



Archiving, referencing and describing software with **HAL** and **Software Heritage**

EOSC France 2024 : National Tripartite Event,
12-13 Sep 2024 Paris

Yannick Barborini - **CCSD / CNRS**



Agenda

- The **HAL+ infrastructure**
- **Collaboration** between CCSD - Inria - Software Heritage
- **Archive** software in HAL and in SWH
- **Describe** and **Reference** source code
- Software in **publication workflows**
- The **next steps**



HAL+ : French Research Infrastructure for Open Science



HAL is the **multidisciplinary open archive** chosen by the entire French scientific and academic community for the dissemination of knowledge



Diamond open access journal platform: a complete solution for editing and publishing overlay journals



Platform dedicated to **organisers of conferences**, workshops or scientific meetings



The collaboration

Stakeholders

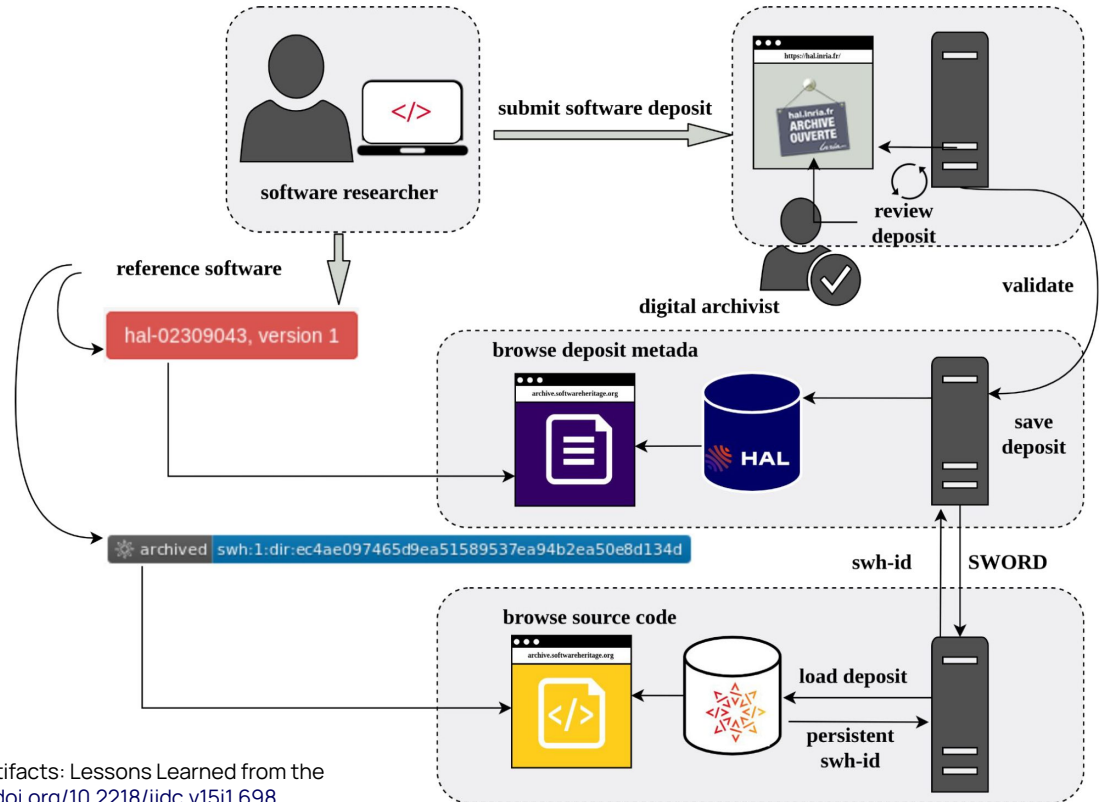
 Software Heritage

Archiving software - Source code method

Software **developed locally** and shared on a personal or institutional website

One compressed archive containing the following files :

- **source code files**
- **README**
- **AUTHORS**
- **LICENSE**
- **codemeta.json**



Archiving software - SWHID method

Software **developed on a collaborative plateforme** using a version control system (on GitHub, GitLab, Bitbucket...)

