

fatiando a terra

Construindo uma base para ensino e pesquisa
de geofísica



LEONARDO UIEDA
leouieda.com

histórico

2004

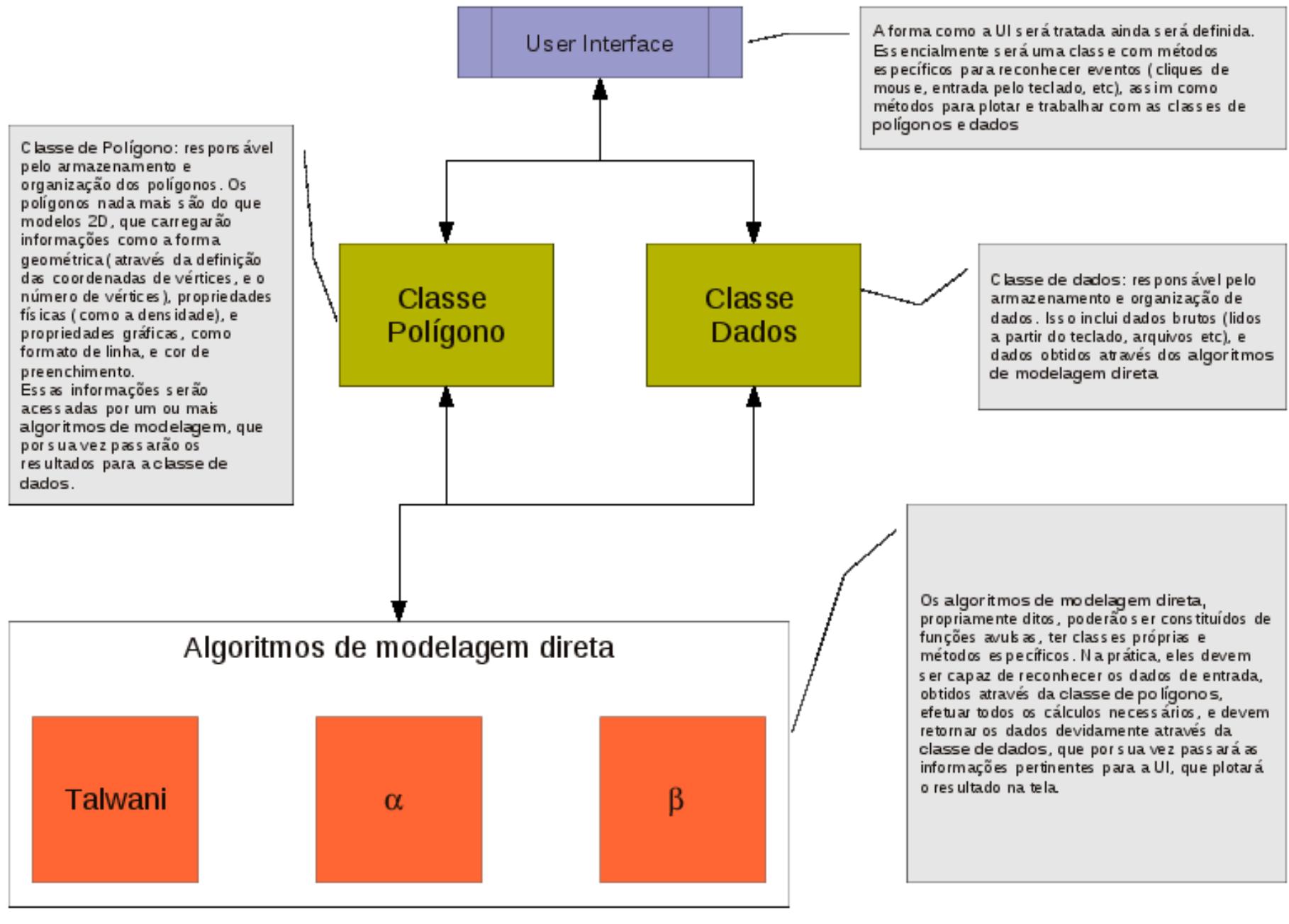


2009



IAG
graduação em geofísica

~2009 - projeto
modelagem direta
grav-mag



2010



mestrado observatório nacional

