Medical Imaging Research Laboratory
www.creatis.insa-lyon.fr

Plateforme VIP

Sorina Pop
7ème Workshop VIP
03/06/2020

Programme

- ✓ Très courte introduction et présentation du programme (Sorina Pop, 5 min)
- ➤ Tour de table, présentation des attentes de chacun (tous, 30 min)
- ➤ Nouvelles de VIP (Sorina Pop, 15 - 20 min)
  - organisation, dernières releases et applis, projets en cours/à venir, recommandations
  - point sur l'utilisation des GPUs
  - infos sur la possibilité d'utiliser le cluster de Creatis
- ➤ Girder et VIP (Axel Bonnet et Frédéric Cervenansky, 10 - 15 min)
  - exécution des pipelines VIP depuis Girder
- ➤ Mise en place d'une BD FAIR provenant de PILoT et interconnectée avec VIP (Obed Meralus et Laurent Mahieu-Williame, 10 -15 min)
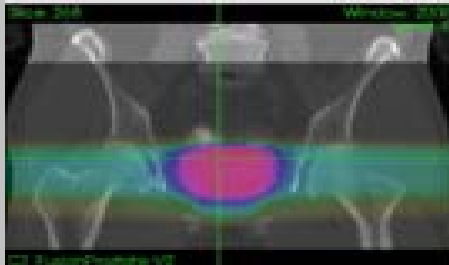- ➤ Divers

CREATIS | Medical Imaging Research Laboratory
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https://vip.creatis.insa-lyon.fr

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Web portal

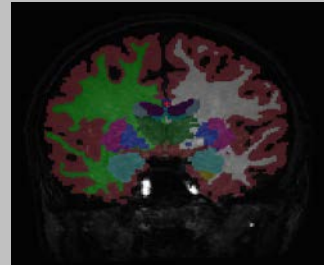Application as a service
File transfer to/from grid

Scientific applications

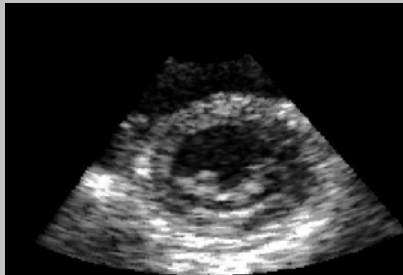**Cancer therapy simulation**

Prostate radiotherapy plan simulated
with GATE(L. Grevillot and D. Sarrut)
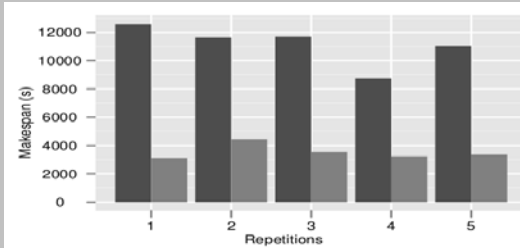
Neuro-image analysis

Brain tissue segmentation
with Freesurfer

Image simulation

Echocardiography simulated with
FIELD-II (O. Bernard *et al*)

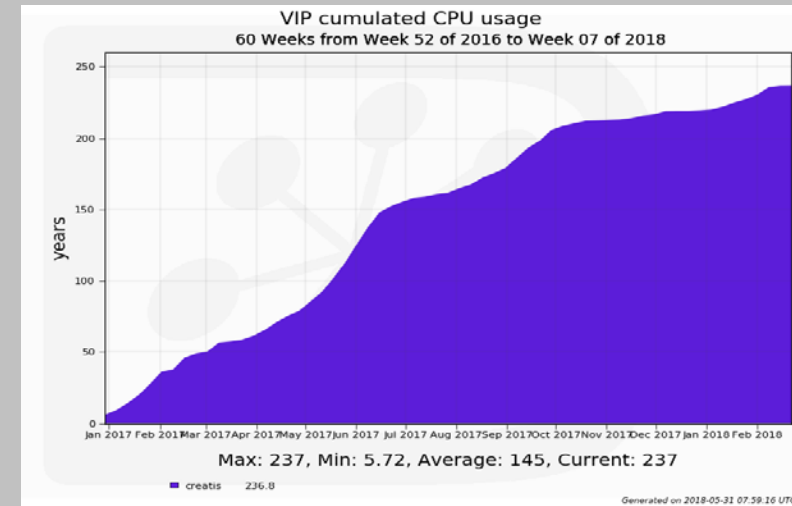**Modeling and optimization of distributed computing systems**

Acceleration yielded by non-clairvoyant
task replication (R. Ferreira da Silva *et al*)

Infrastructure

Supported by EGI Infrastructure
Uses biomed VO (~65 sites in Europe and beyond)
VIP consumes ~**20 CPU years** every month

Max: 237, Min: 5.72, Average: 145, Current: 237

France-Grilles

DIRAC

Users

1000+ registered users in June 2018
55 publications since 2011

3

Why use VIP?