Best practices on repository VCS

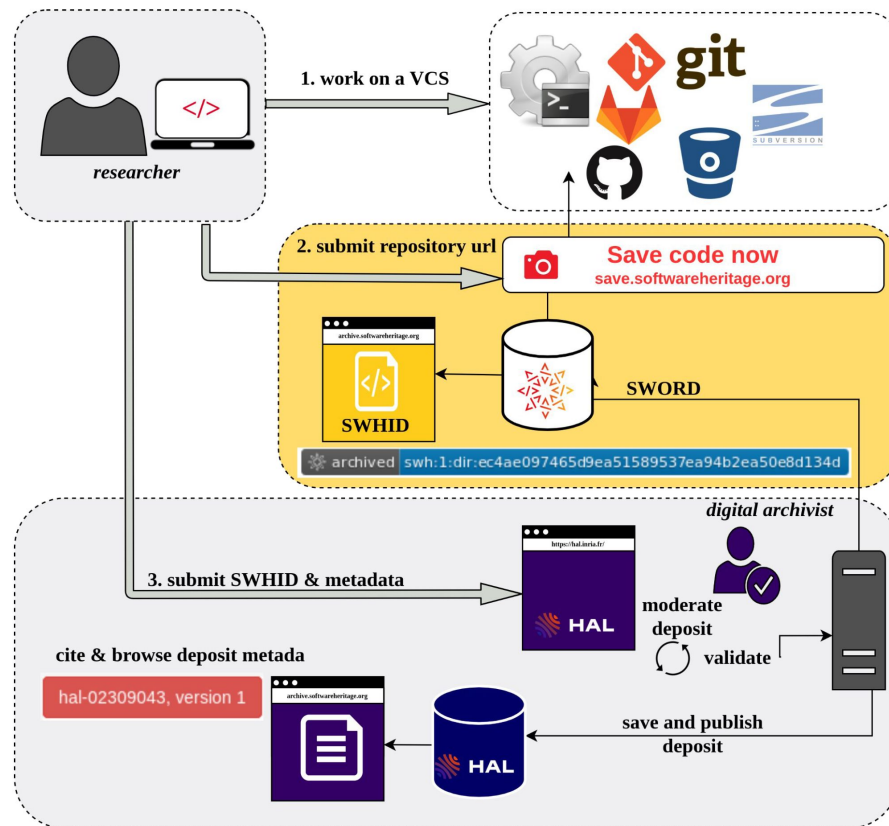
- AUTHORS, LICENSE & README file
- codemeta.json

Save code now with Software Heritage

- you have a SWHID

Use SWHID to create HAL entry complete metadata extract from codemeta.json

- complete author affiliation
- add references publications



Describing software

General properties common to the other types of deposit

- Title,
- Description
- Funding information
- Thesaurus (ACM, JEL, ...)
- ...

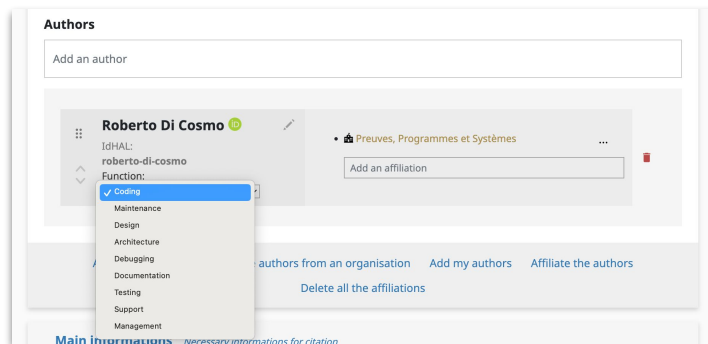
Information about author(s)

- specific role (coding, management, ...)
- affiliations

Software specific metadata

- Licences based on the **SPDX reference list** (<https://spdx.org/licenses/>)
- Programming language
- Code repository
- Platform/OS - environment
- Version
- Development status
- Runtime Platform

7



Licences *
La ou les licences sous lesquelles est publié ce logiciel (vous pouvez utiliser l'autocomplétion)

Langage de programmation

Code Repository
Lien où se trouve le développement du code (SVN, github, gitlab, CodePlex).

