

fatiando a terra

Construindo uma base para ensino e pesquisa
de geofísica



LEONARDO UIEDA

leouieda.com

histórico

2004

—

2009



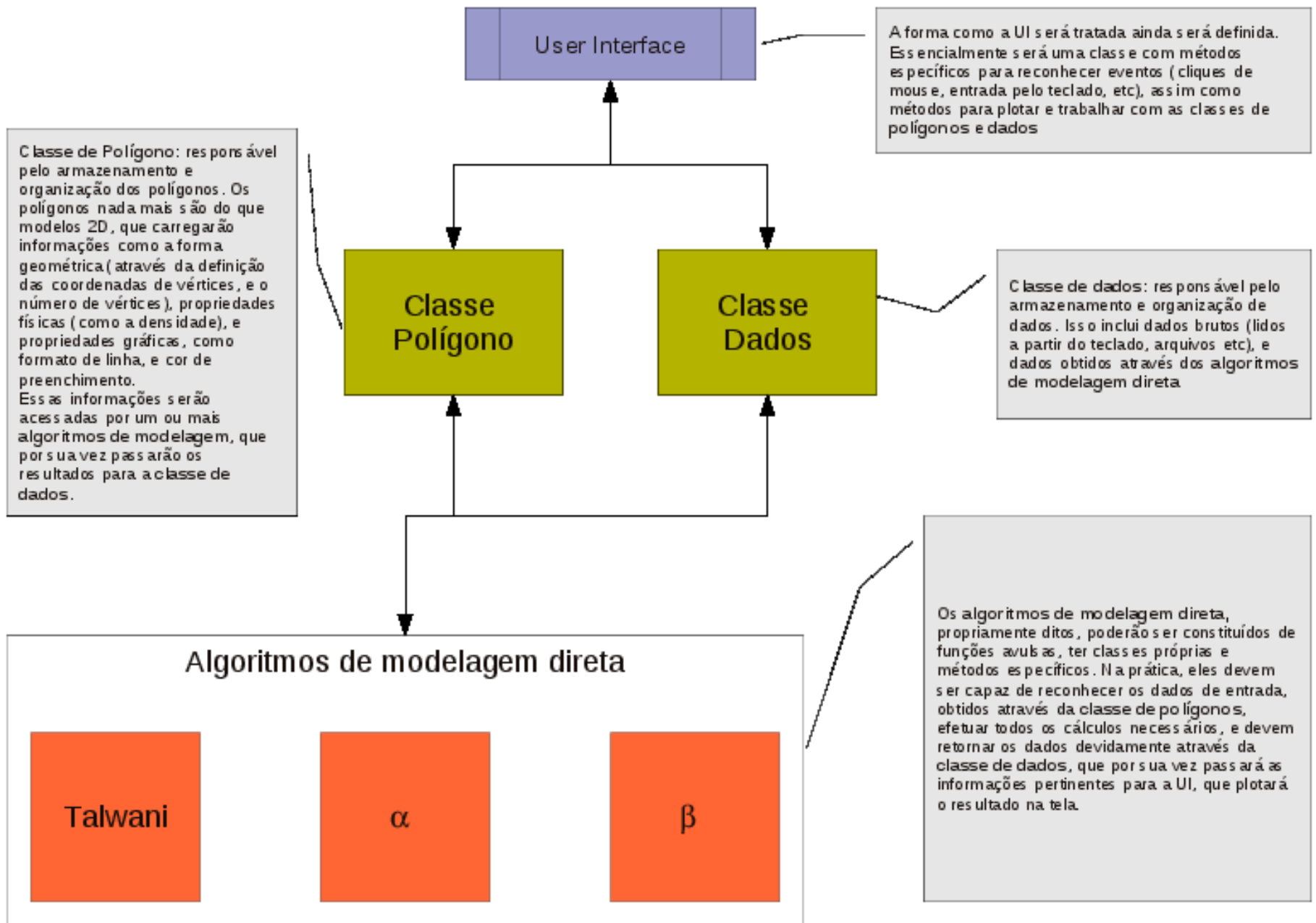
IAG

graduação em geofísica

~2009 - projeto

modelagem direta

grav-mag



2010

A photograph of the National Observatory (Observatório Nacional) in Rio de Janeiro, Brazil. The building is a large, yellow, classical-style structure with a central arched entrance and a clock tower on the roof. It is surrounded by lush greenery, including several tall palm trees. A paved walkway leads directly to the entrance. The sky is clear and blue.