- To get/give access to medical imaging applications

  - No need for installation on the users' side
  - Easy to use

- To share

  - Applications and data

- To get access to distributed computing and storage resources

  - « Free » of charge for research usage
    - Moral obligation to report publications using these resources

People

■VIP team

- Sorina Pop, IR CNRS
- Axel Bonnet, IR CNRS (FLI & CNRS INS2I)
- Frédéric Cervenansky, IR Université

■Creatis research teams' members

- All Creatis teams were represented by at least one person
- See meeting reports at https://www.creatis.insa-lyon.fr/site7/fr/vip

■Students

- Obed Meralus (Labex Primes WP5) – Master thesis : May – September 2020

- Anchen Chai (Labex Primes WP5) – PhD defended in January 2019

■External collaborations

- Tristan Glatard, Associated Professor at Concordia University, Montreal
- Frédéric Suter, CC-IN2P3

VIP platform latest actions

- ■ **VIP software development**
  - ■ Latest VIP release v1.28 from May 2020

- ■ **Latest applications imported & user support**
  - ■ Epilepsy deep learning tools (Carole Lartizien / Daria Zotova)
  - ■ Mixed workflows of SPM preprocessing tools (Carole Lartizien / Julien Jung)
  - ■ Segmentation of the thalami of the premature infant in cUS - mlvl_Inference (Philippe Delachartre)
  - ■ Synthetization of a pseudo attenuation map - Max_prob (Inés Mérida, collab CERMEP)
  - ■ Simulateur 3D PROCHIP (Carole Frindel / Ali Ahmad)
  - ■ Algorithmes de reconstruction (Voichita Maxim / Thomas Grenier)
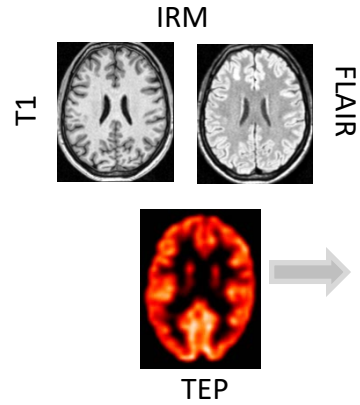 - ■ Autodock (Covid19)

- ■ **Communication**
  - ■ Multiple conferences (JCAD, EGI, MIPRO…), 2 EGI articles
  - ■ 6 VIP workshops (one every 6 months): https://www.creatis.insa-lyon.fr/site7/fr/vip

- ■ **Answer the needs expressed during the workshops**
  - ■ GPU usage
  - ■ VIP – Girder integration

GPU integration

IRM

T1 | FLAIR

TEP

MR (T1/FLAIR) and TEP database:
- 80 normal subjects
- 25 epilepsy patients

| Image pre-processing | Feature extraction | Classification |

Spatial normalisation
Matlab (SPM)

Unsupervised deep representation learning
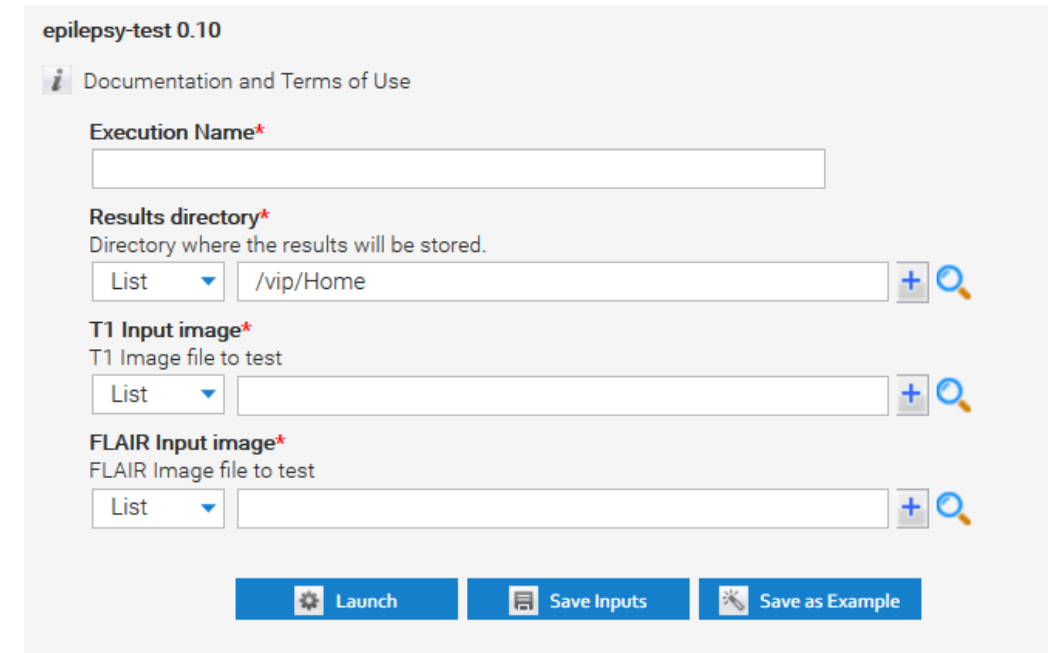Python (Theano)