Platform/OS
Le système d'exploitation compatible avec le logiciel

Version
la version du logiciel (peut être différente de la version publiée sur HAL)

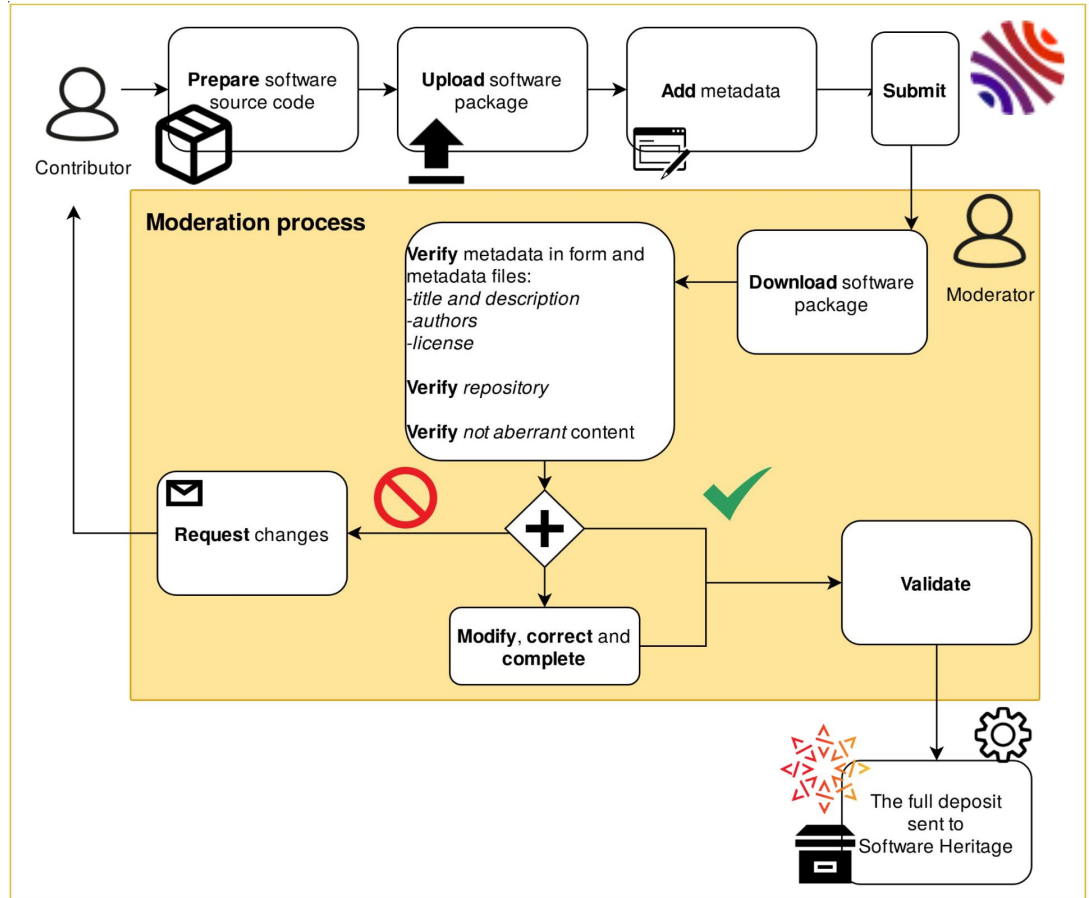
Etat du développement
L'état du développement du logiciel au moment du dépôt (Concept, WIP, Suspendu, Actif, Inactif)

Outils de développement
Les outils de développement associés au logiciel (Framework, middleware, plateforme logicielle)

The Moderation process

Librarians curators

- ⇒ control metadata and sources files
- ⇒ add or corrects metadata
- ⇒ dialogue with contributor to improve deposit



Moderation guide :

Morane Gruenpeter, Jozefina Sadowska. La modération d'un dépôt logiciel : Bonnes pratiques et guide pour le modérateur. [Rapport Technique] Inria; CCSD; Software Heritage. 2018. (hal-01876705)

Software deposit in HAL

Link to the content on SWH

Software specific metadata

Citation

Export

Consulter sur Software Heritage

Dates et versions
hal-04367491, **version 1** (08-01-2024)

