Post-doctoral position

UNION EUROPEENNE
Fonds Européen de développement Régional

RÉGION NORMANDIE

Functional area: Rouen, France
Team: Quantif, LITIS laboratory

Duration: 12 months
Start date: from the 1st of September 2021
Net salary: 2100 – 2400 euros per month

PostDoc Subject

Glioblastoma is the most frequent primary malignant tumor of the central nervous system and represents 2,000 to 2,500 new cases per year in France. The optimal treatment is multimodal: it is based on the combination of a first resection of the tumor (when this is possible), followed by radiotherapy on the operating bed (or the tumor in the absence of initial resection) coupled with chemotherapy followed by maintenance chemotherapy. Despite this standard treatment, tumor recurrence, commonly called cancer progression, is the rule.

In this context, the objective of the work is twofold: (i) to establish a simple process making it possible to import into a common database and process data from routine imaging (MRI), tumor sequencing (analyzes of molecular biology) and the clinic in order to build a tri-modal database; and (ii) develop machine learning based algorithms for predicting progression (topography and delay) from this tri-modal basis for patients with newly diagnosed glioblastoma. Finally, an IT platform will be implemented to include all the necessary operations related to these two objectives. We are conducting the project in close collaboration with the Center of Cancer Research - Henri Becquerel Center in Rouen, where the IT platform will be installed for physicians.

Bibliography:

[1]. Tongxue Zhou, Stéphane Canu, Pierre Vera, Su Ruan, « Latent Correlation Representation Learning for Brain Tumor Segmentation with Missing MRI Modalities », IEEE Trans.on Image Processing, 2021. Vol. 30, pp:4263 – 4274 DOI: 10.1109/TIP.2021.3070752

[2]. Tongxue Zhou, S. Ruan, Stéphane Canu, « A review: Deep learning for medical image segmentation using multi-modality fusion », Elsevier, ARRAY, volumes 3–4, September–December 2019. doi: https://doi.org/10.1016/j.array.2019.100004

[3]. Wang, Chuang, et al. "Toward predicting the evolution of lung tumors during radiotherapy observed on a longitudinal MR imaging study via a deep learning algorithm." Medical physics 46.10 (2019): 4699-4707.

[4]. Zhang, Ling, et al. "Spatio-temporal convolutional LSTMs for tumor growth prediction by learning 4D longitudinal patient data." IEEE transactions on medical imaging 39.4 (2019): 1114-1126.

[5]. Elazab, Ahmed, et al. "GP-GAN: Brain tumor growth prediction using stacked 3D generative adversarial networks from longitudinal MR Images." Neural Networks 132 (2020): 321-332.

Skills and Profile

- PhD in computer science, data science, image processing (medical image processing), computer vision or applied mathematics.
- Excellent programming skills.

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