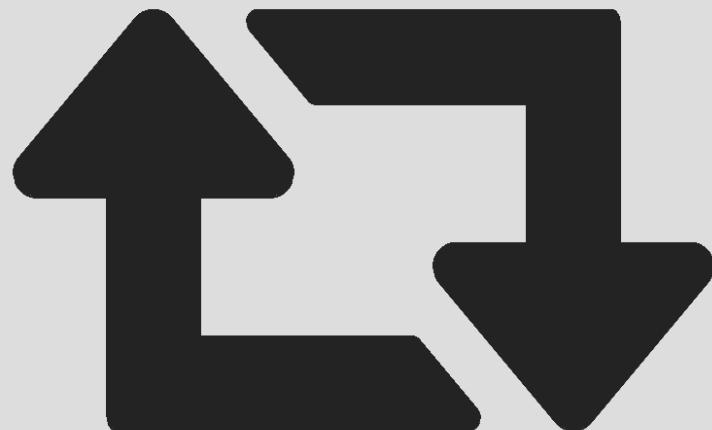
credit: Leandro Ciuffo

juntar código

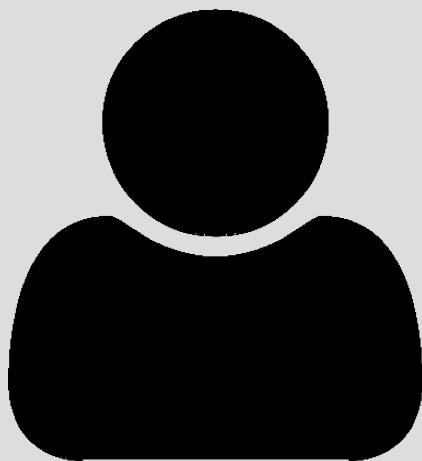
matérias (inversão)

dissertação, extra

reutilizar



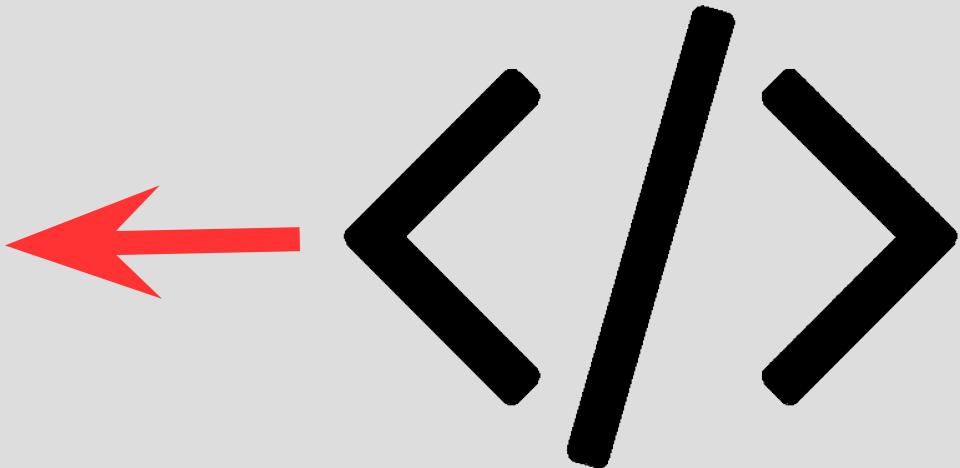
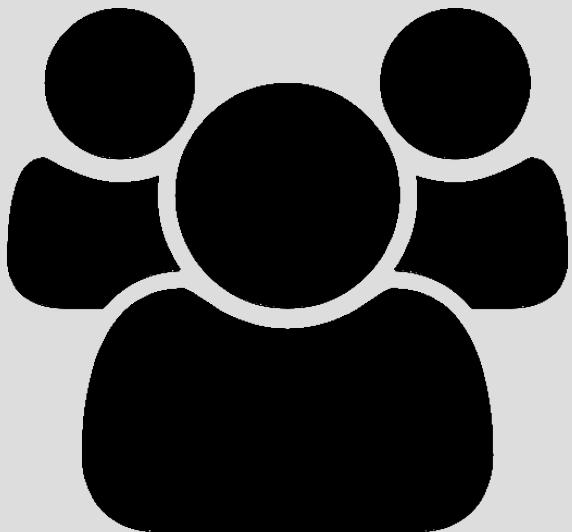
muita
re-implementação