Identifiants
HAL Id : [hal-04367491](#), version 1
SWiD : [swh:1:dir:1cc37ea1204712905a0f25fd0ce309eea9b25af0;origin=https://hal.archives-ouvertes.fr/hal-04367491;visit=sw:h:1:snp:670b1be9dc54c1765fc49ae951a22c9109a6e76b;anchor=swh:1:rel:42914f2ecde0e28fb498e3c948075deba586350;path=](#)

Métadonnées

- version : 1.0.3
- Licences : GNU LESSER GENERAL PUBLIC LICENSE Version 3
- Langage de programmation : Faust
- Code Repository : <https://github.com/alainbonardi/abclib>
- Platform/OS : MacOSX, Windows, Linux
- Outils de développement : Compilateur Faust : <https://github.com/grame-cnrcm/faust>

Citer

Alain Bonardi, Paul Goutmann, David Fierro, Adrien Zanni. abclib. 2023. (swh:1:dir:1cc37ea1204712905a0f25fd0ce309eea9b25af0;origin=https://hal.archives-ouvertes.fr/hal-04367491;visit=sw:h:1:snp:670b1be9dc54c1765fc49ae951a22c9109a6e76b;anchor=swh:1:rel:42914f2ecde0e28fb498e3c948075deba586350;path=), (hal-04367491)

Exporter

CodeMeta BibTex XML-TEI
Dublin Core DC Terms
EndNote DataCite

Logiciel Année : 2023

abclib
Alain Bonardi (1, 2), Paul Goutmann (2), David Fierro (2), Adrien Zanni (2)
[Afficher plus de détails](#)

1 MUSIDANSE - Esthétique, musicologie, danse et création musicale
 2 CICM - Centre de recherche Informatique et Création Musicale

Résumé en

abclib 20 years of research, teaching and creation in mixed music using Faust language CICM (Centre de recherches Informatique et Création Musicale) - University Paris 8 <http://cicm.univ-paris8.fr/> abclib library is released by the CICM / MUSIDANSE (Centre de Recherches Informatique et Création Musicale, Paris 8 University) and is the result of 20 years of research, teaching and creation in mixed music, expressed as a set of codes in Faust language. The main topics addressed are: spatial sound processing and synthesis using ambisonics multi-channel sound processing utility objects for mixed music. It comes as a prolongation of the HOA library developed by the CICM between 2012 and 2015 which provided an impressive framework for ambisonics: <http://hoalibrary.mshparisnord.fr/> abclib takes over HOA, proposing a large set of processes written in Faust language and implemented at various ambisonic orders (from 1 to 7, which means from 3 to 15 parallel instances). It also puts the emphasis, outside the scope of ambisonics on multi-channel sound processing with various dimensions from 1 to 16 parallel instances. The use of Faust language guarantees software durability and interoperability between Mac and Windows systems, as well as Max and PureData softwares. The Faust processes are compiled to Max or PureData objects. Help patches are also provided as well as some overview patches or graphic abstractions based on jitter (in Max) or cyclone libraries (in PureData). In the field of ambisonics, 2D objects are provided, including general objects (encoders, decoders, optimizers, scopes), geometry objects (maps, mirrors, rotates, specific trajectory generators), and a set of spatial sound processes (decorrelators, delays, granulators, ring modulators) in both 'syn' and 'fx' modes. The names of the ambisonic objects in 2D use '2d' as a prefix: for instance abc_2d_decoder3~ is an ambisonic decoder in 2D at order 3. Multi-channel sound process objects do not use '2d' prefix: for instance, abc_delays16 implements a set of 16 parallel delay lines. Multi-channel sound processors include flangers, parallel and sequential delays, frequency shifters, harmonizers, granulators, reverberations. The abclib library also provides utility objects for mixed music: chowning-like panners, matrices, envelopes, an attack and release detector, synthesizers (additive, subtractive, sound coat, sound grain, Risset's bell, rain drops, audiotester). Graphic objects especially to represent spatial components were developed using simple available functionalities in the two softwares: in Max, we use OpenGL primitives implemented thanks to jitter. In PureData, we use the cyclone library (that should be installed to enable the visualization of the ambisonic field). Teaching mixed music at Paris 8 University helped us in many implementation choices, thinking of practical requirements for composers, to allow them to test their patches either in multichannel academic studios or at home in simple stereo. abclib has been developed by Alain Bonardi with the collaboration of Paul Goutmann, David Fierro and Adrien Zanni.

