Phase Unwrapping Algorithms For Radar Interferometry

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Phase Unwrapping Algorithms For Radar

Phase unwrapping algorithms for radar interferometry: residue-cut, least-squares, and synthesis algorithms. Howard A. Zebker and Yanping Lu. Department of Geophysics, Stanford University, Stanford, California 94305-2215. Received May 5, 1997; accepted September 18, 1997; revised manuscript received October 9, 1997 The advent of interferometric synthetic aperature radar for geophysical studies has resulted in the need for accurate, efficient methods of two-dimensional phase unwrapping.

Phase unwrapping algorithms for radar interferometry ...

While phase unwrapping algorithms have proliferated over the past ten years, two main approaches are currently in use. Each is most useful only for certain restricted applications. All these algorithms begin with the measured gradient of the phase field, which is subsequently integrated to recover the unwrapped phases.

OSA | Phase unwrapping algorithms for radar interferometry ...

Phase unwrapping is a mathematical problem-solving technique increasingly used in synthetic aperture radar (SAR) interferometry, optical interferometry, adaptive optics, and medical imaging. In Two-Dimensional Phase Unwrapping, two internationally recognized experts sort through the multitude of ideas and algorithms cluttering current research, explain clearly how to solve phase unwrapping problems, and provide practicable algorithms that can be applied to problems encountered in diverse ...

Two-Dimensional Phase Unwrapping: Theory, Algorithms, and ...

Phase unwrapping is a problem that occurs in several fields as diverse as Synthetic Aperture Radar and MR Angiography. In all cases the problem is that the measuredphase signal can only take on values in a range, whilst the original phase signal can take on any value.

A Fast, Automated, N-Dimensional Phase Unwrapping Algorithm

Chapter 2 gives a basic background on radar interferometry and phase unwrapping, fol- lowed by a quick review of the main phase unwrapping approaches and state-of-the-art algorithms, in Chapter 3.

RADAR INTERFEROMETRY: 2D PHASE UNWRAPPING VIA GRAPH CUTS

Phase unwrapping is a mathematical problem-solving technique increasingly used in synthetic aperture radar (SAR) interferometry, optical interferometry, adaptive optics, and medical imaging.

Two-Dimensional Phase Unwrapping by Ghiglia, Dennis C. (ebook)

In this paper, we present a non-iterative Simultaneous Phase Unwrapping and Denoising algorithm for phase imaging, referred to as SPUD. The proposed method relies on the least-squares Discrete...

(PDF) SPUD: Simultaneous Phase Unwrapping and Denoising ...

Two-dimensional phase unwrapping is the process of recovering unambiguous phase data from a 2-D array of phase values known only modulo 2pi rad. SNAPHU is an implementation of the Statistical-cost, Network-flow Algorithm for Phase Unwrapping proposed by Chen and Zebker (see references below). This algorithm poses phase unwrapping as a maximum a posteriori probability (MAP) estimation problem, the objective of which is to compute the most likely unwrapped solution given the observable input data.

SNAPHU: Statistical-Cost, Network-Flow Algorithm for Phase ...
Statistical-Cost, Network-Flow Algorithm for Phase Unwrapping (SNAPHU) Stanford Radar Interferometry Research Group Software written in C that runs on most Unix/Linux platforms. Used for phase unwrapping (an interferometric process). The SNAPHU algorithm has been incorporated into other SAR processing software, including ISCE.

What is Synthetic Aperture Radar? | Earthdata
A wide range of interferometric techniques recover phase information that is mathematically wrapped on the interval (- π, π]. Obtaining the true unwrapped phase is a longstanding problem. We present an algorithm that solves the phase unwrapping problem, using a combination of Fourier techniques.

OSA | Fast phase unwrapping algorithm for interferometric ...
Phase Unwrapping with SNAPHU. Two-dimensional phase unwrapping is the process of recovering unambiguous phase data from a 2-D array of phase values known only modulo 2pi rad. SNAPHU is an implementation of the Statistical-cost, Network-flow Algorithm for Phase Unwrapping proposed by Chen and Zebker. This algorithm poses phase unwrapping as a maximum a posteriori probability (MAP) estimation problem, the objective of which is to compute the most likely unwrapped solution given the observable ...

SNAPHU | STEP
Abstract—Two-dimensional (2-D) phase unwrapping is a key step in the analysis of interferometric synthetic aperture radar (InSAR) data. While challenging even in the best of circumstances, this problem poses unique difficulties when the dimensions of the interferometric input data exceed the limits of one's computational capabilities.

CiteSeerX — Citation Query A novel phase unwrapping method ...
The phase of the radar echoes may only be measured modulo 2 pi; however, the whole phase at each point in the image is needed to obtain elevations. An approach to 'unwrapping' the 2 pi ambiguities...

Satellite Radar Interferometry: Two-Dimensional Phase ...
Phase unwrapping (PU) is one of the key processes in measuring the elevation or deformation of the Earth's surface from its interferometric synthetic aperture radar (InSAR) data. PU problems may be formulated as maximum a posteriori estimation estimations of Markov random field (MRF). The key issue of this formulation is energy minimization.

Comparison of optimization algorithms for interferometric ...
DOI: 10.7463/0712.0423364 Corpus ID: 129949655. Phase unwrapping of radar topographic interferograms @article{Shuvalov2012PhaseUO, title={Phase unwrapping of radar topographic interferograms}, author={Roman Shuvalov}, journal={Science and Education of the Bauman MSTU}, year={2012}, volume={12} }

Phase unwrapping of radar topographic interferograms ...
Abstract. The last three decades have been abundant in various solutions to the problem of Phase Unwrapping in a SAR radar. Basically, all the existing techniques of Phase Unwrapping are based on the assumption that it is possible to determine discrete "derivatives" of the. unwrapped phase.

Optimizing the minimum cost flow algorithm for the phase ...
The algorithm is designed to handle noisy interferograms and is based on the following principles: 1) Unwrapping is carried out on the perimeter of "growth regions", and these regions are allowed to grow with consistency checking. 2) Phase information from neighboring pixels is used to predict the correct phase of each new pixel to be unwrapped.

A region-growing algorithm for InSAR phase unwrapping ...

Automatic phase unwrapping algorithms in Synthetic Aperture Radar (SAR) Interferometry. IEICE Transactions on Electronics, E83C (12):1896-1904. Chen, C. W. and Zebker, H. A., 2001. Two-dimensional phase unwrapping with use of statistical models for cost functions in nonlinear optimization.

Data Recipes — Further Reading | ASF

Phase unwrapping is a mathematical problem-solving technique increasingly used in synthetic aperture radar (SAR) interferometry, optical interferometry, adaptive optics, and medical imaging.

Two-Dimensional Phase Unwrapping: Theory, Algorithms, and ...

Abstract Phase unwrapping (PU) is one of the key processes in reconstructing the digital elevation model of a scene from its interferometric synthetic aperture radar (InSAR) data. It is known that two-dimensional (2-D) PU problems can be formulated as maximum a posteriori estimation of Markov random fields (MRFs).