

Resampling.jl

Bathymetry Slope-Based Resampling

This program tests the full sonar bathymetry processing chain, from raw `.raw` sonar files through slope-aware synthetic resampling. It is designed for development, validation, and diagnostics.

Slope Estimation

```
slopes = slopesFromBathymetry(baths, config["slopes"]["krad"])
slopes = computeSlopes(baths, slopes)
```

Purpose:

- `slopesFromBathymetry`: Calculate slope magnitude and orientation between adjacent depth points.
- `computeSlopes`: Optionally load precomputed slopes or assigned constant values

Slope-Aware Resampling

```
new_baths = resampleBathymetry(baths, slopes,
    config["slopes"]["srاد"],
    config["slopes"]["nrsp"])
```

Purpose: Augment original bathymetry using slope vectors to simulate new depth/position samples around the real measurements.

- `srاد`: Perturbation radius in meters
- `nrsp`: Number of synthetic points per real sample

Export Results

```
export_file = joinpath(@__DIR__, config["slopes"]["export_file"])
export_slopes(baths, slopes, export_file)
```

Purpose: Write slope metadata (azimuth, gradient, etc.) to disk for visualization or reuse.

Diagnostics and Testing Output

```
println(baths[1].depth[1:15])      # Print original depth samples
println(size(new_baths[1].depth))  # Size of synthetic samples
println(new_baths[1].depth[1:15])  # Preview resampled depths
```

Purpose: Basic sanity checks for:

- Confirming correct bottom detection

- Verifying expected upsampling
- Validating that synthetic depths stay near realistic values