Fort Huachuca East Range Reflections: Programs, Compute Resources, and Lessons Learned

Devin Bayly

Data and Visualization Consultant Research Technologies UArizona

Agenda

1. Personal Background
2. Compute Access
3. Project Experience
4. Questions

Personal Background

- Math and Neuroscience
- Visualization as retrospective
- Web visualization (Mozilla Iodide, early Observable Competitor)
- UA HPC
- **Note: No photogrammetry education!**

RTDV

- Services
  - DCC
  - High Performance Visualization
  - Visualization adjacent support (project collaborations)
- Past Projects
  - https://rtdatavis.github.io/
  - "Tell it to the river"
  - "Stellarscape"
  - PhytoOracle VR SXSW

Getting in touch

- vislab-consult@list.arizona.edu
- Data & Vis Tuesdays 9-11am
- Code commons Wednesdays 2-6pm

Support material

- HPC visualization
- Blender USD Point Cloud support
- Lidar processing OSG science gateway (underway)

Compute Access: On Campus

- HPC
  - Workshops updates by email
- Cyverse DE
- Visualization Wall
- Catalyst Studios
- Sensor Lab

Compute Access: Off Campus Specific Programs

- RMACC
  - Alpine CU Boulder
  - Cumulus (Persistent Cloud Compute)
- OSG
- Jetstream 2
  - exosphere

Compute Access: Off Campus General

- Campus Champions
- ACCESS
  - My allocation (demo)
  - Assistance writing Explore Allocation

Fort Huachuca Project: Background

- Supporting students and PI from Digital Humanities
- Reconstructing the east range
- ~145km^2 (yikes!)
- Wingtra one (no ppk)
- 1cm resolution
- >60k images
- Open Drone Map
- Desired outputs
  - DEM & Ortho
  - Pointcloud (.laz)
  - 3d textured models
  - VR assets
  - OGC 3d Tiles
  - (different departments want different outputs)
- project repo
  - includes qgis and odm scripts
  - under development

Fort Huachuca Project: Workflows

- WebODM on HPC (vanilla)
  - Converted Docker Compose to Singularity instances
  - ElGato 16 core 12 hour instance, 200-800 images success
  - pro:
    - using OOD remote desktop can teach students to use
  - con:
    - manual submission will not scale to image numbers we have

Fort Huachuca Project: Workflows

- ODM Split Merge Cluster (sm-cluster)
  - support doc
  - Setup 8 worker nodes
  - put their configuration info in cluster-odm
  - launch cluster-odm
  - launch odm container with `--split 200 --sm-cluster http://localhost:3000`
  - pro:
    - can point at entire folder of images and start processing programmatically
  - con:
    - Image products depend on flight pattern (long and narrow feature artifacts more than square tile)
    - unpredictable OOMs and allocation time limits exceeded
    - no all image products can be merged (no 3d)

Fort Huachuca Project: Workflows

- QGIS group segmentation SLURM HPC ODM
  - establish tiled overlapping groups of images from the different flights
  - export a large JSON with those groups
  - Implement a python script that launches HPC tasks (12-16 hours) aimed at processing each group separately
  - leverage .las information for aligning the 3d models
  - pro:
    - reliably completes without OOM, and/or timeouts
  - con:
    - hard on the presentation end of the pipeline

Fort Huachuca Project: Difficulties

- Missing files
  - Experiencing a lot of problems filling in sections of map
- Storage issues
  - 10TB runs out fast
- ODM requires a lot of parameter education
  - missing manual helps with this

Closing thoughts

- ODM is a great program with a very active community, recommend experimenting with it
- Reach out to me for any assistance with getting compute access
- Visualization and DCC project support
- Acknowledgment
  - Tyson Swetnam Jeff Gillan
  - Support from Piero Toffanin