Outlier detection algorithm
Python
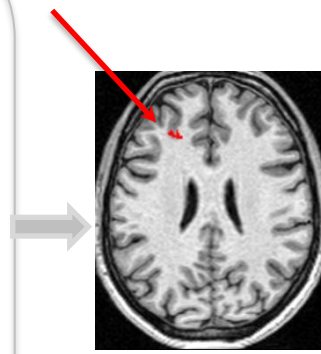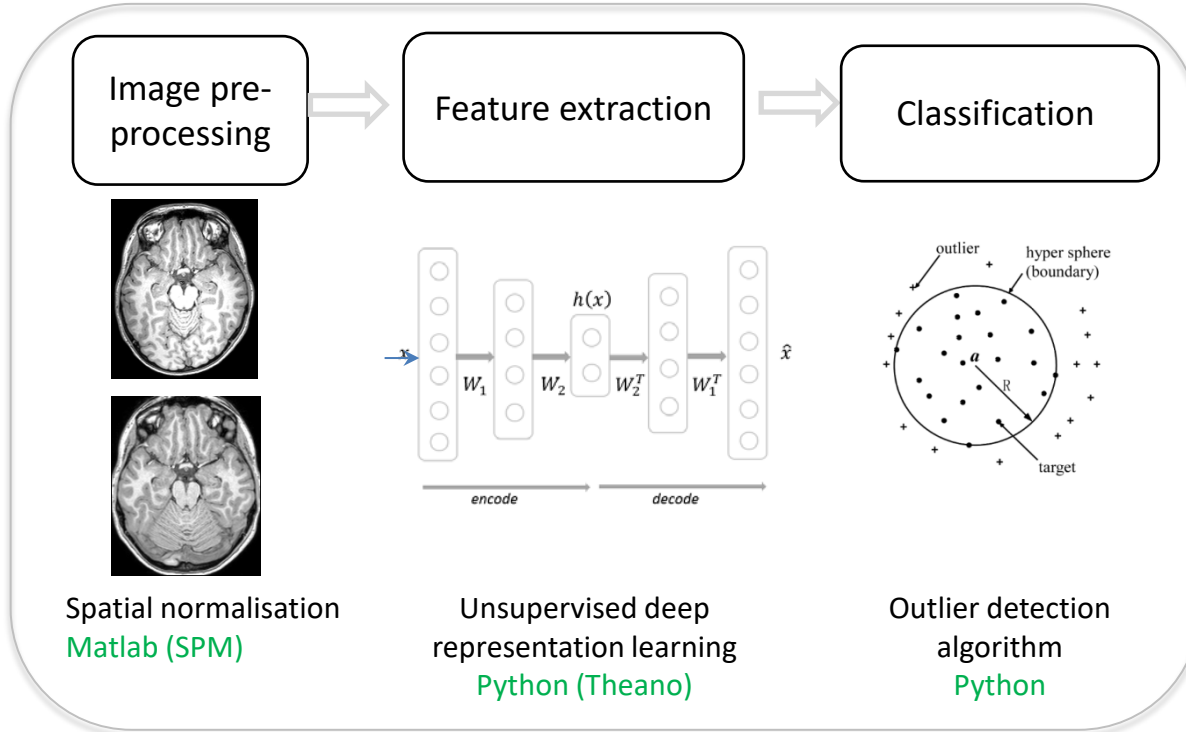
Projet Carole Lartizien
- Papier " Exploiting GPUs on distributed infrastructures for medical imaging applications with VIP and DIRAC." S. Pop et al., MIPRO 2019

Crédits: Carole Lartizien, PhD work of Zara Alaverdyan
(Oct 2015-Oct 2018)

Current usage

- The training is run and the model is generated beforehand, then made available on VIP

- End users launch test jobs from VIP
  – Workflow with SPM pre-processing and test applications
  – Use of Docker containers

Docker containers

- A Docker **image** is an executable package that includes everything needed to run an application--the code, a runtime, libraries, environment variables, and configuration files
  - Useful for sharing and deploying your application on any platform
  - No need for installation (other than Docker)
  - Helps with reproducibility (to a certain extent)
  - Usually quite straightforward, except for GPUs…

Using the Creatis cluster

- Aim : use the GPUs, data and software already available

- Challenges

  - Access rights : restricted to creatis users

  - OS : Fedora

- Since May 2020, VIP can launch executions on GPUs from the Creatis cluster

  - Main current limitation : use of a single account, data access rights

VIP as a platform

- Organisation
  - Responsable : Sorina Pop
  - Comité de pilotage : O. Beuf, H. Benoit-Cattin, J. Pansanel (IPHC Strasbourg)
- Recommandations
  - Don't hesitate to contact us
    - Understand your needs and propose an adequate service
  - Include VIP in your projects
    - Contact us before submitting the project

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Application publishing in VIP with Boutiques

- Share your tools in a packaged and fully described fashion
- Boutiques publishes descriptors to Zenodo (https://zenodo.org)