mestrado

observatório nacional

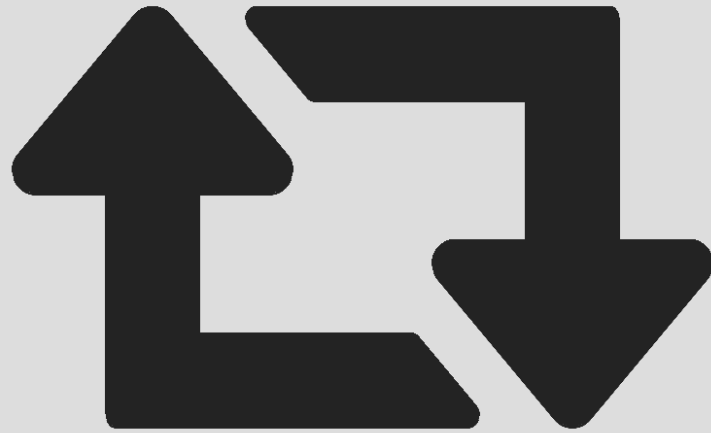
credit: Leandro Ciuffo

juntar código

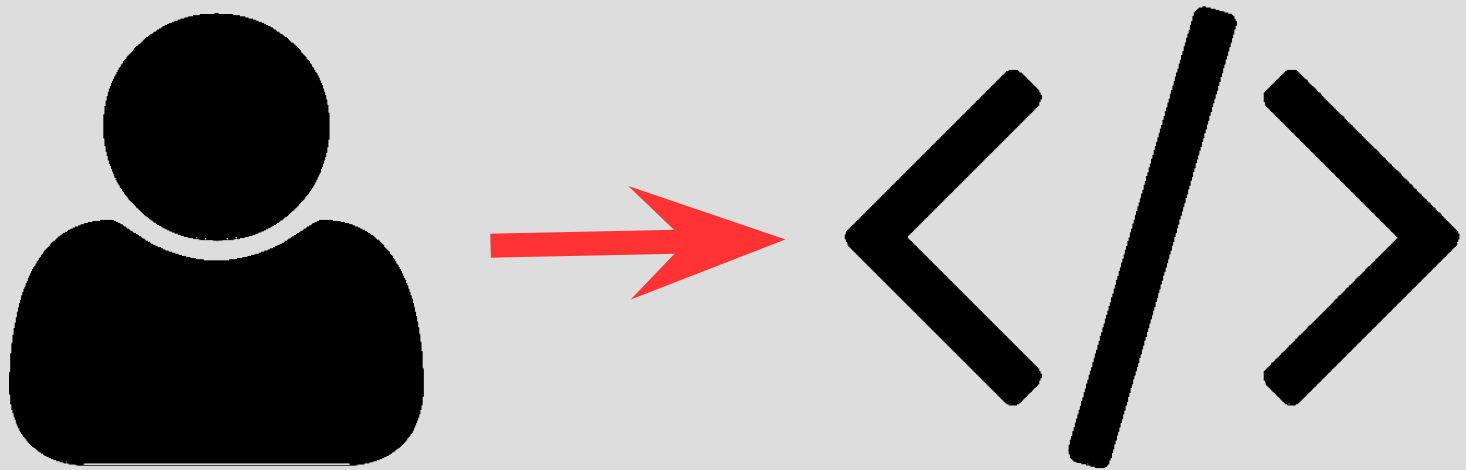
matérias (inversão)

