GeoKhadem

GeoKhadem is a lightweight Python library developed by Md Khadem Ali for basic GIS and Remote Sensing operations. The library provides core functionalities such as NDVI and NDWI calculation using numerical arrays, making it suitable for satellite image processing, vegetation monitoring, and water body detection.

This package is ideal for researchers, students, and developers who work with geospatial data and need quick, efficient index calculations without relying on large software stacks.

Key Features

- Calculate NDVI (Normalized Difference Vegetation Index)
- Calculate NDWI (Normalized Difference Water Index)
- Built with pure NumPy — fast and lightweight
- Designed for integration with raster processing libraries (like Rasterio, GDAL)
- Includes basic unit tests for core functions
- Ready for further expansion (classification, visualization, etc.)

Usage Example

Here Code:

```
import numpy as np
from geokhadem import calculate_ndvi, calculate_ndwi

# Simulated image bands as NumPy arrays
nir = np.array([0.8, 0.7, 0.6])
red = np.array([0.3, 0.2, 0.4])
green = np.array([0.5, 0.6, 0.4])

# Calculate NDVI
ndvi = calculate_ndvi(nir, red)
print("NDVI:", ndvi)

# Calculate NDWI
ndwi = calculate_ndwi(green, nir)
print("NDWI:", ndwi)
```

Use Cases

GeoKhadem can be used in:

- Agricultural monitoring
- Vegetation health assessment
- Water body detection
- Satellite image analysis (Landsat, Sentinel)
- Academic research and teaching
- GIS & Remote Sensing analysis focused on regions like Natore, Bangladesh

About the Developer

This package was developed by Md Khadem Ali as part of a research and development initiative focusing on geospatial technology. The aim is to build accessible, modular, and locally relevant tools for geospatial analysis.

Future plans include:

- Raster file support (GeoTIFF)
- Land cover classification tools
- Interactive maps using Folium