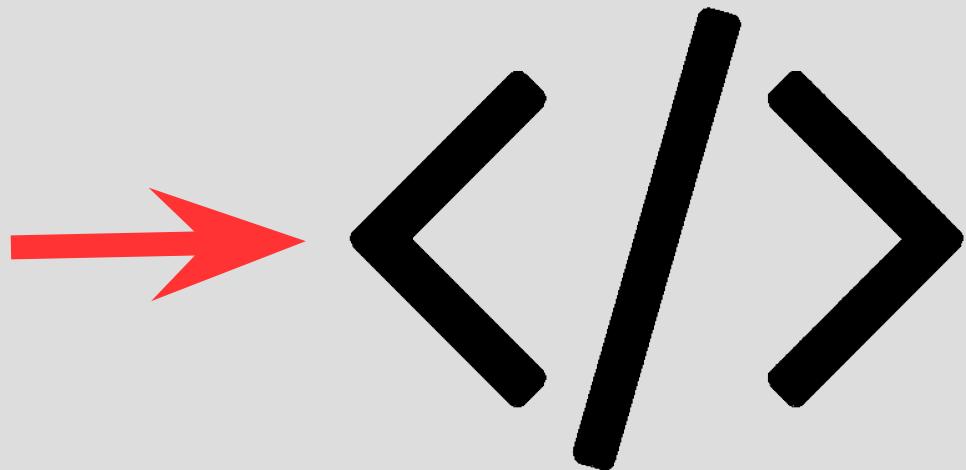
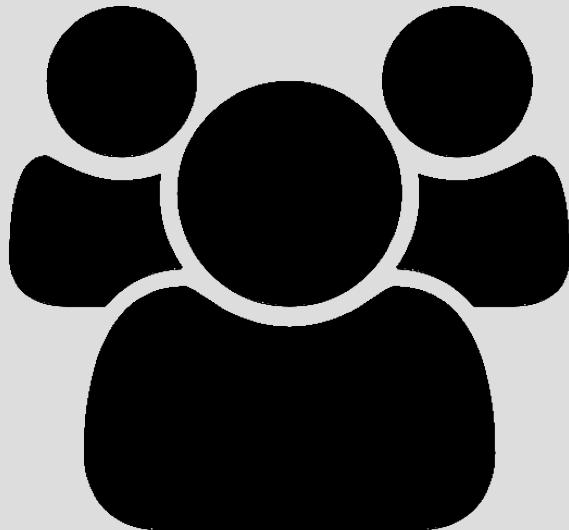
repetição

leva a erros

1 código
++ usuários

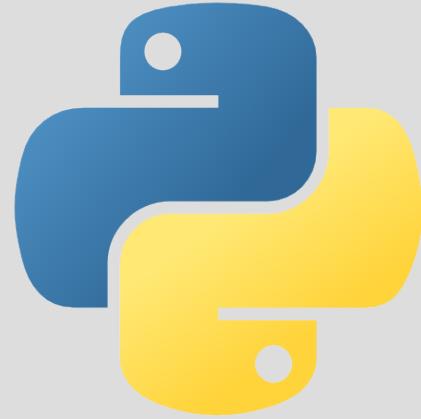


1 código
++ programadores



biblioteca

(funções, classes, etc)



pythonTM

fácil de aprender
rápido de implementar

github.com

GitHub, Inc. (US) | https://github.com/fatiando/fatiando/tree/928515b0fcfdcccbc4f661ed2469390ef43ec1d

tree: 928515b0fc ▾ fatiando / +

Restructured the repos. Made fatiando python package with directmods, ...

... math, utils and geoinv. Includes direct models for prism gravity, sclimate signal from heat well log, and simple cartesian tomography. Geoinv has the inversion program for the single perturbation climate signal, and simple tomography (including using an image as a model).

--HG--
extra : convert_revision : svn%3A2c9857fa-f4c4-11dd-ada4-5153b8187bf2/trunk%4037

	leouieda authored on 30 Apr 2010	latest commit 928515b0fc
📄 c	Restructured the repos. Made fatiando python package with directmods, ...	5 years ago
📁 fatiando	Restructured the repos. Made fatiando python package with directmods, ...	5 years ago
📁 old	Moved the old src of the project to trunk/old. Don't think it'll be u...	5 years ago
📄 SConstruct	Restructured the repos. Made fatiando python package with directmods, ...	5 years ago
📄 test.py	Restructured the repos. Made fatiando python package with directmods, ...	5 years ago



github.com

GitHub, Inc. (US) | https://github.com/fatiando/fatiando/tree/928515b0fcfdccbc4f661ed2469390ef43ec1d

tree: 928515b0fc ▾ fatiando / +

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extra : convert_revision : svn%3A2c9857fa-f4c4-11dd-ada4-5153b8187bf2/trunk%4037

	author	date	commit	actions
	leouieda	authored on 30 Apr 2010	928515b0fc	
	c	Restructured the repos. Made fatiando python package with directmods, ...		5 years ago
	fatiando	Restructured the repos. Made fatiando python package with directmods, ...		5 years ago
	old	Moved the old src of the project to trunk/old. Don't think it'll be u...		5 years ago
	SConstruct	Restructured the repos. Made fatiando python package with directmods, ...		5 years ago
	test.py	Restructured the repos. Made fatiando python package with directmods, ...		5 years ago

A red arrow points to the author name "leouieda" in the first commit row.



github.com

GitHub, Inc. (US) | https://github.com/fatiando/fatiando/tree/928515b0fcfdccbc4f661ed2469390ef43ec1d

tree: 928515b0fc ▾ fatiando / +

Restructured the repos. Made fatiando python package with directmods, ...

