Intégration dans VIP d'un pipeline de préprocessing pour la neuro

Plan

- Présentation du pipeline
- Démo sur girder

Objectifs de l'intégration sur VIP

- Mettre à disposition un pipeline standard de préprocessing
- Simplifier son utilisation : sur un outil web sans installation
- Premier pas vers plus de reproductibilité (ReproNim)

Pre-processing on MRI images

1. Conversion from DICOM to NIFTI *(dcm2niix)*
2. **Resolution augmentation according to z**
   Interslices interpolation
3. Intensity normalization
   Between 0 and 1024 : useful for the other steps
4. Registration: intra on T1
   Rigid registration ELASTIX
5. Registration: inter on MNI TI (atlas)
   Affine registration FLIRT
6. Brain extraction
   HD-BET
7. Pre/post gado T1 normalization
   Linear regression on 2D histogram
8. Bias field artifacts correction
   N4 bias field correction
9. Intensity normalization
   *Standardization: useful for the network*

T2

T2 after process
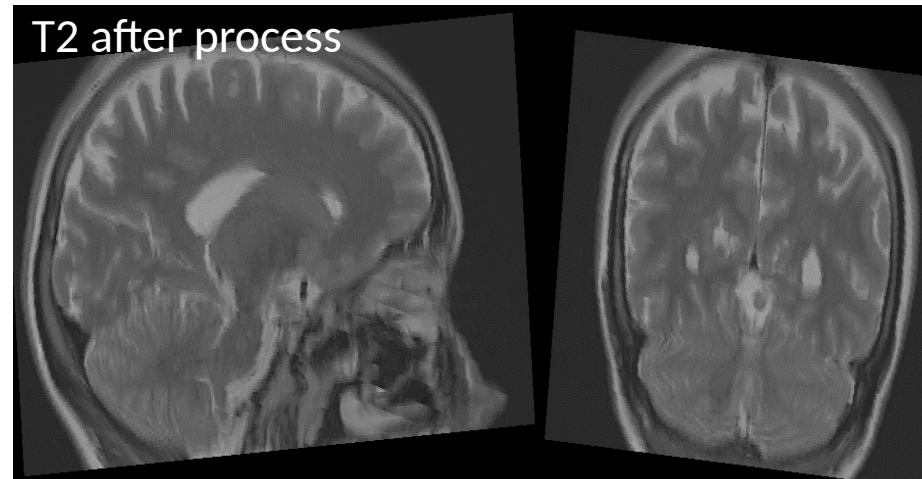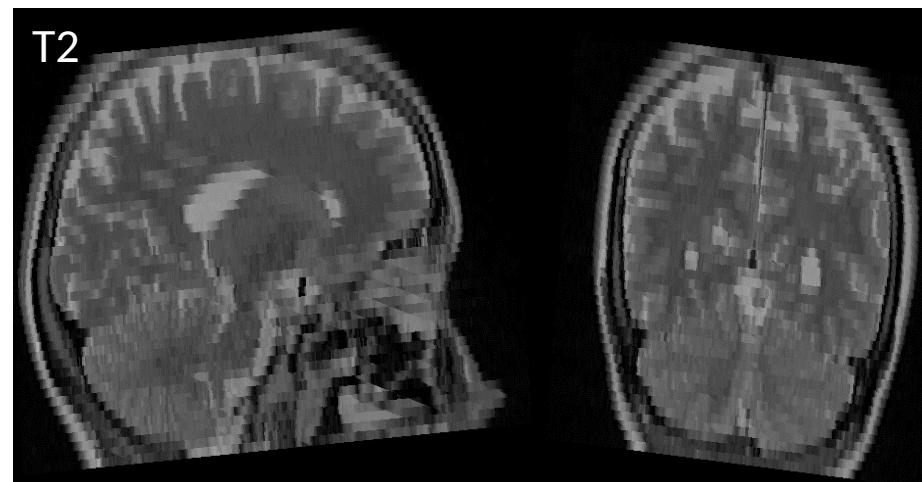
SDIKA Michaël. A sharp sufficient for B-Spline vector field invertibility : application to diffeomorphic registration and interslice interpolation. 2013.
SDIKA Michaël. A fast nonrigid image registration with contraints in the Jacobian unsing large scale constrained optimization. 2008.