dissertação, extra

reutilizar



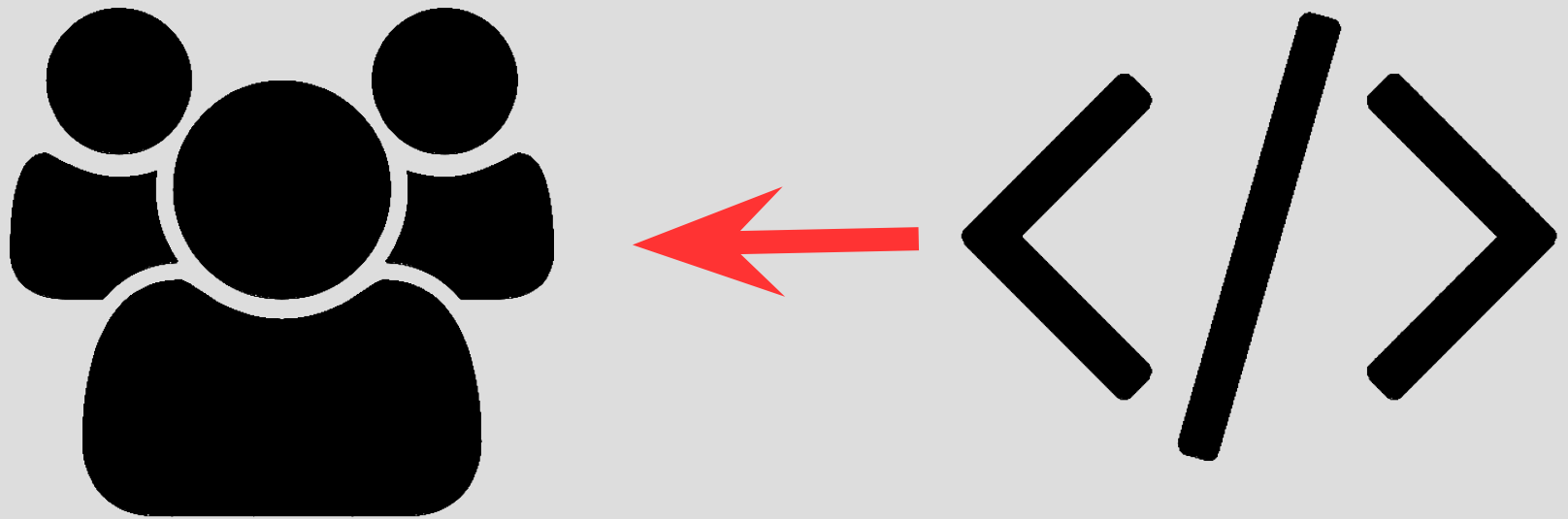
muita
re-implementação



repetição

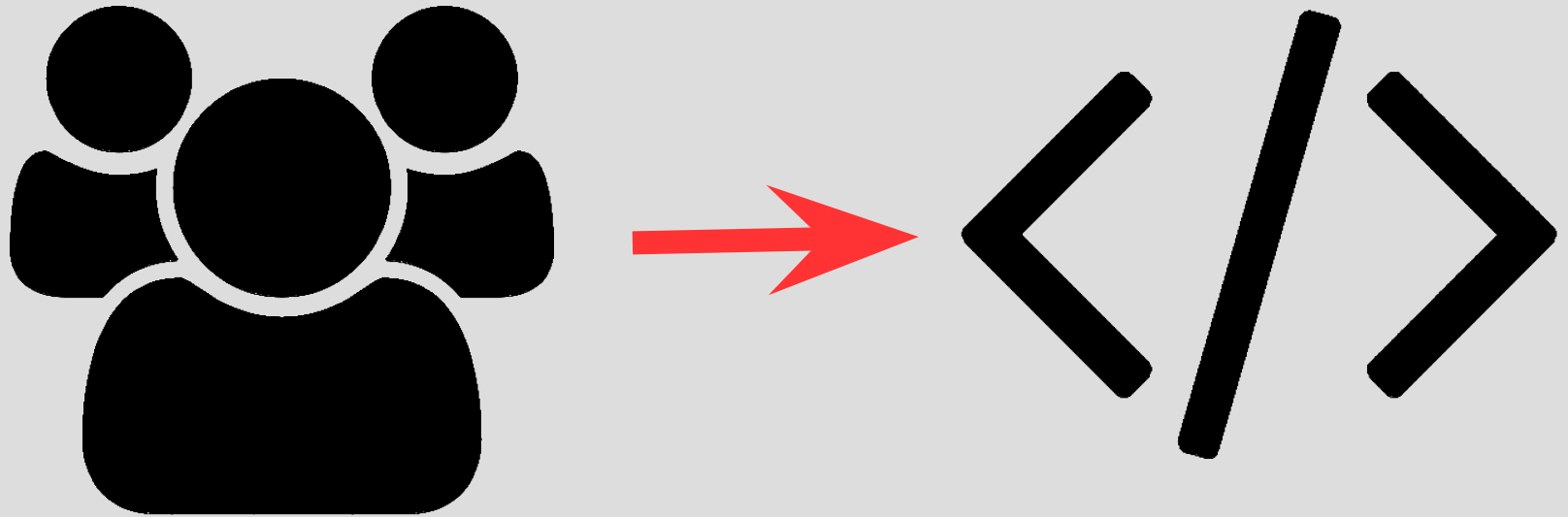
leva a **erros**

1 código
++ usuários



1 código

++ programadores



biblioteca

(funções, classes, etc)



pythonTM

fácil de aprender
rápido de implementar

github.com



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



tree: 928515b0fc fatiando / +



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github.com



tree: 928515b0fc **fatiando** / +



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--HG--

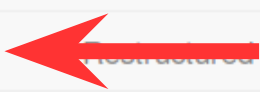
extra : convert_revision : svn%3A2c9857fa-f4c4-11dd-ada4-5153b8187bf2/trunk%4037

leouieda authored on 30 Apr 2010

latest commit 928515b0fc

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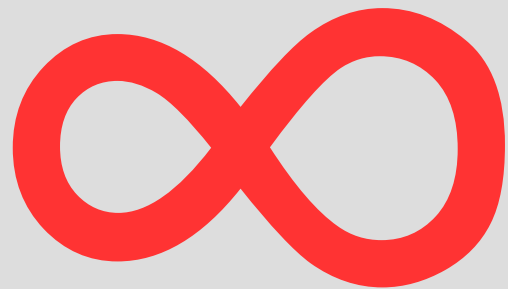
fatiando