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extra : convert_revision : svn%3A2c9857fa-f4c4-11dd-ada4-5153b8187bf2/trunk%4037

	author	date	commit
	leouieda	authored on 30 Apr 2010	latest commit 928515b0fc
↳ c		Restructured the repos. Made fatiando python package with directmods, ...	5 years ago
↳ fatiando		Restructured the repos. Made fatiando python package with directmods, ...	5 years ago
↳ old		Moved the old src of the project to trunk/old. Don't think it'll be u...	5 years ago
↳ SConstruct		Restructured the repos. Made fatiando python package with directmods, ...	5 years ago
↳ test.py		Restructured the repos. Made fatiando python package with directmods, ...	5 years ago

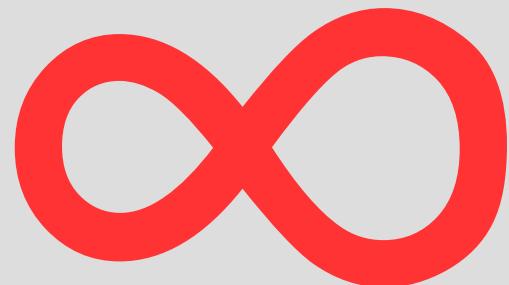
fatiando





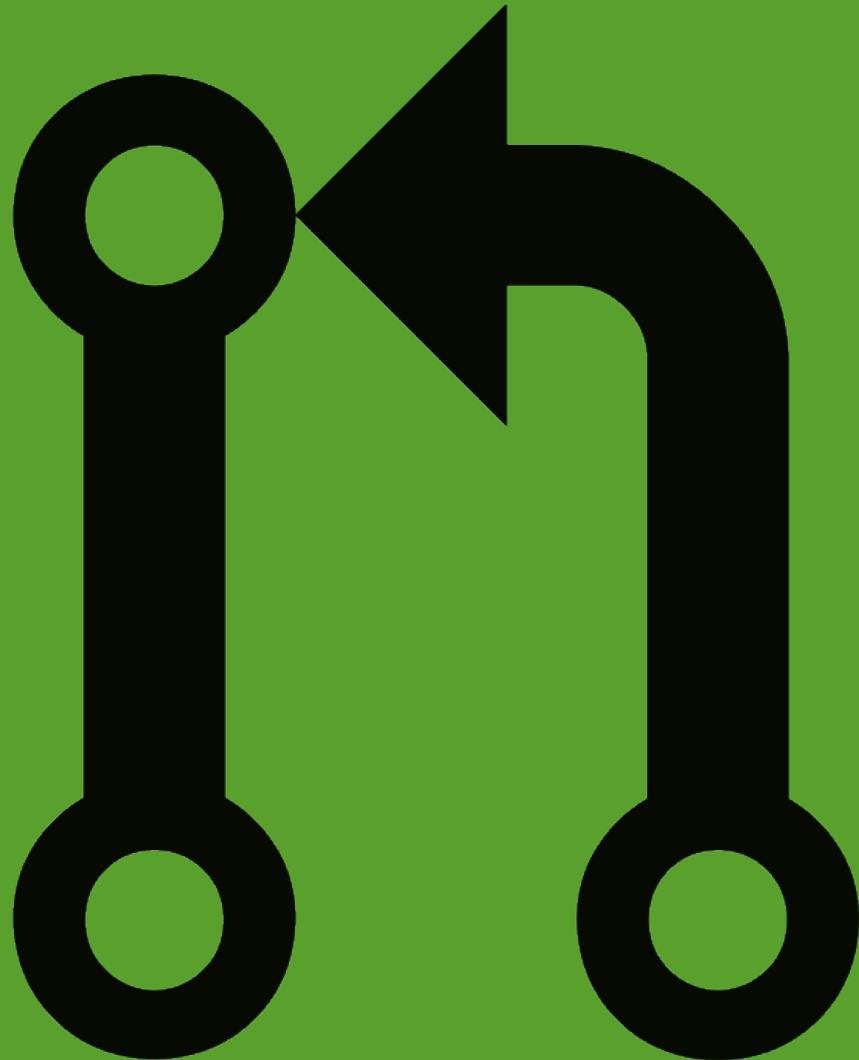
controle
de versão
(VCS)