Mots clés en

spatial sound processing spatial sound synthesis
ambisonics multi-channel sound processing
utility objects for mixed music Faust language

Domaines

Sciences de l'Homme et Société Informatique [cs]

[Liste complète des métadonnées](#)

Alain Bonardi Connectez-vous pour contacter le contributeur

<https://hal.science/hal-04367491v1>

Citation and Exports

- Citation available directly from records
 - **SWHID** : Gives access to the source code files
 - **HAL-ID** : Refers to the software as a work

- BibTeX Export with [BibLaTeX](#) `@software` or `@softwareversion`

- `codemeta.json` export

Cite



Alain Bonardi, Paul Goutmann, David Fierro, Adrien Zanni. abclib. 2023, <swh:1:dir:1cc37ea1204712905a0f25fd0ce309eea9b25af0;origin=https://hal.archives-ouvertes.fr/hal-04367491;visit=swh:1:snp:670b1be9dc54c1765fc49ae951a22c9109a6e76b;anchor=swh:1:rel:42914f2eced0e28fbb498e3c948075deba586350;path=/>. <hal-04367491>

Exporter

CodeMeta

BibTeX

XML-TEI

Dublin Core

DC Terms

EndNote

DataCite

```
@softwareversion{bonardi:hal-04367491v1,
  TITLE = {{abclib}},
  AUTHOR = {Bonardi, Alain and Goutmann, Paul and Fierro, David and Zanni, Adrien},
  URL = {https://hal.science/hal-04367491},
  NOTE = {},
  INSTITUTION = {{Centre de recherche Informatique et cr{\`e}ation musicale}},
  YEAR = {2023},
  SWHID =
{swh:1:dir:1cc37ea1204712905a0f25fd0ce309eea9b25af0;origin=https://hal.archives-ouvertes.fr/hal-04367491;visit=swh:1:snp:670b1be9dc54c1765fc49ae951a22c9109a6e76b;anchor=swh:1:rel:42914f2eced0e28fbb498e3c948075deba586350;path=/},
  VERSION = {1.0.3},
  REPOSITORY = {https://github.com/alainbonardi/abclib},
  LICENSE = {GNU LESSER GENERAL PUBLIC LICENSE Version 3},
  KEYWORDS = {spatial sound processing ; spatial sound synthesis ; ambisonics ; multi-channel sound processing ; utility objects for mixed music ; Faust language},
  HAL_ID = {hal-04367491},
  HAL_VERSION = {v1},
}
```

The identifiers of the software deposit

Reference with the SoftWare Hash Identifier (SWHID)

 archived `swh:1:dir:1cc37ea1204712905a0f25fd0ce309eea9b25af0`

- Identification of the software source code artefact
- a digital fingerprint specific source code content

Needed to :

- Identify - reproduce
- Archive

Cite with the HAL-ID

hal-04367491v1

- Identification of the software record
- Metadata of the deposit
- Authors and contributors are verified in the moderation process

Needed to :

- Give credit to the authors
- Index

Software in publication workflows



Possibility of **linking a publication submitted to episciences to software** (with SWHID or HALId)
 ⇒ **The link is displayed on the article landing page during the evaluation phases and after publication.**

Link also available :





- in Episciences APIs (REST, OAI-PMH)
- in export formats (XML, ...)