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T1

FLAIR

Registered FLAIR
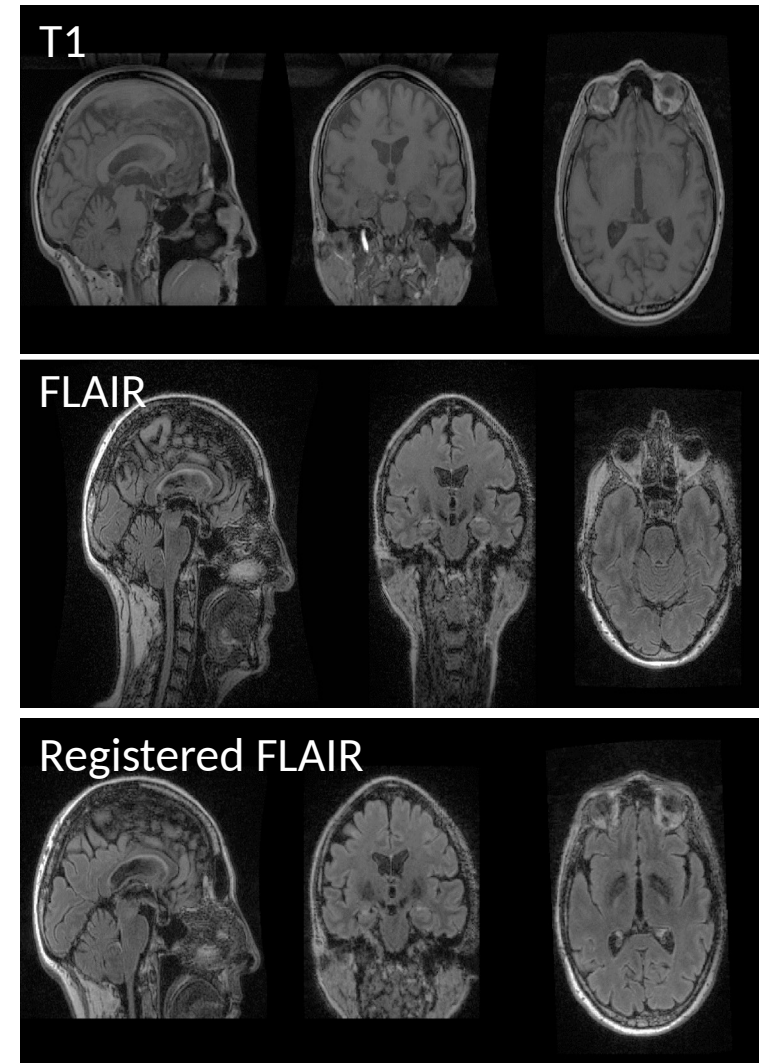
KLEIN et al. Elastix: a toolbox for intensity based medical image registration. 2009.

SHAMONIN et al. Fast Parallel Image Registration on CPU and GPU for Diagnostic Classification of Alzheimer's Disease. 2014.

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T1 MNI

T1

Registered T1
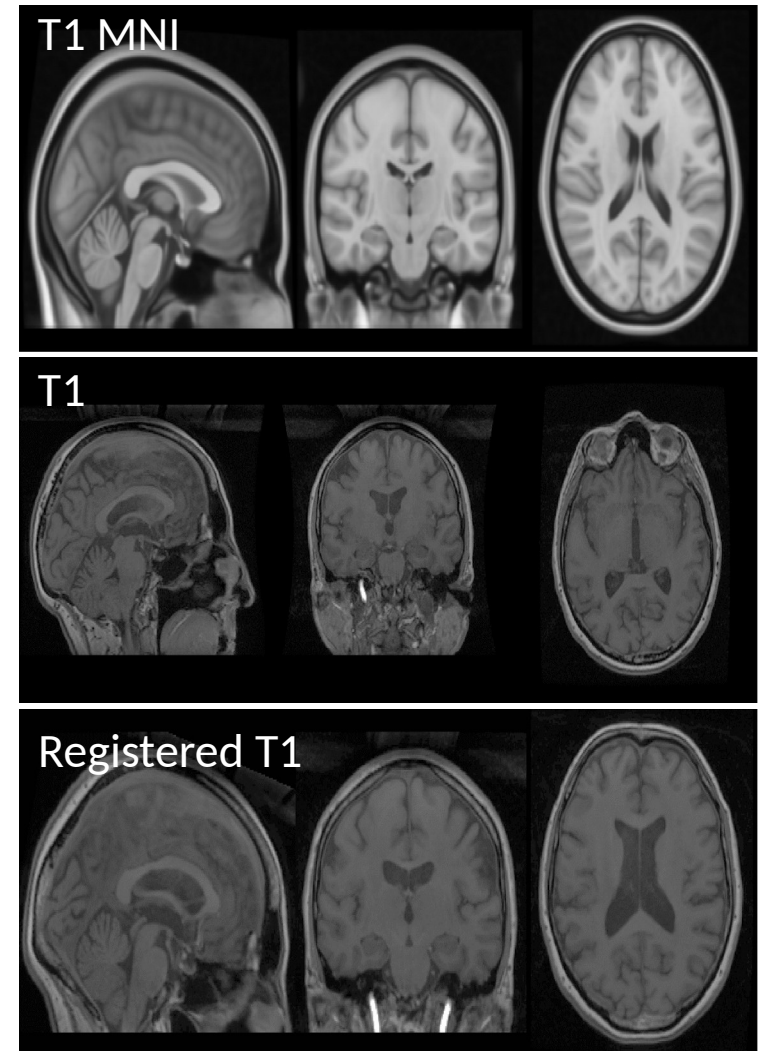
JENKINSON et al. *A global optimisation method for robust affine registration of brain images. 2001.*

