The 8th European Congress on Computational Methods in Applied Sciences and Engineering
ECCOMAS Congress 2022
5-9 June 2022, Oslo, Norway

IMAGE-INFORMED BIOMECHANICAL MODEL FOR GLIOBLASTOMA GROWTH: A COMBINED DESCRIPTIVE AND PREDICTIVE MODEL

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Keywords: *Glioblastoma, Tumor Growth, Medical Imaging, Deep Learning, Image Segmentation, Patient-specific Modelling*

Despite the different range of treatment available such as surgery, radio and chemo therapy, glioblastoma multiforme (GBM) is one of the most complex to treat [1]. It is classified as a grade 4 tumor by the WHO and carries a poor prognosis and high recurrence propensity. Providing clinicians with an accurate model that predicts the anisotropic tumor growth is essential to apply the most adequate treatment for the patient. In that scope, the large variety of medical images (contrast enhanced and diffusion weighted MRI [2]), of every patient constitutes a strong basis. Thanks to image analysis techniques multiple parameters such as the geometry and initial conditions can be extracted to initialize a clinically relevant tumor growth model. Accurately defining the initial state of the tumor is of major importance and reducing the errors in image segmentation is a key step into providing a accurate growth model. In this work, we apply an automated self configurating deep learning-based segmentation method (nnU-Net) to GBM patients MRIs [3]. The initial tumor geometry obtained from the segmented image will then be integrated into the growth model. Both the global trend of glioblastoma evolution and the patient-specific characteristics will be involved. The goal is to gather the best of both descriptive and predictive methods to build a robust and cross-validated approach of patient-specific glioblastoma forecasting.

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