

In-Browser Raster Data Processing

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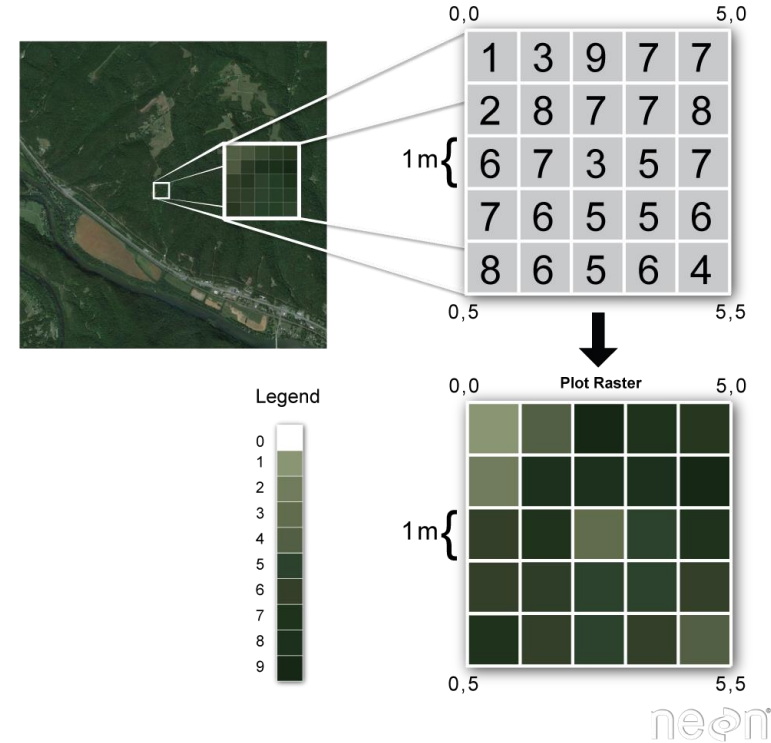


Introduction

- What is raster data?
- What is Web Assembly(Wasm)?
- Why use Wasm for this project?

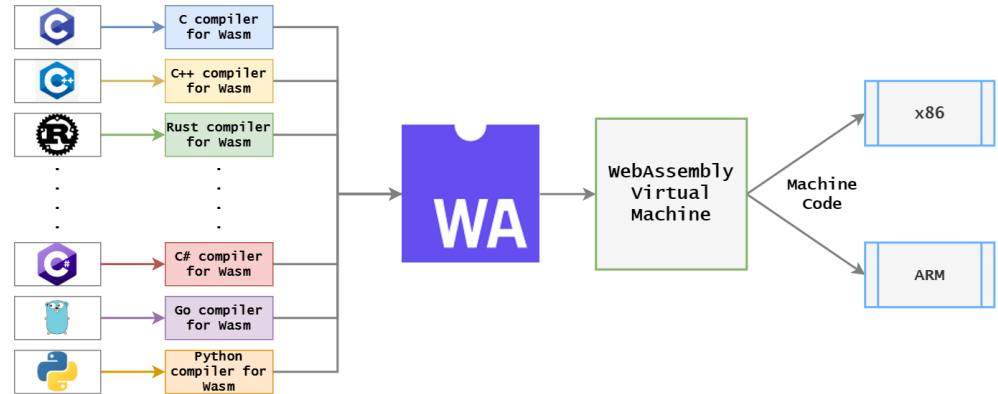
Raster Data

- Type of spatial data.
- Data from satellites.
- Represented as multi-dimensional arrays.
- Datasets from CDS.