JENKINSON et al. *Improved optimization for the robust and accurate linear registration and motion correction of brain images. 2002*
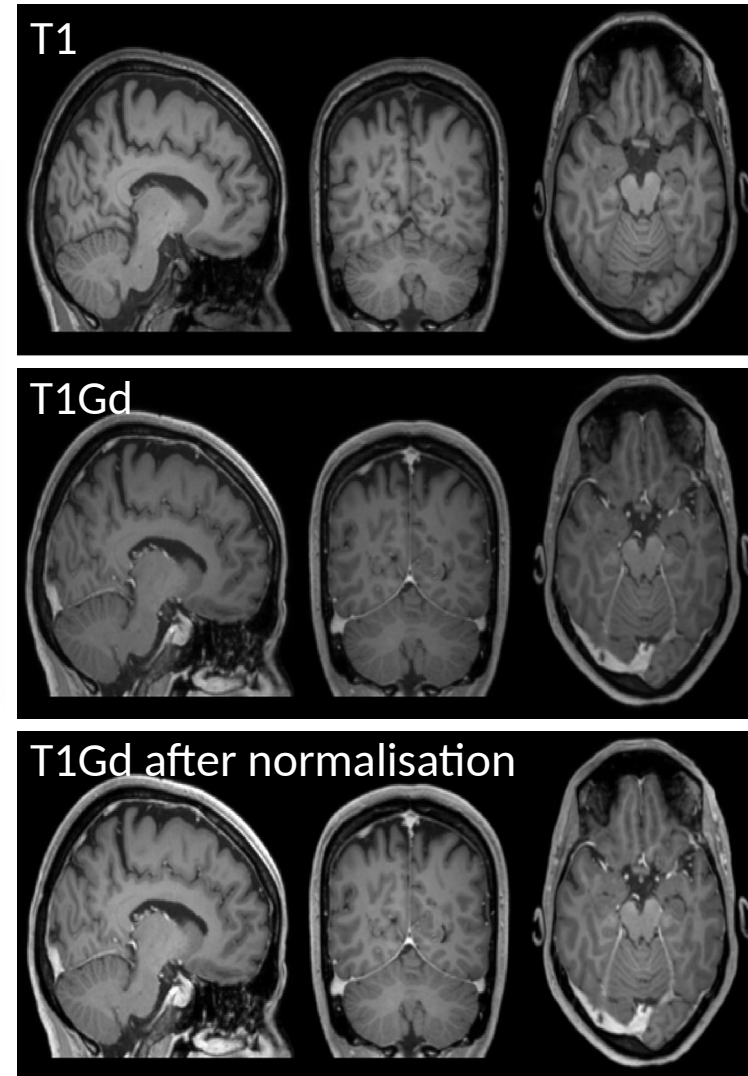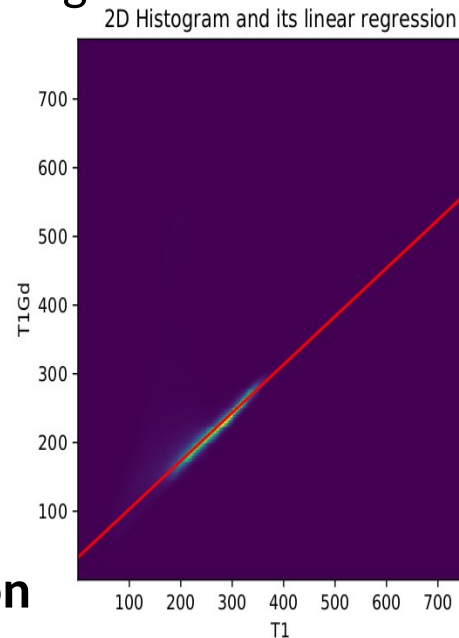
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T1 with brain mask
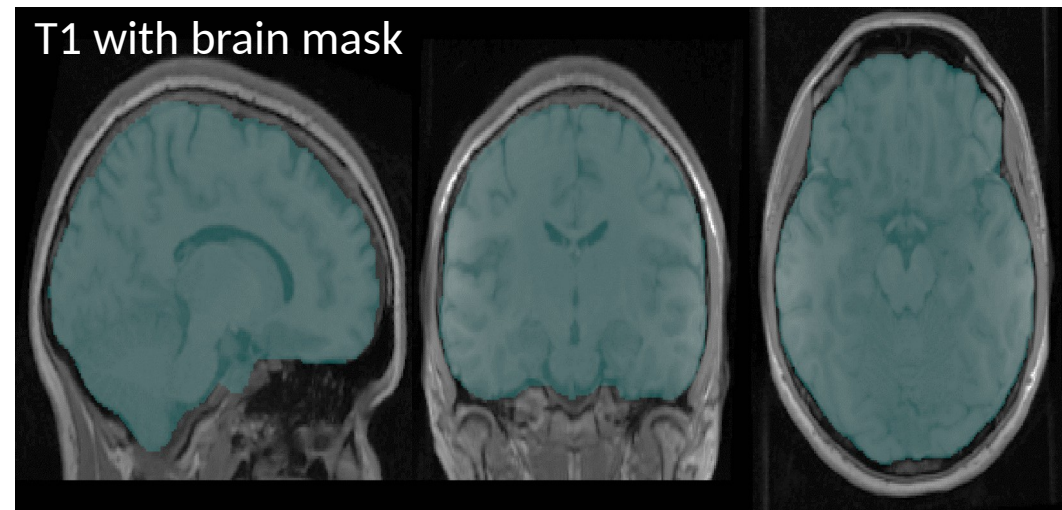
ISENSEE et al. Automated brain extraction of multi-sequence MRI using artificial neural networks. 2019.