ctrl + Z



git/mercurial

software-carpentry.org



v0.0.1

(pré-beta-dev-testing)

curso de inversão

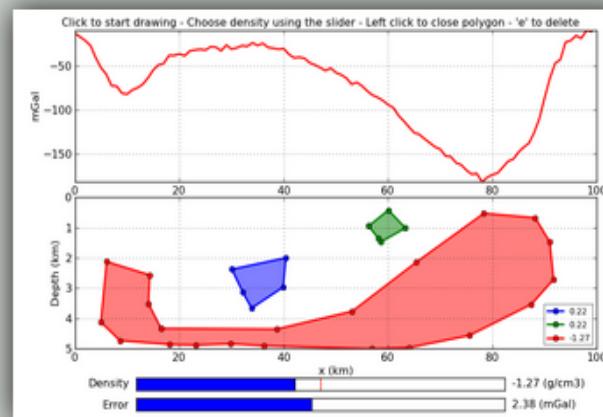
IAG 02/2011

github.com/pinga-lab/inversao-iag-2012

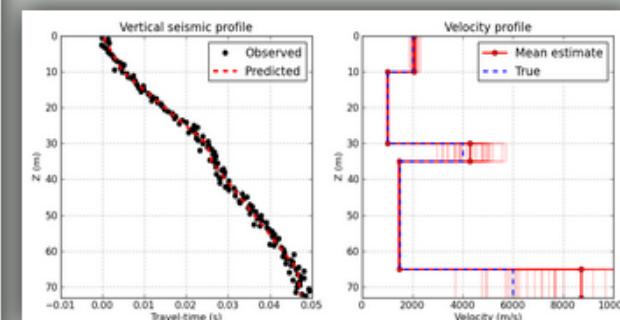
Example Gallery

Some of the functionality already implemented:

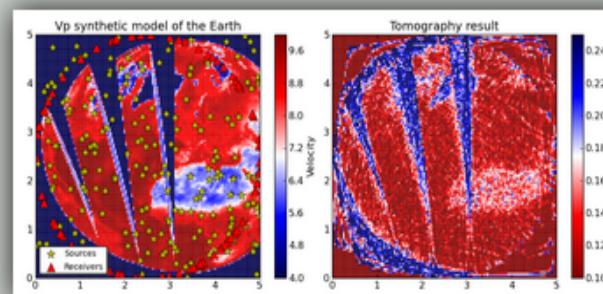
Moulder - 2D gravimetric direct modeling



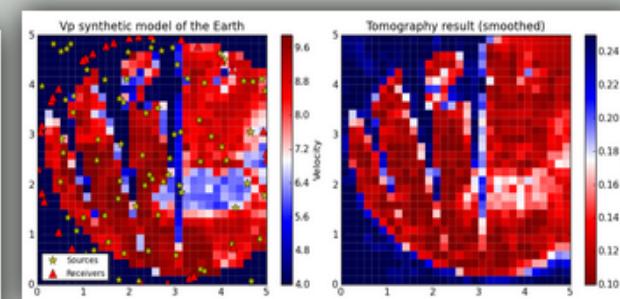
Inversion of synthetic vertical seismic profile data



Straight-ray travel-time tomography of large models using sparse linear algebra



Straight-ray travel-time tomography



Simple inversion for the relief of the 2D triangular basin

... and also a trapezoidal basin





2015



fatiando

0.3-dev

Cite us

Install

Docs



Site ▾

Page ▾

Search



fatiando a terra

modeling and inversion in geophysics

An easy and flexible way to perform and implement geophysical data analysis.

All from inside the powerful [Python](#) language.

Fatiando is built on top of the [Scipy](#) ecosystem: [Numpy](#), [Cython](#), [matplotlib](#), [Mayavi](#), etc. Current capabilities include:

- [Data processing](#)
- [Generate synthetic data](#)
- [Forward modeling](#)
- [Inversion](#)
- [2D and 3D visualization](#)

~700 downloads/mês

código no GitHub



This repository Search Explore Gist Blog Help leouleda + ⚙️ ⚙️ ⚙️ ⚙️

fatiando / fatiando

Unwatch 15 ⭐ Star 30 Fork 26

Python toolkit for modeling and inversion in geophysics <http://www.fatiando.org> — Edit

