUT_RASTER = Raster
textureTask.Execute
```

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)
```


ENVI Server Job Console — This Computer

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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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)

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

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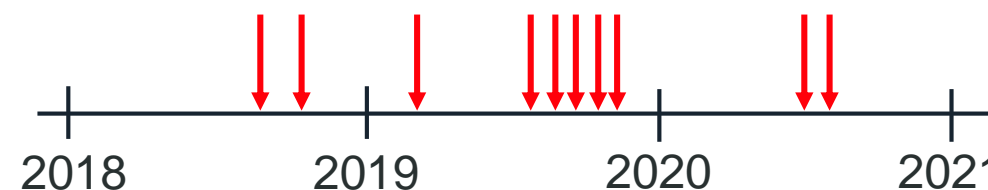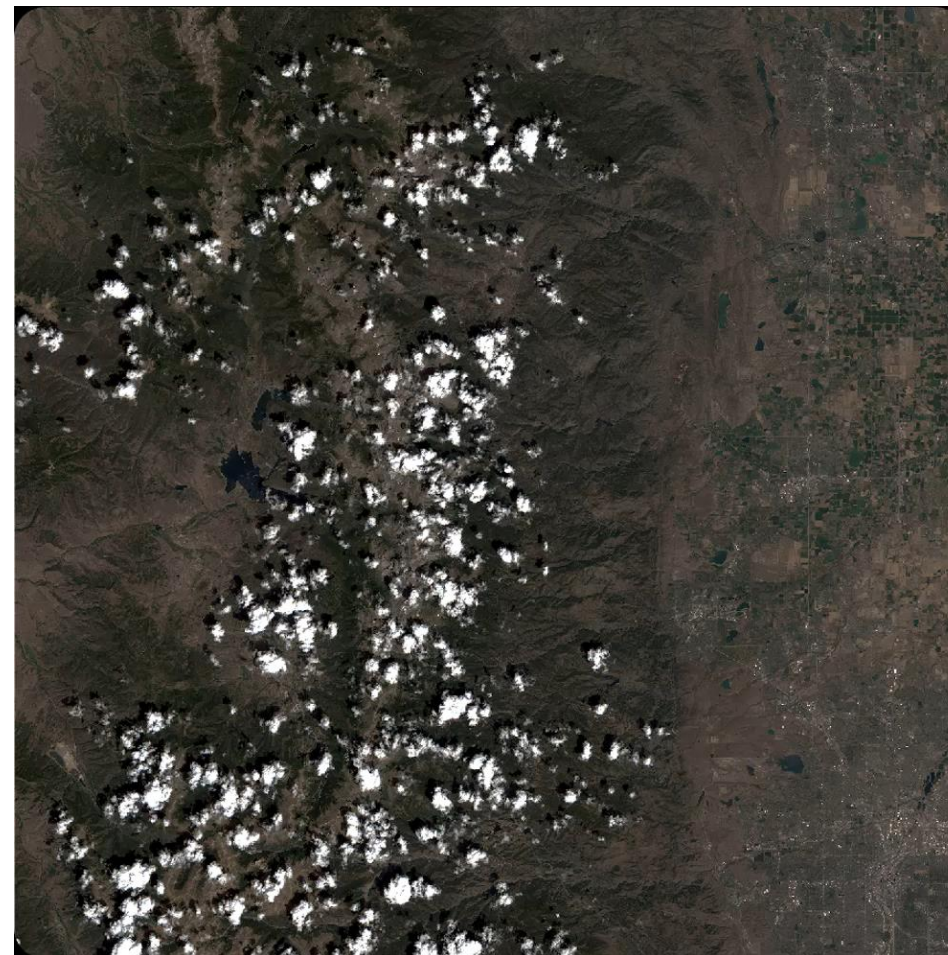# Sentinel 2 Time Series: Background