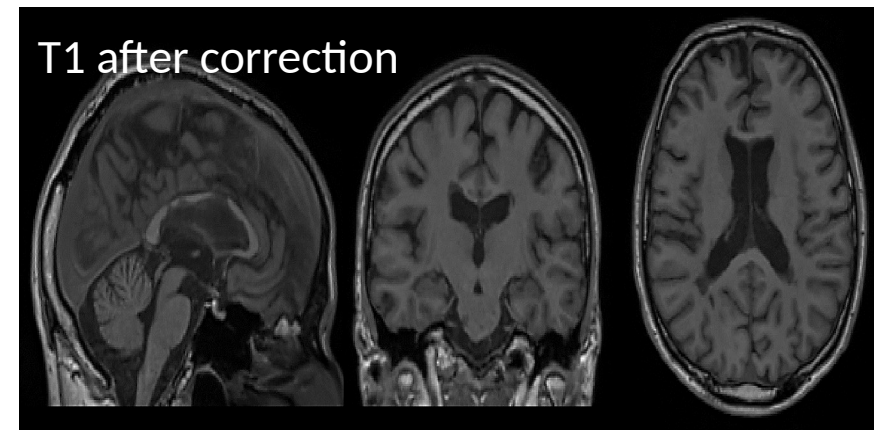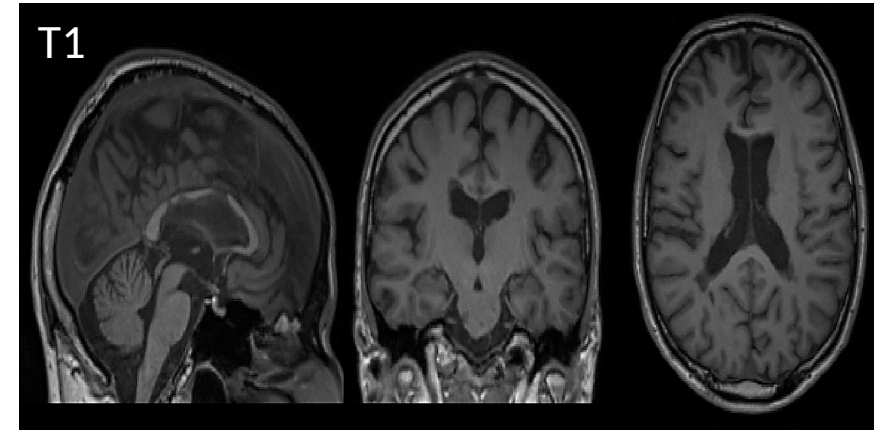
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2D Histogram and its linear regression

T1

T1Gd

T1Gd after normalisation

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NICHOLAS et al. N4ITK: Improved N3 Bias Correction. 2010.

Conclusion

- Première version : testez, testez, testez

- Évolutions à venir

- Premier étape pour une toolbox neuro sur VIP