A development framework for medical image processing software

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Creatis is a biomedical imaging research laboratory, with about 200 persons, whose main areas of excellence and international influence are linked to two fundamental problems, namely:

• **Identification** of major health issues that can be addressed by imaging

• **Identification** of theoretical barriers in biomedical imaging related to signal and image processing, modeling and numerical simulation.
CREATIS
Research center in medical imaging
~200 people – 6 research teams

EuBIAS 2013 – European BioImage Analysis Symposium
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Image acquisition
Image processing
Medical interpretation
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Heart-Vessels-Lungs Imaging

Brain Imaging

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Ultrasound imaging

Imaging and exploring methodologies in NMR

Tomographic Imaging and Therapy with Radiation

Methods and systems in MRI and optics

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Difficulties:

- Advanced image **visualization** and **interaction**
- **Heterogeneous** workflows, data
- Reinvent the wheel

Objectives:

**Recover** the truth (normal and abnormal patterns, stability upon the data, ...)

Software development service objectives:

- Create a development environment **prototyping**, demonstration, evaluation, clinic cases.

- **Help** to the software developers.

- **Support** and **teaching** on the developed tools.
History:

Library development

- Library IDO~1992 : Processing function collection
- DaVaW~2001 : widgets collection
- GDCM~ 2003 : DICOM reader
- BBTK ~2008 : High level widgets collection

Processing image applications

- CreaTools Python ~2003 (DaVaW)
- Maracas ~2004
- CreaTools suite ~2008 (BBTK)
A home-made suite (library and applications) that provides:

- Advanced graphical interface, visualization and interaction components (complex viewers, ROI creation, DICOM browser...)

- Easy and transparent inter-operation between all components: black box concept
Specific application

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Module A

Module B

Module C
Advantages:
- Reusability of the laboratory production: Sharing
- Fast and easy user interface generation
- Automatic documentation generation
- Interoperability
- Sustainability
Available black boxes types (and examples):

- Interface building: widgets
- Visualization and Interaction: complex viewers
- Image processing: algorithms from ITK or the researchers
- Input/Output: image reading and writing through gdcm (DICOM browser)
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Creatools base libraries
creaNewProject  crealmageIO  creaMaracasVisu  gdcms  bbtk  ...

Third party Library:  itk  vtk  boost  qt  wx  ...

BBTK through bbEditor
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Source code (C++/bbs) → CMake → BBP (Black Box toolkit Package) → Compiler → bbEditor (BBTK graphic editor) → Application prototypes → Binary (executable), Library (dll/lib/so/a/dylib)

Project (.sln, Makefile, XCode)
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CreaDevManager helps managing all this workflow!

Functionalities:
- Library Manager
- Package Manager
- Application Manager
- Edit CMakeLists File

* Make easier the pipeline from project creation to compilation and package plug
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http://www.creatis.insa-lyon.fr/creatools/

http://git.creatis.insa-lyon.fr/pubgit/
https://git.creatis.insa-lyon.fr/git/

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http://www.creatis.insa-lyon.fr/mailman/listinfo/creatools

Simple and flexible **framework** for designing/testing/prototyping new **medical image/mesh processing** methods.

- Reusability of the laboratory production
- Using script language (prototyping)
- Workflow Editor
- Automatic documentation generation
- Plug-in connection mechanism
- Multi scale/modality images
- High level widgets
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Thank you
Merci
Gracias
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