Denoising of Soil Moisture from InSAR Phase Closure

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1. Abstract

Goal: high-resolution soil moisture data in remote regions
- Interferometric synthetic aperture radar (InSAR) phase closure corresponds to in situ soil moisture data
- Noisy. Currently, only linear averaging.
- Test other types of denoising.
- Challenge: no real training data

2. Background

3. Method

- Sentinel-1 C-band satellite data, soil moisture from Oklahoma Mesonet sites
- Five Denoising methods:
  - Mean, Median, Bilateral, Non-local Means, DnCNN

4. Sample Timeseries

5. Parameter Sweep

6. Results: Filtered Images at t=1 with site-by-site correlation

7. Method comparison

8. Conclusion

- Conventional image filters not optimized for radar, needs more specific training data
- Non-local means best – likely able to pull statistics from similar image areas (e.g. wheat fields)
- Given processing time, mean and median best
- No magic bullet here!