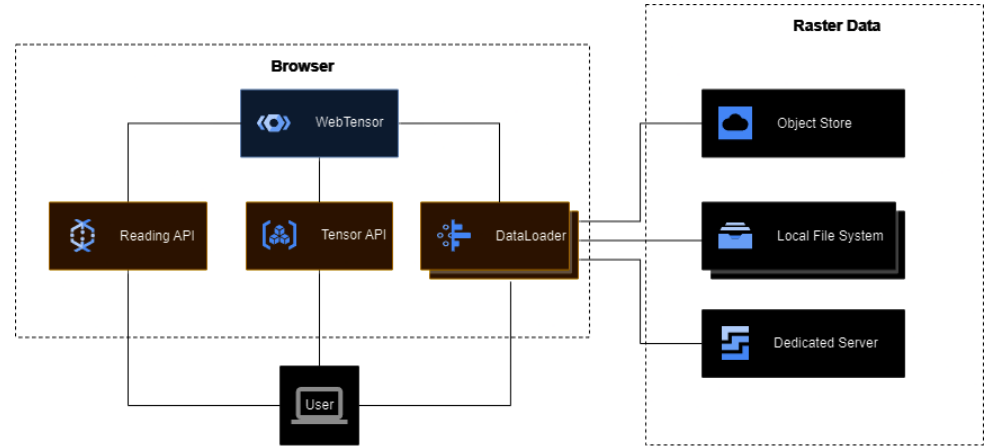
Web Assembly

- It is a byte code instruction format.
- Linked together with JS and HTML.
- Can be run on modern browser.
- Achieves near native performance.
- Polyglot.



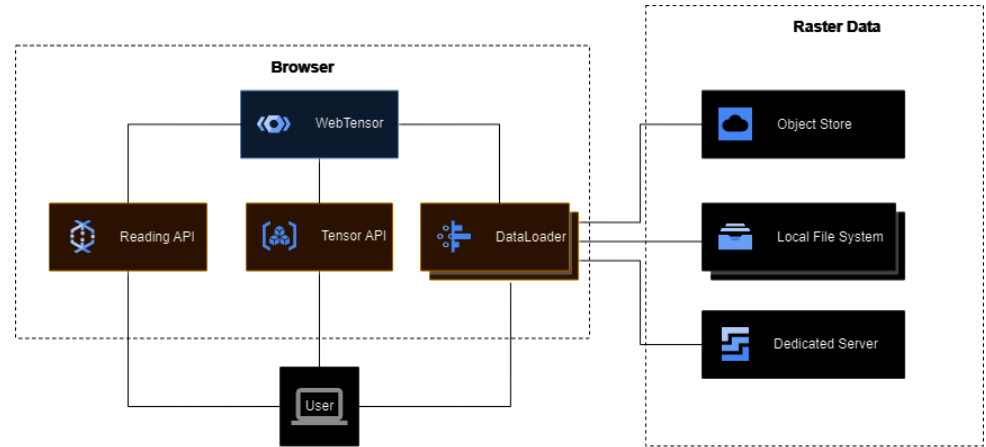
Implementation

- Data loader.
- Raster data processing module or WebTensor.
- User Interface for visualization.



Data Loader

- Parquet-Wasm
- Coordinate Reference System(CRS) Type
- Spatial Extent
- Band Selection
- Chunk Size



User Interface

- Histograms
- Min and Max values



Tools

- Emscripten for C/C++.
- Pyodide for python.
- Geospatial Data Abstraction Library(GDAL).
- Xarray.



Benchmarking

- Implement the same program without wasm.
- Compare and measure the performance.

References

- [1] L. F. Naumann, “WebTensor: Towards high-performance raster data analysis in the browser,” in Datenbanksysteme für Business, Technologie und Web (BTW 2023), 20. Fachtagung des GIfachbereichs „Datenbanken und Informationssysteme“ (DBIS), 06.-10, März 2023, Dresden, Germany, Proceedings, vol. P-331 of LNI, pp. 1083–1089, Gesellschaft für Informatik e.V., 2023.
- [2] S. Singla, A. Eldawy, T. Diao, A. Mukhopadhyay, and E. Scudiero, “Experimental study of big raster and vector database systems,” in 2021 IEEE 37th International Conference on Data Engineering (ICDE), pp. 2243–2248, 2021.

Thank you!

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