Diego Domenzain
Geophysics and Optimization

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About

I am interested in applying physics, mathematics and high performance computing for the betterment of humanity and exploration of reality.

I acquire, analyze and process big volumes of data using math and physics by designing and deploying computational algorithms.

Specializing in scientific computing, numerical methods, forward models, inverse problems, imaging methods, geophysics and machine learning.

Previous interests include graph theory, error correcting codes, finite geometries and combinatorics.

I also like drawing, swimming and bouldering.

Coding in

Matlab • Python • Bash
Slurm • Pytorch
TensorFlow • Julia

Skills

geophysics • machine learning
inverse methods • forward models
high performance computing
scientific computing
algorithm design
image & signal processing
data visualization

Experience

Postdoctoral Researcher
Colorado School of Mines (CSM). 2020 - current

Ph.D. Geophysics
Boise State University (BSU). 2015 - 2019

MSc. Discrete Mathematics
Michigan Technological University (MTU). 2012 - 2014

Selected Publications

Efficient inversion of 2.5D electrical resistivity data using the discrete adjoint method. Geophysics - In press 2021. Diego Domenzain, John Bradford, Jodi Mead.

Joint inversion of full-waveform inversion GPR and ER data. Part 1. Geophysics, 85(6), 1-72. Diego Domenzain, John Bradford, Jodi Mead.

Joint inversion of full-waveform inversion GPR and ER data. Part 2. Geophysics, 85(6), 1-74. Diego Domenzain, John Bradford, Jodi Mead.

Code

Gerjoii
Matlab • Bash • Slurm • Python • Pytorch

• 2D Forward modeling of radar and electrical resistivity.

• Novel joint multi-parameter optimization algorithm that recovers electrical parameters of the subsurface from radar and resistivity data.

• Embedded cross-gradients routine that improves structural sensitivities.

• Machine learning routine for finding inversion weights.

• 2.5D Electrical resistivity inversion algorithm that is capable of handling very fine discretization domains with very low computer memory requirements.

Alles
Matlab • Python • Julia

Code gallery of various optimization, graph algorithms, partial differential equations, cloud computing examples, and time-frequency data analysis. Examples include decision trees & random forests, self-organizing maps, AWS, Markowitz portfolio, and matrix completion.

Current Project

Gerjoii + ML
TensorFlow • Keras • Python

Joint inversion of radar and electrical resistivity data enhanced by Machine Learning:

Using a minimal set of data examples to generate a starting model for a deterministic inversion, and employing a modified GAN approach to generate subsurface model parameters.