Critical Digital Cartography in Archaeological Research

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1. A Case Study on the Byrsa Hill

The Byrsa Hill is an excellent case study on how archaeological data management strategies can subtly and profoundly influence how a site is interpreted, and how such strategies can shield problematic interpretations from critique. As the organizational and cultural centre of the ancient city of Carthage, the hill has been repurposed in multiple acts of colonial invasion, including by the Roman Empire (ca. 30 BCE), and the Second French Colonial Empire (1800s and 1900s CE).

The body of published archaeological data on the Byrsa Hill is both sprawling and sparse, scattered across many publications with wildly different standards for data quality and completeness. In this presentation, I show how GIS systems can be used to integrate and interrogate those disparate datasets, yielding new interpretations and questions from legacy archaeological data.

2. Demo: Digitizing and Republishing Legacy Archaeological Data

This is one workflow you could use to digitize and republish features from older archaeological publications. The fake data used in this demo can be found at the link given in Section 3. In the instructions below, layers are indicated by `monospace font`).

1. Open a basemap and zoom in on the UVic campus.
2. Bring LargeMap.jpg into your workspace, georeference it with the georeferencing toolbar:
   i. Move `LargeMap.jpg` underneath `Basemap`.
   ii. From the georeferencing toolbar, open the Viewer, and add control points to align the buildings in `LargeMap.jpg` with the buildings in `Basemap`.
   iii. Move `LargeMap.jpg` above `Basemap` to check the fit.
   iv. Export the georeferenced `LargeMap.jpg` to a new geodatabase as a Feature Class called “LargeMap”, remove `LargeMap.jpg`, and then re-import the Feature Class
3. Bring `SmallMap.jpg` into your workspace, and georeference it relative to the reference grid in `LargeMap`, following the same steps used above.
4. Add a polygon Feature Class to your geodatabase with the fields “Period” and “Ontology”, and bring it into your workspace.
5. In the Feature Class, create features by tracing the features visible in `SmallMap.jpg`.
6. Using the Attributes pane, add metadata to the features in accordance with `SmallMap.jpg`.
7. Save the edits to the Feature Class, and then export it as a shapefile.
8. Log in to Github, and initialize a new repository with a description and a ReadMe file.
9. Upload your shapefiles and make the commit.

Specific Supplementary Notes:

- The reason we export and reimport the georeferenced `LargeMap.jpg` is that the georeferencing toolbar can behave oddly if two maps are being actively georeferenced in the same workspace. You can also export and reimport `SmallMap.jpg` if you wanted to georeference additional maps.

- The reason we export the georeferenced data to a geodatabase is to avoid creating auxiliary files, which will happen if you export to another file format. Auxiliary files (.aux, .xml, etc…) can have some advantages for professionals, since they separate data transformations from the data files themselves, but you should try to avoid creating them because they will make your folders much more cluttered and confusing.
- In this demo, we exported data to shapefiles. The shapefile format is very old and is supported on many platforms, but it also does not include many attractive features that newer formats have, such as longer case-sensitive field names, plain-text encoding, and single-file structure (shapefiles always have auxiliary files). If you like, you can try exporting your Feature Class in a different format by going to Arc Toolbox > Conversion Tools. One of the formats that is most friendly to web publishing is GeoJSON, which is very easy to integrate with Leaflet and other lightweight web mapping packages.

General Supplementary Notes:

- In naming your files, try to avoid spaces. The reason for this is that if you or anyone else ever needs to access your files using a terminal, it makes it much harder to do that because the terminal will think a file path with spaces in it is actually multiple paths. This may sound esoteric or irrelevant to you, but it will definitely matter if you continue to work in GIS, or if you collaborate with GIS professionals, so it is best to acquire this habit now.
- In this demo, we used ArcMap, but you could also accomplish these tasks using a program called QGIS, which is essentially an open source version of ArcGIS. QGIS is faster and much more flexible than both ArcMap and ArcGIS Pro, and in my experience it is much more intuitive and user-friendly. It is also free. See Section 3 for links to tutorials on QGIS.

3. Resources and Links

The data and analyses presented in Section 1 can be found in my thesis:

- Thesis: https://dx.doi.org/10.14288/1.0401823
- Supplementary data files: https://dx.doi.org/10.14288/1.0402158
- Mirror of the data files: https://github.com/josephburkhart/Byrsa-Archive-Static

The mock data used in Section 2 can be found in a public github repository for this lecture, along with this handout and other relevant files:

- Repository: https://github.com/josephburkhart/UVicArchMapGuestLecture

Other Useful Links:

- Introductions to Github: short video, long video, text-based
- Tutorials on Georeferencing: ArcGIS Pro, ArcMap, QGIS
- Tutorials on QGIS: long video, text-based