1,711 commits 15 branches 4 releases 7 contributors

branch: master fatiando +

Merge pull request #191 from fatiando/latest-pep8 ...
leouleda authored 6 days ago latest commit 8853f42397

File	Description	Time Ago
benchmarks	Merge branch 'master' into tesseroid-kernels	a month ago
cookbook	Merge branch 'master' into docs-gh-pages	3 months ago
doc	Leave changelog for last and add as contrib	7 days ago
fatiando	Removed OMP prange from gravmag forward modeling	28 days ago
test	Use the latest PEP8 release and ignore some errors	6 days ago
.coveragerc	Remove interactive from coverage report	5 months ago
.gitattributes	Added versioneer support	9 months ago
.gitignore	Ignore vim backup files	3 months ago
.push-docs.sh	Add tests back to travis and push only on master	a month ago
.travis.yml	Install pep8 from conda	6 days ago
CITATION.rst	Updated citation file	6 months ago
LICENSE.txt	Updated year in license text	a year ago
MANIFEST.in	Rename readme extension to rst	5 months ago
Makefile	Ignore the errors in the Makefile as well	6 days ago
README.rst	Replace glitter badge by shields.io badge	13 days ago
requirements.txt	Add version numbers to requirements	28 days ago
setup.py	Removed OMP prange from gravmag forward modeling	28 days ago
versioneer.py	Added versioneer support	9 months ago

Code Issues Pull requests Wiki Pulse Graphs Settings

HTTPS clone URL <https://github.com/fatiando/fatiando> You can clone with HTTPS, SSH, or Subversion. ⚙️

Download ZIP

README.rst

 fatiando a terra

[Website](#) | [Docs](#) | [Mailing list](#) | [Google+](#)

A Python package for modeling and inversion in geophysics.

pypi v0.3 downloads 620/month build passing coverage 66% doi 10.5281/zenodo.16205 GITTER JOIN CHAT

contribuidores



leouieda

1,389 commits / 422,442 ++ / 300,020 --

#1



birocoles

56 commits / 3,882 ++ / 1,071 --

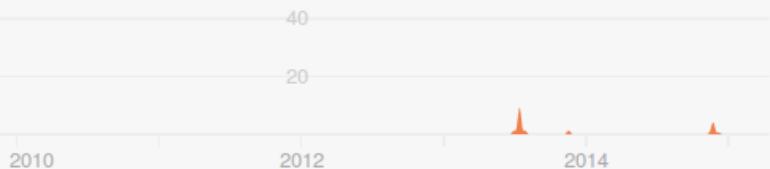
#2



hbueno

28 commits / 304 ++ / 176 --

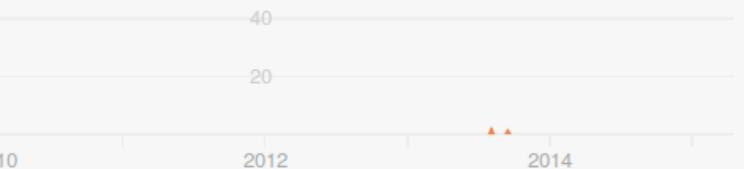
#3



eusoubrasileiro

7 commits / 510 ++ / 171 --

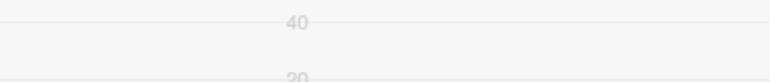
#4



gmarkall

2 commits / 44 ++ / 299 --

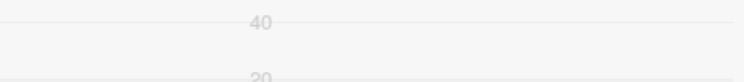
#5



caparicajr

1 commit / 13 ++ / 13 --

#6



Convolutional model for seismic data (using a depth model) #190

 Open victortxa wants to merge 4 commits into `fatiando:master` from `victortxa:convolutional_model`

 Conversation 3

 Commits 4

 Files changed 1



victortxa commented 16 days ago

Collaborators

Checklist

- Make tests
- Create/upd...
- Include rel...

Merge gravmag.fourier with gravmag.transform #186

 Open mtb-za wants to merge 4 commits into `fatiando:master` from `mtb-za:gravmag_merge`

 Conversation 15

 Commits 4

 Files changed 9



mtb-za commented 20 days ago

This closes issues #171 and #172.

Updated the two recipes that I wrote. The first one was well. This was suggested as #171.

The `*.ansig` function was also

Cut Regular Grid #189

 Open santis19 wants to merge 8 commits into `fatiando:master` from `santis19:cutregulargrid`

 Conversation 7

 Commits 8

 Files changed 1



santis19 commented 19 days ago

griddler.cut_regular function added.