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
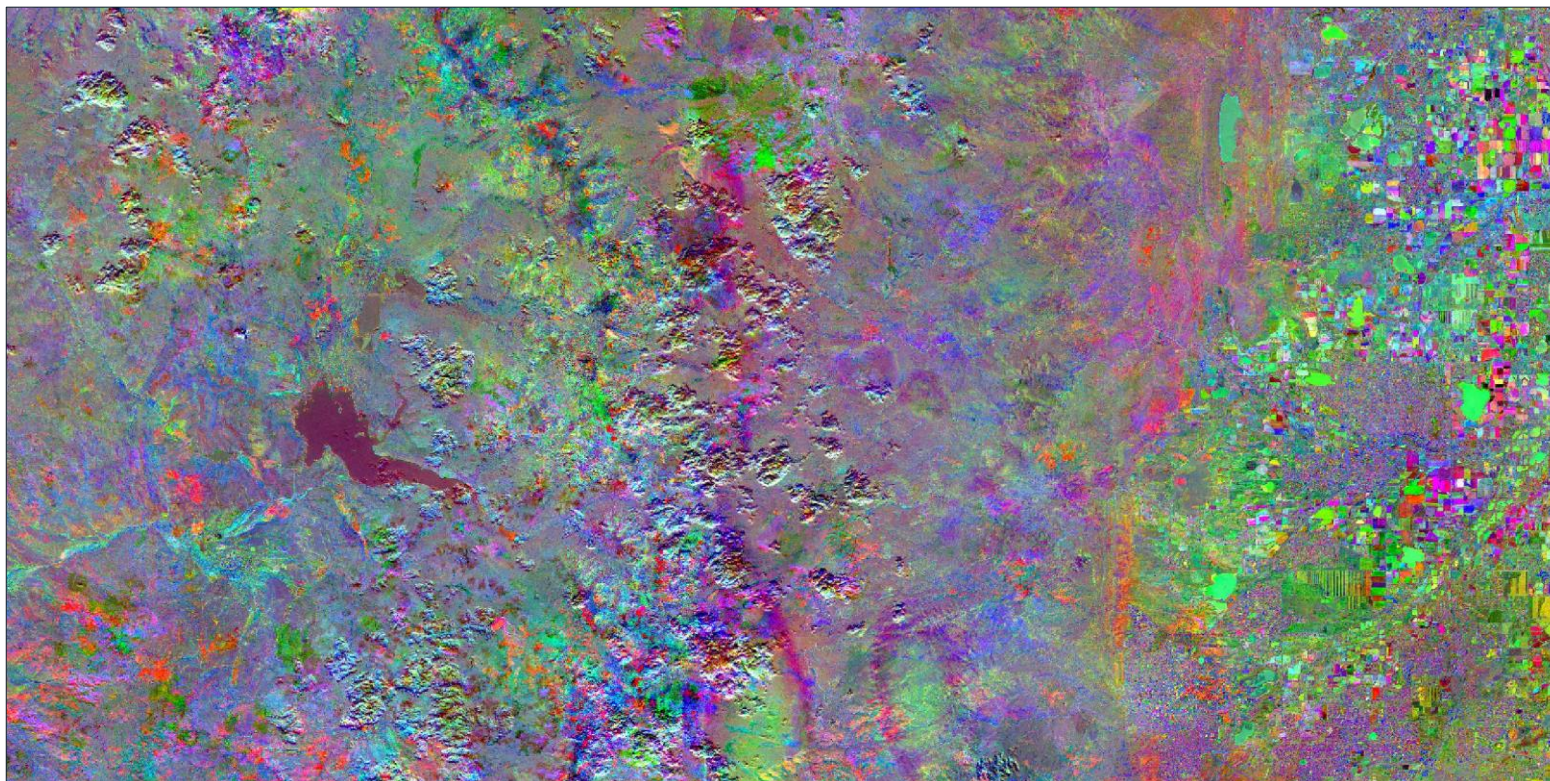
1060 seconds (17.5 minutes) of processing with ENVI Server