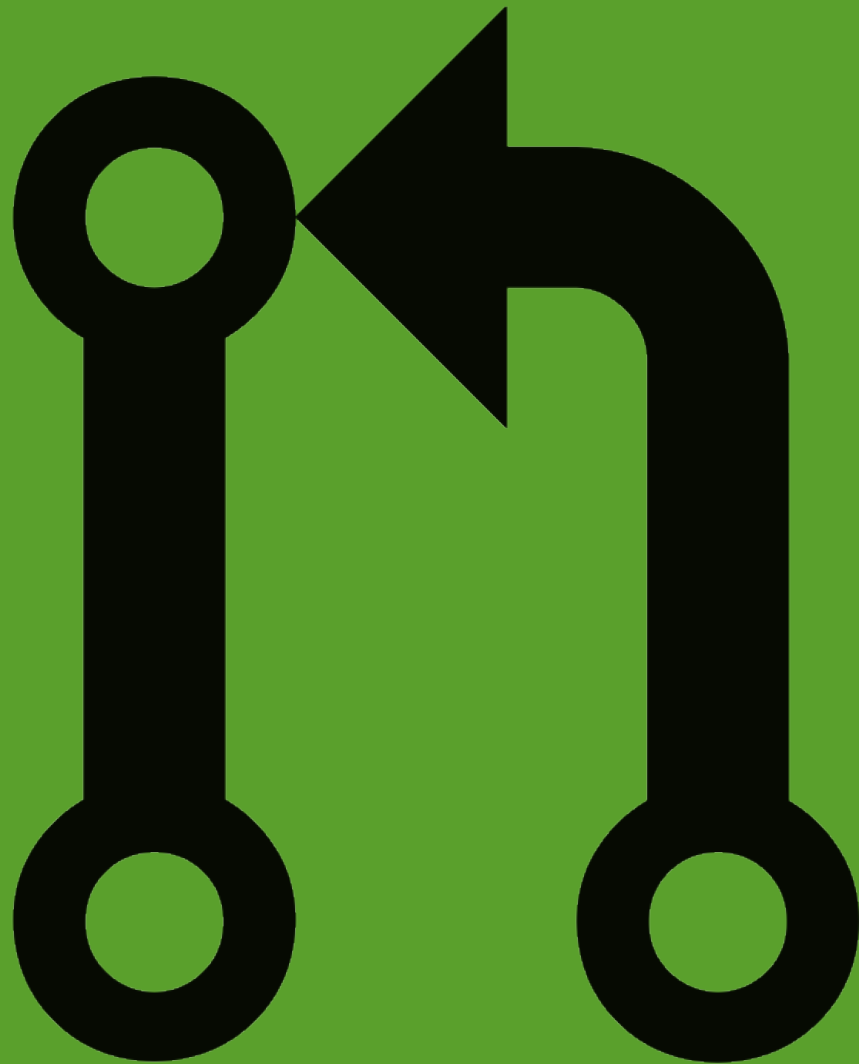
controle
de versão
(VCS)

ctrl+z



git/mercurial

software-carpentry.org



v0.0.1

(pré-beta-dev-testing)

The background image shows a classroom or computer lab. Several students are seated at desks, working on computers. In the background, a presentation screen displays the word "Regularização" and some mathematical formulas. The room has fluorescent lighting and a projector mounted on the ceiling.

curso de inversão

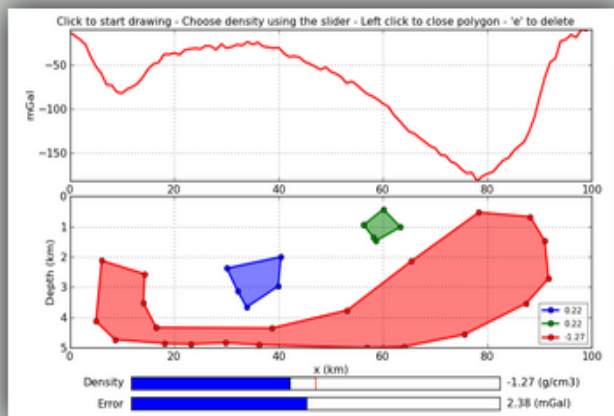
IAG 02/2011

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

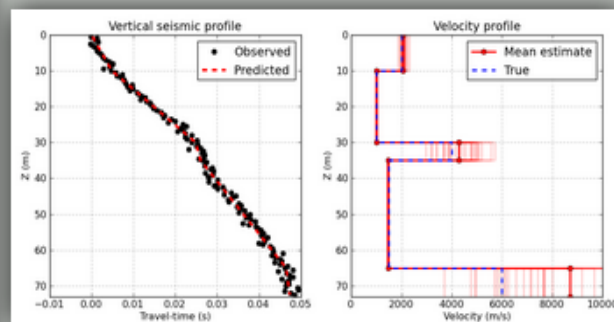
Example Gallery

Some of the functionality already implemented:

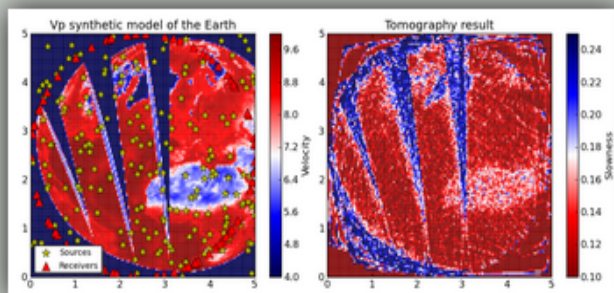
Moulder - 2D gravimetric direct modeling



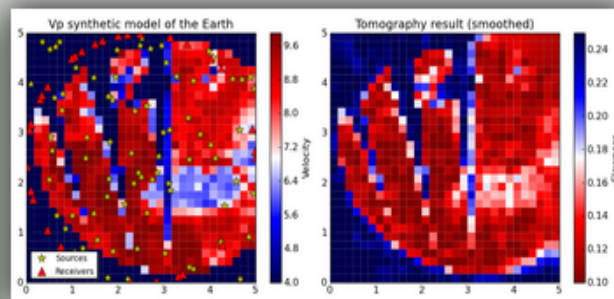
Inversion of synthetic vertical seismic profile data



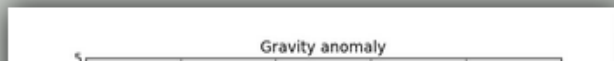
Straight-ray travel-time tomography of large models using sparse linear algebra



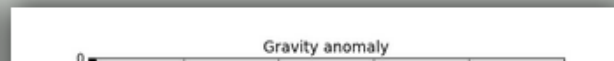
Straight-ray travel-time tomography



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](#) ▼

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



fatiano / fatiando

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

benchmarks	Merge branch 'master' into tessierold-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 erros	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

README.rst

 fatiando a terra

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

A Python package for modeling and inversion in geophysics.

python v0.3 downloads 620/month build passing coverage 68% doi 10.5281/zenodo.16205 GITTER JOIN CHAT

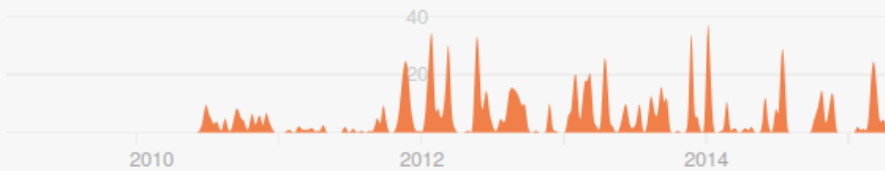
contribuidores



leouieda

#1

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



birocoles

#2

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



hbueno

#3

28 commits / 304 ++ / 176 --



eusoubrasileiro

#4

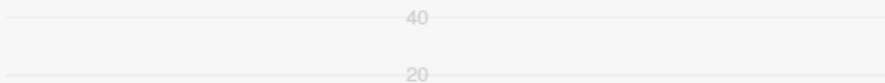
7 commits / 510 ++ / 171 --



gmarkall

#5

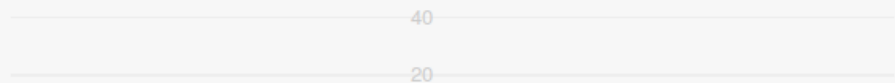
2 commits / 44 ++ / 299 --




caparicajr


#6

1 commit / 13 ++ / 13 --



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

Collaborate

Checklist Merge gravmag.fourier with gravmag.transform #186

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

 **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 #

Updated the two recipes that I
well. This was suggested as #

The *.ansig function was also

Cut Regular Grid #189

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

 Conversation 7  Commits 8  Files changed 1



santis19 commented 19 days ago

gridder.cut_regular function added.