When we have a regular grid and we want to cut a rectangular

fatiando

diversos métodos

+

inversão

+

visualização

biblioteca

pacotes >

módulos >

funções/classes

fatiando/

gravmag/

seismic/

inversion/

vis/

gridder

mesher

utils

constants

datasets

pacotes

módulos

tour

demo 1

Anomalia Bouguer de um prisma

IPython notebook

ipython.org

demo 2

Prisma poligonal
e interatividade

aulas

exploração

interatividade



credit: AVTC Series

modelos
dados sintéticos
dados reais

IPython

+

fatiando

exemplo 1

modelagem direta

exemplo 2

anomalia magnética

exemplo 3

ondas sísmicas

pesquisa

criação de
métodos
de inversão

minimizar

$$\phi(\bar{p}) = \sum_{i=1}^N [d_i^o - d_i(\bar{p})]^2$$

exemplo:

Método de Newton

$$\nabla^2 \Phi \Delta \bar{p} = -\nabla \Phi$$

Hessiana

gradiente

aproximação

$$\nabla^2 \Phi \approx \bar{\bar{J}}^T \bar{\bar{J}}$$

Jacobiana

regularização

$$\Gamma(\bar{p}) = \sum_{i=1}^N [d_i^o - d_i(\bar{p})]^2 + \mu \sum_{j=1}^M p_j^2$$

regularização

$$\Gamma(\bar{p}) = \sum_{i=1}^N [d_i^o - d_i(\bar{p})]^2 + \mu \sum_{j=1}^M p_j^2$$

$$(\nabla^2 \Phi + \mu \nabla^2 \Theta) \Delta \bar{p} = -\nabla \Phi - \nabla \Theta$$

Hessiana

gradiente

componentes:

modelagem direta

Jacobiana

Hessiana

gradiente

minimização

regularização

componentes:

modelagem direta

Jacobiana

Hessiana

gradiente
minimização

regularização

genérico

componentes:

modelagem direta implementar
Jacobiana
Hessiana
gradiente
minimização
regularização

esses
genérico

fatiando.inversion

demo 1

Ajuste de reta

demo 2

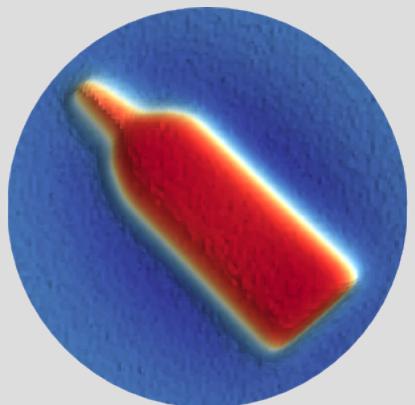
Inversão grav para
relevo de bacia 2D

conclusão

construir

em cima do nosso trabalho

grupo de pesquisa



PINGA

Grupo de problemas inversos em geofísica

pinga-lab.org



People



Vanderlei C. Oliveira Jr.

Researcher



Leonardo Uieda

Professor



Valéria C. F. Barbosa

Researcher



Fillipe Claudio Lopes Siqueira

PhD student



Victor do Couto Pereira

MSc student



Marlon Cabrera Hidalgo Gato

MSc student



André Luis Albuquerque dos Reis

MSc Student

artigos novos

método no fatiando

testes e aplicações

em IPython notebooks



Estimation of the total magnetization direction of approximately spherical bodies

by Oliveira Jr, V. C., D. P. Sales, V. C. F. Barbosa, and L. Uieda (2015)

This article is unpublished and is currently undergoing peer-review.

Info

Open-Access

Repository: [pinga-lab/Total-magnetization-of-spherical-bodies](#)

Journal: Nonlinear Processes in Geophysics

DOI: [10.5194/npgd-1-1465-2014](https://doi.org/10.5194/npgd-1-1465-2014)

Supplement: [10.5281/zenodo.16191](https://zenodo.16191)

Abstract

We have developed a fast total-field anomaly inversion to estimate the magnetization direction of multiple sources with approximately spherical shape and known centres. Our method can be applied to interpret multiple sources with different magnetization directions. It neither requires the prior computation of any transformation like reduction to the pole nor the use of regularly spaced data on a horizontal grid. The method contains flexibility to be implemented as a linear or non-linear inverse problem, which results, respectively, in a least-squares or robust estimate of the components of the magnetization vector of the sources.