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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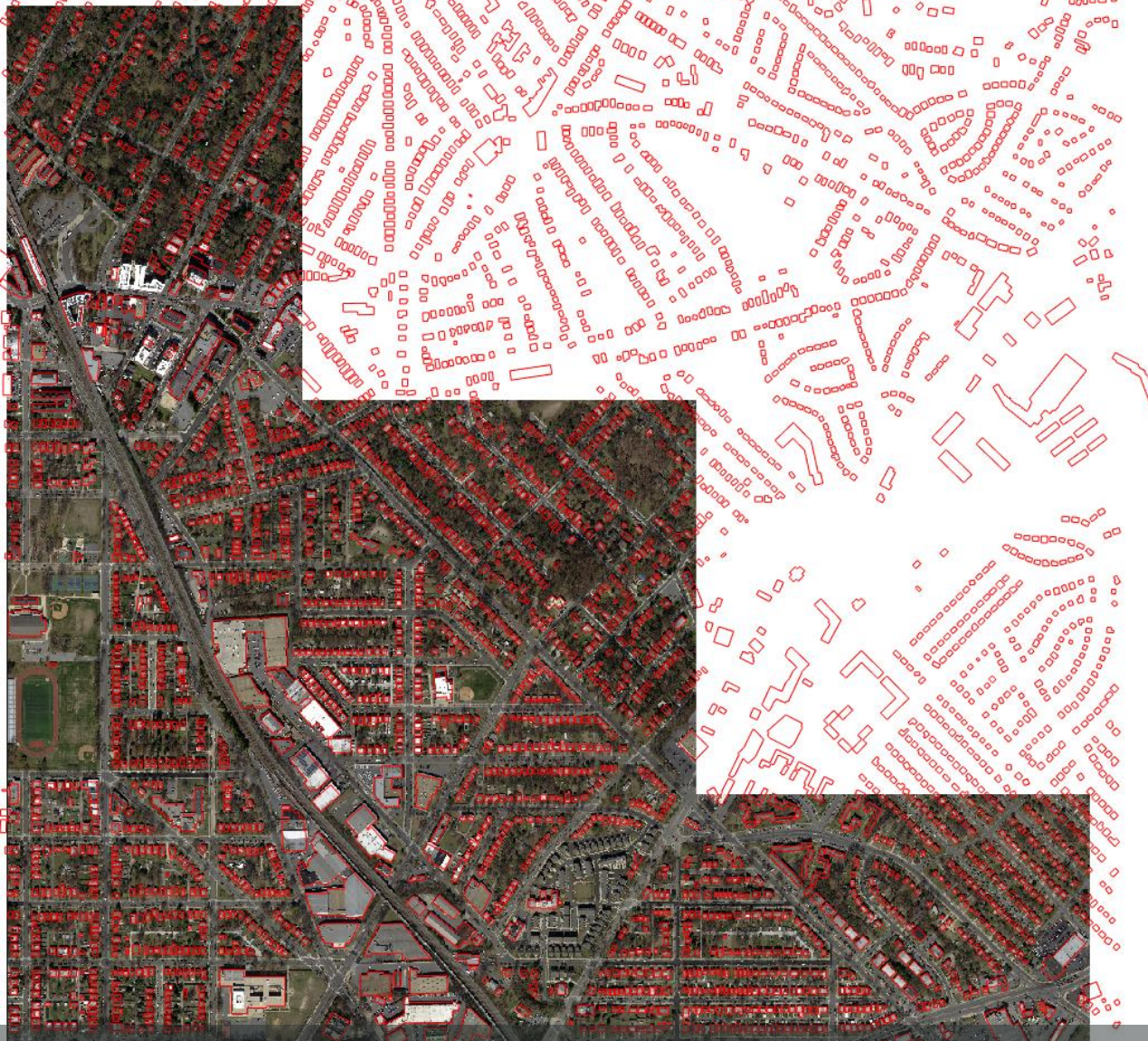| ENVI PROGRAMMER |
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ENVI Server and Deep Learning