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

fatiaando

diversos métodos

+

inversão

+

visualização

biblioteca

pacotes >

módulos >

funções/classes

fatando/

gravmag/
seismic/
inversion/
vis/

pacotes

gridder
mesher
utils
constants
datasets

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

+

fatiano

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

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

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

Hessiana

gradiente

componentes:

modelagem direta

Jacobiana

Hessiana

gradiente

minimização

regularização

componentes:

modelagem direta

Jacobiana

Hessiana

gradiente

minimização

regularização

genérico

componentes:

modelagem direta

Jacobiana

Hessiana

gradiente

minimização

regularização

implementar

esses

genérico

fatiaando.inversion

demo 1

Ajuste de reta

demo 2

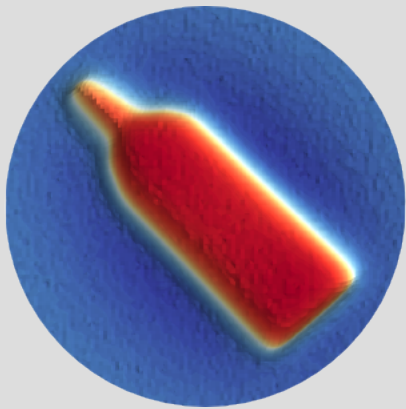
Inversão grav para
relevo de bacia 2D

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

[Papers >](#)

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](#)

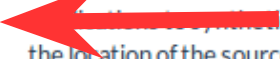
Journal: Nonlinear Processes in Geophysics

DOI: [10.5194/npgd-1-1465-2014](#)

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

Article Level Metrics

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.  **código** Estimates of synthetic 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



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: COMP

Note

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

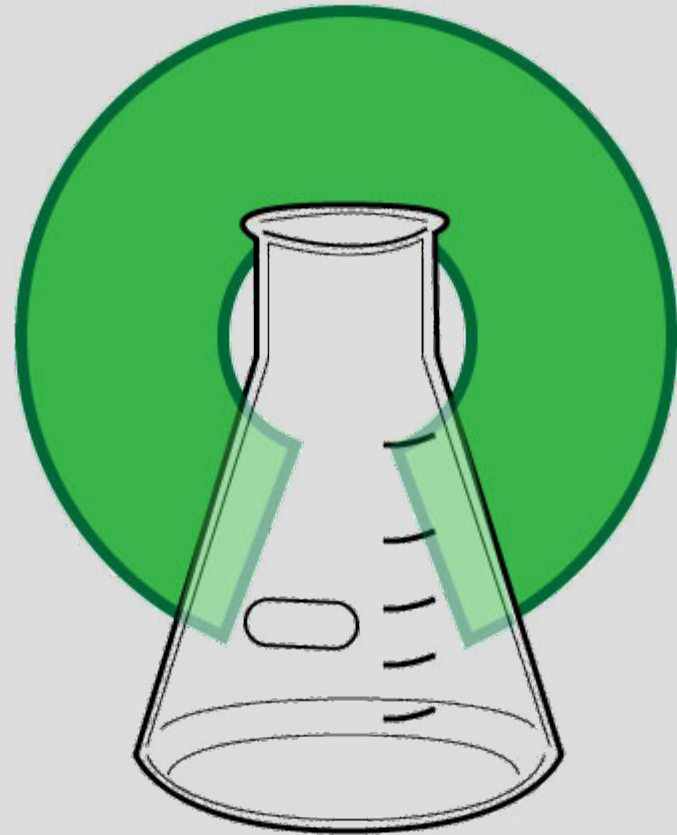
Parameters:

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

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

implementação

share
reuse
remix



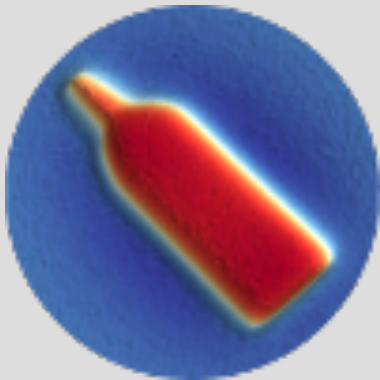
open science

credit: Greg Emmerich

Informações



fatiando.github.io



pinga-lab.org