Script

Libraries

```
import os          operating system
import glob   search files using wildcard patterns
from pathlib import Path
from eoreader.reader import Reader      Library for reading satellite data
from eoreader.bands import RED, GREEN, BLUE, to_str
from osgeo import gdal   Geospatial Data Abstraction Library (GDAL) provides functions for reading
                          writing, and manipulating raster and vector geospatial data.
```

Functions

```python
def get_file_list(data_dir: str, search_criteria: str) -> list[str]:
    return glob.glob(os.path.join(data_dir, search_criteria))
```

Given a directory path (data_dir) and a search criteria string (search_criteria), it uses glob.glob() and os.path.join() to search for files that match the criteria in the specified directory and returns a list of file paths.

```python
def make_directory(dir_path: str):
    if not os.path.exists(dir_path):
        os.makedirs(tif_dir)
```

Given a directory path (dir_path), it checks if the directory exists. If not, it creates the directory using os.makedirs()

```python
def get_filename(filepath: str, with_extension=False) -> str:
    if with_extension:
        return os.path.basename(filepath)
    return Path(file).stem
```

Given a file path (filepath), it extracts the filename without the extension if with_extension is set to False, or with the extension if with_extension is set to True.

```python
def raster2tif(input_file_path: str, output_path: str, crs=None) -> str:
```

Given an input file path (input_file_path), an output path for the resulting GeoTIFF file (output_path), and an optional coordinate reference system (crs), it performs the following steps:
  - **Creates an instance of the Reader class.**
  - **Opens the input file using reader.open() and returns a product object.**
  - **If crs is not provided, it retrieves the coordinate reference system of the input file (product.crs()) and converts it to a string (to_string() method).**
  - **Defines a list of bands to be stacked (band_list), filters out the bands present in the product (ok_bands), and stacks them together using the product.stack() method, specifying the desired resolution and output path.**
  - **Cleans up temporary files generated during stacking using product.clean_tmp().**
  - **Closes the product (product.clear()).**
  - **Opens the output file using gdal.Open() from the GDAL library.**
  - **Reprojects the output file to the desired coordinate reference system (crs) using gdal.Warp().**
  - **Returns the coordinate reference system.**

Main

- Calls make_directory() to create the necessary directories.
- Retrieves the list of ZIP files in the data_dir using get_file_list() and assigns it to zip_files.
- Initializes an empty string for the coordinate reference system (crs).
- Iterates over the ZIP files, extracts the product name using get_filename(), defines the output TIFF file path, and calls raster2tif() to convert each ZIP file to a GeoTIFF. The first file determines the crs, and subsequent files are reprojected to match that crs.
- Retrieves the list of TIFF files in the tif_dir using get_file_list() and assigns it to tif_files.
- Builds a virtual mosaic (vrt) using gdal.BuildVRT() with the list of TIFF files.
- Specifies the output path for the mosaic GeoTIFF file (mosaic_file_path) and uses gdal.Translate() to create the final mosaic file.
- Sets vrt to None to release the associated resources.

USGS Websites

Steps for Downloading USGS Datasets

1.

In Geocoder under search criteria, write name of the desired place in feature.

2.

Select preferred date range and click on datasets.

3.

List of dataset will be displayed, select the type of datasets you want and click on results.

Note: Credentials for glovis and Earth explorer have to be same.

Types of Datasets

- **Satellite Imagery:** Earth Explorer offers access to satellite imagery from various sensors, including Landsat, Sentinel, MODIS, and more.

- **Digital Elevation Models (DEM):** Earth Explorer provides access to elevation data, such as digital elevation models, digital terrain models, and hill shade data.

- **Aerial Photography:** Users can access historical and contemporary aerial photography collections from the USGS
.

- **Geological and Geophysical Data:** This includes geological maps, mineral resource assessments, seismic data, gravity and magnetic surveys, and more.

- **Land Cover and Land Use Data:** This data helps in understanding land use patterns, monitoring changes in vegetation, and assessing environmental impacts.

- **Natural Hazards Data:** Earth Explorer includes data related to natural hazards such as earthquakes, volcanoes, landslides, and wildfires.

Earth Engine Data Catalog

- Earth Engine's public data catalog includes a variety of standard Earth science raster datasets.

- You can import these datasets into your script environment with a single click.

- You can also upload your own raster data or vector data for private use or sharing in your scripts.

You can import another dataset which is not in Earth Engine yet by suggesting a dataset.

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