Original Image and Training Data
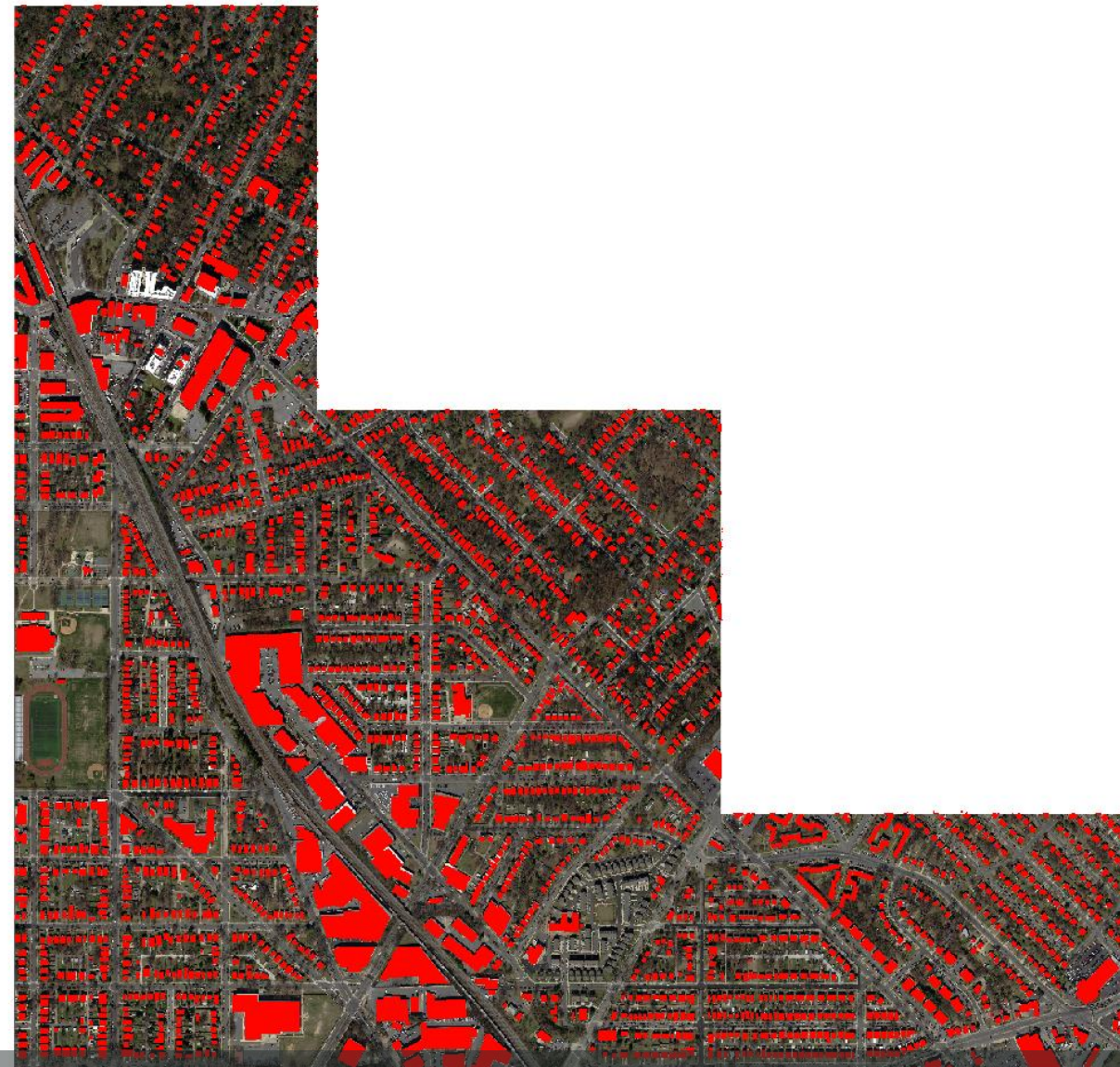
Prepared Image and Training Data

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/USBuilding Footprints

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

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

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