Orfeo ToolBox
Open source processing of remote sensing images (updated for 6.6)

OTB Team
Things to know about OTB…

Orfeo ToolBox is:

- An **image processing library** for remote sensing
- **Free and open source software** under Apache v2.0 license (since 6.0, formerly CeCILL-v2)
- **Funded and developed by CNES** (French Space Agency) in the frame of the development of the Pléiades satellite (and beyond)
- A project of OSGeo since 2017
- Used at CNES, ESA (European Space Agency), mission exploitation platforms, remote sensing labs, teaching…
- Written in **C++** on top of ITK (medical image processing)
- Built on the shoulders of giants (GDAL, OSSIM, OpenCV…)
- **Big Data** capable, thanks to built-in streaming and multithreading

[orfeo-toolbox.org]
Why open source?

Maximum reach
OTB is dedicated to every user of satellite images. Its wide dissemination contributes to the missions success (Pléiades, Sentinels...) 

Quality and efficiency
OTB covers a vast panel of applications and thematic fields. Openness should:
- Facilitate appropriation and validation for users
- Encourage contributions and bug reports
- Available on multiple platforms
- “The Cathedral & the Bazaar”\(^1\): the more widely available the source code is for public testing experimentation, the more rapidly all forms of bugs will be discovered

Reproducible research
OTB capitalizes a part of the CNES R&D in IP, open source contributes to transparent, reproducible and trans-disciplinary research.

\(^1\)http://www.catb.org/esr/writings/cathedral-bazaar/
Outline

What's new in last OTB versions?

OTB in QGIS

New remote modules
Features as Remote Modules

More to come!
6.4 (January 2018)

- Enhancement of multiple files selection widget
- Application and filter for local contrast enhancement (CLAHE)
- Improvement of generic SAR sensor model
- Python 3 support
- After this release: moving to gitlab!
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Gitlab: easier, more integrated

- Request for comments, bugs, feature requests ⇒ gitlab issues
- All code modifications goes through Merge Requests
- Easier code review, links between issues and Merge Requests
- Code contribution more straightforward
- Provides hosting for Remote Modules
6.6 (June 2018)

- Data augmentation: generate synthetic samples to improve classifiers performances (CESBIO)
- New algorithms for dimensionality reduction: Autoencoders, PCA and Self Organizing Map (CESBIO)
- Multi writer (CS-SI)
6.6 (June 2018)

- Multi writer (CS-SI)

```cpp
ReaderType1::Pointer reader1 = ReaderType1::New();
reader1->SetFileName( inputImageFileName1 );

ReaderType2::Pointer reader2 = ReaderType2::New();
reader2->SetFileName( inputImageFileName2 );

WriterType::Pointer writer = WriterType::New();
writer->AddInputImage( reader1->GetOutput(), outputImageFileName1);
writer->AddInputImage( reader2->GetOutput(), outputImageFileName2);
writer->SetNumberOfLinesStrippedStreaming( numberOfLinesPerStrip );
writer->Update();
```
6.6 (June 2018)

- Improvement in Application engine: simplify complex type in input or output images (SAR images manipulation), stop button in the graphic interface...
- Migration from Qt4 to Qt5
- Better integration in QGIS (next slides)
- Lots of bugfixes!
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Access to OTB in QGIS: A powerful wedding

- Facilitate access to OTB (QGIS widely use in the GIS community)
- Avoid to duplicate efforts (use QGIS GUI, GIS features...)
- Powerful features in QGIS processing (batch processing, Python scripting...)
- Collaboration with the QGIS community is very positive
- Support from QGIS developers
- OSGeo power
- Demo: https://www.youtube.com/watch?v=ufSQ2SgSIV4
New OTB-QGIS plugin available!

