

Descriptif de Sujet de projet d'initiation à la recherche OMA

Entreprise/Laboratoire : TheraPanacea

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Projet court (15,5 jours / 124h) ou long (33,5 jours / 268h) : both options are available.

1- Contexte/Orientation : Deep Learning Deformable Fusion

Image registration is one of the most critical problems in radiology targeting to establish correspondences between images modalities of the same patient or longitudinal studies. This problem is traditionally casted as an optimization problem. In the advent of deep learning, the objective of this project will be to study recent advances for unsupervised deep learning deformable registration in the context of CT images for radiation oncology.

2- Résultats attendus : quel est le (ou les) livrables attendus du travail des élèves ?

The outcome of this effort will be a prototype that evaluates deep learning unsupervised registration methods in the context of different anatomies using different loss functions combining data similarity and context specific labels extending prior work

<https://arxiv.org/abs/1809.06226>

done for magnetic resonance images based on image similarities metrics to context annotations.

3- Compétences à l'œuvre et approches :

Good coding skills, some experience on deep learning methods, willingness to learn new things, hard work and motivation.

4- Planning dans les grandes lignes

- T0+1,5 month = T1 : development of the deep learning architecture to encode label constraints costs using different loss functions
- T1 + 1,5 month = T2 : validation/optimization of the architecture on different anatomies
- T2 + 1,5 month : comparison with state of the art methods, report, publication

5- Bibliographie (éventuelle)

<https://arxiv.org/abs/1809.06226>