⇒ **Possibility of submitting and evaluating software** in Episciences previously deposited in HAL

Stéphane André ; Camille Noël - **Solving viscoelastic problems with a Laplace transform approach supplanted by ARX models, suggesting a way to upgrade Finite Element or spectral codes**
 jtcam:10304 - Journal of Theoretical, Computational and Applied Mechanics, October 10, 2023 - <https://doi.org/10.46298/jtcam.10304>

Solving viscoelastic problems with a Laplace transform approach supplanted by ARX models, suggesting a way to upgrade Finite Element or spectral codes Article



Authors: Stéphane André ^{1,2}; Camille Noël ^{3,4}

-  Laboratoire Énergies et Mécanique Théorique et Appliquée
-  Laboratoire d'Énergétique et Mécanique Théorique et Appliquée (LEMETA)
-  Laboratoire Cogitamus
-  Laboratoire Cogitamus = Cogitamus Laboratory

Finite Element codes used for solving the mechanical equilibrium equations in transient problems associated to (time-dependent) viscoelastic media generally relies on time-discretized versions of the selected constitutive law. Recent concerns about the use of non-integer differential equations to describe viscoelasticity or well-founded ideas based upon the use of a behavior's law directly derived from Dynamic Mechanical Analysis (DMA) experiments in frequency domain, could make the Laplace domain approach particularly attractive if embedded in a time discretized scheme. Based upon the inversion of Laplace transforms, this paper shows that this aim is not only possible but also gives rise to a simple algorithm having good performances in terms of computation times and precision. Such an approach, which fully relies on the Laplace-defined Behavioral Transfer Function (LTBF) can be promoted if it uses AutoRegressive with exogenous input parametric models perfectly substitutable to the real LTBF. They avoid the huberto prohibitive pitfall of having to store all past data in the computer's memory while maintaining an equal computation precision.


<https://doi.org/10.46298/jtcam.10304>
 Source: HAL:hal-03845394v2
 Published on: October 10, 2023
 Accepted on: July 20, 2023
 Submitted on: November 15, 2022



Keywords: Laplace transform, ARX models, iterative algorithm, Viscoelasticity, Fractional relaxation kernels, SPLMECA, SOLID [Engineering Sciences (physics)] Mechanics (physics.med-ph) Solid mechanics (physics.class-ph)
 Licence: Attribution 4.0 International (CC BY 4.0)

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Software


Other

 archived [swh:1:dir:3d4ad405846eb4dcf7ca35f9e72e85c6e817657c](https://doi.org/10.46298/jtcam.10304)¹

 Software Heritage Navigating in [swh:1:dir:3d4ad405846eb4dcf7ca35f9e72e85c6e817657c](https://doi.org/10.46298/jtcam.10304) View in the archive 

3d4ad40 /

File	Mode	Size
 ExePaper_ConvData.mat	-rW-r--r--	1.6 MB
 ExecutablePaper_JTCAM#11178_AndreNoel.mlx	-rW-r--r--	66.0 KB
 llap.m	-rW-r--r--	196 bytes
 LICENSE	-rW-r--r--	6.9 KB

 Permalink

Next steps

- Joint program in 2024-2025 to **support research software preservation** in university libraries
- Continue to organise **software moderation** at community level
- Export Format
 - improve **XML-TEI** format
- Integration in **Hal Data Triplesore**
 - <https://data.hal.science/>
 - with SPARQL and RDF
- **Make links between publications data and software**




Links between publications data and software

Improving the creation of links between publications, data and software source codes and exchange the relationships between repositories

⇒ **HALiance project - WP7**

Link the ressources ✕

Deposit relationships : **hal-01133087**

 **References** `swh:1.dir:f4f0c309fe07b42c62b84edf682bba0bfecff4d0;origin=https://hal.archives-ouvertes.fr/hal-02955901;visit=swh:1.snp:8a5796701fdd762ae1c77d3d8fb5583afe625d53;anchor=swh:1.rev:9d1304a95456ed7b1ce59613fc810f5463b35273;path=/` ✎ ✖

Relationship

Is cited by (IsCitedBy) ▾

Identifier

Repository

- ✓ HAL
- Nakala
- Recherche Data Gouv
- Software Heritage
- Other repository

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This work was part of the **HALiance project**, funded by the French National Research Agency (ANR)



PIA - Equipex+ HALiance
ANR-21-ESRE-0047

Links between publications data and software

Software related to the publication

[Download](#)

Dates and versions

- hal-01133087, **version 1** (18-03-2015)
- hal-01133087, **version 2** (25-06-2015)
- hal-01133087, **version 3** (21-08-2015)