- Keep It Simple
- Ease the integration of new versions of OTB in QGIS
- Support of OTB binary installers in QGIS (“out of the box”)
- All OTB applications available in QGIS (same name, same documentation...)
- Beta version available as a plugin
- Hope the plugin will be soon added to QGIS source code
- Source code for new plugin:
  https://gitlab.orfeo-toolbox.org/orfeotoolbox/qgis-otb-plugin
- Compatible with QGIS 3.2
- Thanks to all the QGIS team!
OTB configuration in QGIS

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
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<tbody>
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<td>General</td>
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<td>OTB application folder /home/rashad/projects/otb/local/otb/applications</td>
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<td></td>
<td>OTB folder /home/rashad/projects/otb/local</td>
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<td></td>
<td>SRTM tiles folder</td>
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<td>SAGA</td>
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<tr>
<td>Scripts</td>
<td></td>
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</tbody>
</table>
GUI of the *TrainImagesClassifier* application
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About remote modules

What they are

- Pieces of OTB code (filters, applications ...)
- That can be hosted on any git repository
- With a different licence
- While still being tested and packaged with OTB
  - [gitlab.orfeo-toolbox.org/remote_modules/remote-module-template](https://gitlab.orfeo-toolbox.org/remote_modules/remote-module-template)

How people use them

- A standard way to package new features to share with other
- Small modules (1 filter, 1 app) or bigger
- Processing chains in Python relying on one (or more) remote modules
**OTBTF remote module: OTB + tensorflow**

- Remote module developed by Remi Cresson (IRSTEA)
- Based on TensorFlow
- Provides all the plumbing to perform Deep Learning based image processing on Remote Sensing images:
  - Generate training data from the OTB training data sampling framework
  - Train your network (can also be done directly with TensorFlow)
  - Serve the model on full remote sensing images with streaming

- [gitlab.irstea.fr/remi.cresson/otbtf](https://gitlab.irstea.fr/remi.cresson/otbtf)
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6.6.1 (soon!)

Bugfixes

▶ Bugfix only release, 100% backwards-compatible!
▶ 50+ bugfixes backported from 7.0.0 milestone
▶ Dependencies upgrades
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7.0 (soon!)

Features

▶ Add box kernel to morphological operations apps
▶ No data extended filename for image writers
▶ Documentation improvements
▶ 50+ bugfixes

Refactoring

▶ Semantic Versioning (https://semver.org)
▶ LSMSSmallRegionsMerging ⇒ SmallRegionMerging
▶ Convert ⇒ DynamicConvert
▶ Deprecate OTBMapnik and OTBVectorDataRendering
▶ Rename parameters, remove options...
Support/Help/Contribute

General resources
  Site web  orfeo-toolbox.org
  Wiki  wiki.orfeo-toolbox.org
  Blog  blog.orfeo-toolbox.org

Documentation and help
  Guides  Software Guide and CookBook (remote sensing recipes)
  Doxygen  doxygen

Users mailing list  otb-users@googlegroups.com
Developers mailing list  otb-developers@googlegroups.com

Follow-up
Look at the code?  gitlab.orfeo-toolbox.org
Find a bug? Feature propositions?  gitlab.orfeo-toolbox.org/orfeotoolbox/otb/issues
  Dashboard  dash.orfeo-toolbox.org
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OSGeo and OSGeo-fr

OSGeo
OSGeo website www.osgeo.org

OSGeo-fr (French chapter) osgeo.asso.fr

Upcoming events (France)
Capitole du Libre (17&18 Nov) 2018.capitoledulibre.org
Paris Open Source Summit (5&6 Dec) opensourcesummit.paris
Rencontres des Utilisateurs Francophones de QGIS (13 & 14 Dec) conf.qgis.osgeo.fr

FOSS4G
FOSS4G 2019 Bucharest 2019.foss4g.org
Survey by Inno3

- Inno3 is currently conducting for CNES a study about open-source benefits
- OTB is used as an example for this study
- They need your feedback!

https://huit.re/otb-survey

Do not hesitate to discuss with them during the day

(Camille and Benjamin, raise your hands!)
Thank you! Any questions?