Moreover, the data show the robustness of our method against interfering anomalies and errors in the location of the sources' centre. Besides, we show the feasibility of applying the upward continuation to interpret non-spherical sources. Applications to field data, over the Goiás Alkaline Province (GAP), Brazil, show the good performance of our method in estimating geologically meaningful magnetization directions. The results obtained for a region of the GAP, near from the alkaline complex of Diorama, suggest the presence of non-outcropping sources marked by strong remanent magnetization with inclination and declination close to -70.35° and -19.81° , respectively. This estimated magnetization direction leads to predominantly positive reduced-to-the-pole anomalies, even for other region of the GAP, in the alkaline complex of Montes Claros de Goiás. These results show that the non-outcropping sources near from the alkaline complex of Diorama have almost the same magnetization direction of that ones in the alkaline complex of Montes Claros de Goiás, strongly suggesting that these sources have emplaced the crust almost within the same geological time interval.

Review

-codigo

Total magnetization estimation methods (`fatiando.gravmag.magdir`)

Estimation of the total magnetization vector of homogeneous bodies.

It estimates parameters related to the magnetization vector of homogeneous bodies.

Algorithms

- **DipoleMagDir**: This class estimates the Cartesian components of the magnetization vector of homogeneous dipolar bodies with known center. The estimated magnetization vector is converted to dipole moment, inclination (positive down) and declination (with respect to x, North).

`class fatiando.gravmag.magdir.DipoleMagDir(x, y, z, data, inc, dec, points)`

[source]

Bases: `fatiando.inversion.base.Misfit`

Estimate the magnetization vector of a set of dipoles from magnetic total field anomaly.

By using the well-known first-order approximation of the total field anomaly (Blakely, 1996, p. 179) produced by a set of dipoles, the estimation of the Cartesian components of the magnetization vectors is formulated as linear inverse problem. After estimating the magnetization vectors, they are converted to dipole moment, inclination (positive down) and declination (with respect to x, North).

Reference

Blakely, R. (1996), Potential theory in gravity and magnetic applications: CUP

Note

Assumes x = North, y = East, z = Down.

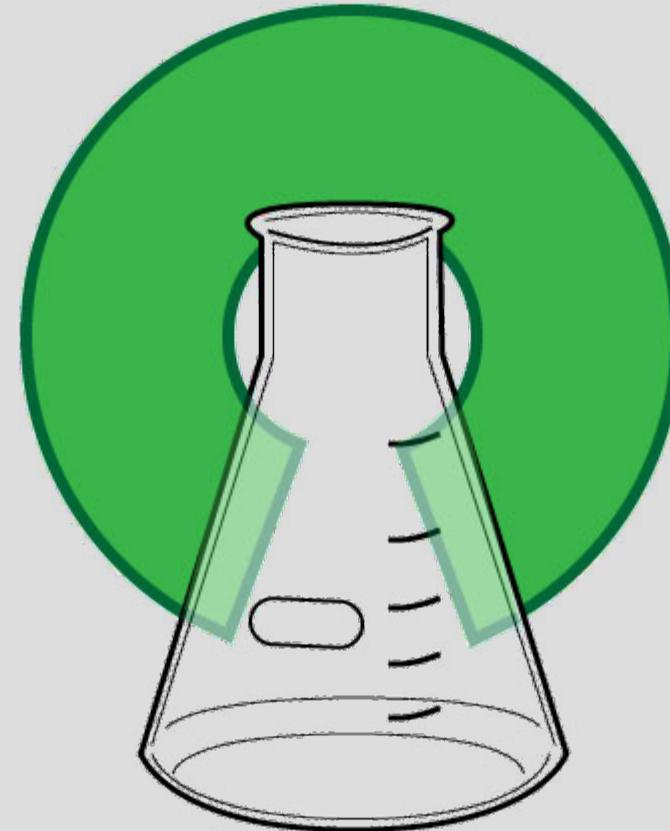
implementação

Parameters:

- **x, y, z : 1d-arrays**

The x, y, z coordinates of each data point.

share
reuse
remix



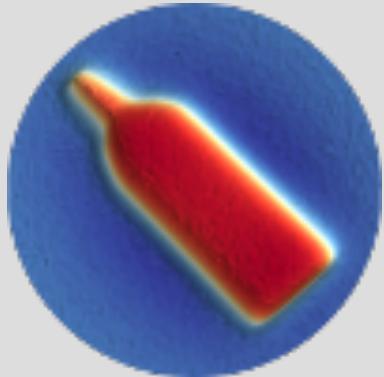
open science

credit: [Greg Emmerich](#)

Informações



fatiando.github.io



pinga-lab.org