Identifiers

HAL Id : **hal-01133087, version 3**
 DOCID : **1185861**
 DOI : **10.1109/TSP.2015.2480045**

Cite

Srdan Kikić, Laurent Albera, Nancy Bertin, Rémi Gribonval.
 Physics-driven inverse problems made tractable with
 cosparse regularization. *IEEE Transactions on Signal
 Processing*, 2016, 64 (2), pp.335-348.
 <10.1109/TSP.2015.2480045>, <hal-01133087v3>

Export

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Journal Articles | IEEE Transactions on Signal Processing | Year : 2016

Physics-driven inverse problems made tractable with cosparse regularization

Srdan Kikić (1), Laurent Albera (2, 1), Nancy Bertin (1), Rémi Gribonval (1)

[Show details](#)

- 1 PANAMA - Parcimonie et Nouveaux Algorithmes pour le Signal et la Modélisation Audio
- 2 LTSI - Laboratoire Traitement du Signal et de l'Image

Abstract en

Sparse data models are powerful tools for solving ill-posed inverse problems. We present a regularization framework based on the sparse synthesis and sparse analysis models for problems governed by linear partial differential equations. Although nominally equivalent, we show that the two models differ substantially from a computational perspective: unlike the sparse synthesis model, its analysis counterpart has much better scaling capabilities and can indeed be faster when more measurement data is available. Our findings are illustrated on two examples, sound source localization and brain source localization, which also serve as showcases for the regularization framework. To address this type of inverse problems, we develop a specially tailored convex optimization algorithm based on the Alternating Direction Method of Multipliers.

Keywords en

inverse problems
Poisson's equation
cosparsity
sparsity
acoustic wave equation
source localization

Domains

Signal and Image Processing
Image Processing [eess.IV]

Complete list of metadata

Files and preview

Ressources associées -

PDF
arXiv
sw:1:dir:/4f0c309fe07b42e262b84edf6822ba0b0cfccf440?origin=https://hal.archives-ouvertes.fr/hal-02335901%3Bsw:1:dir:/sw:1:amp;Ba379b7916d6782ae1c7743d8f85583af6e2c543;anchor=sw:1:rev:941304a85456e67b1ce59613f610f5463b35273;path=/>
Reset view
View in the archive

Software Heritage

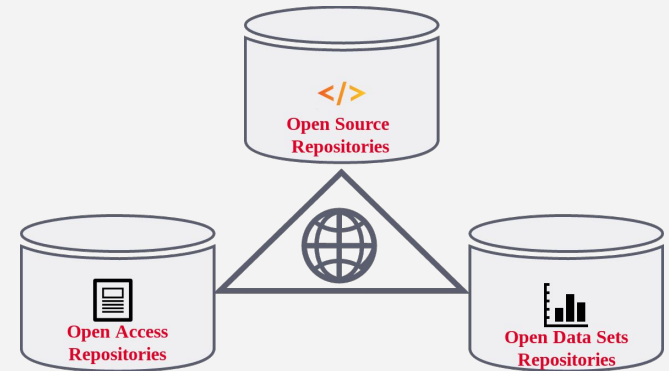
Navigation in sw:1:dir:/4f0c309fe07b42e262b84edf6822ba0b0cfccf440

File	Mode	Size
Optimization		
PoissonEq		
Specific		
Tools		
WaveEq		
DS_Store	-rw-r--r--	6.0 KB
21x21x21withN128.mat	-rw-r--r--	7.8 MB

History

Benefits of depositing in HAL

- **Archive** software in HAL and in SWH
 - **Long term preservation** : HAL and SWH have a long term preservation service
- **Ease** the software **identification**
 - the software artifacts with a **SWHID** (SoftWare Heritage Identifier)
 - the metadata record and citation with the **HAL-ID**
- **Describe** source code with verified metadata
 - **Moderation** and control of the metadata by librarians and/or curators
- **Cite** the software deposit with a complete citation
 - Several **exports format** make it easier for citation
- **Great visibility** for software in open science context
 - Softwares integrates the scientific output of researchers (**HALCV**), research units, universities and institutions



*The three pillars of Open Science, Software Heritage
CC-BY 4.0 2019*

Thank you !

Yannick Barborini

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