
Patient-specific models of anatomical structures and pathologies generated from volumetric medical images play an increasingly central role in many aspects of patient care. A key task in generating these models is the segmentation of anatomical structures and pathologies of interest. Although numerous segmentation methods are available, they often produce erroneous delineations that require time-consuming modifications.


Optic pathway gliomas (OPG) represent 5% of pediatric brain tumors and compose a major therapeutic dilemma to the treating physicians. While chemotherapy is widely used for these tumors, our ability to predict radiological response is still lacking. In this study, we use volumetric imaging to examine in detail the long-term effect of chemotherapy on the tumor as well as its various sub-components.


Tracking the progression of low grade tumors (LGTs) is a challenging task, due to their slow growth rate and associated complex internal tumor components, such as heterogeneous enhancement, hemorrhage,
and cysts. In this paper, the authors show a semiautomatic method to reliably track the volume of LGTs and the evolution of their internal components in longitudinal MRI scans.


We present a new method for rigid registration of CT scans in Radon space. The inputs are the two 3D Radon transforms of the CT scans, one densely sampled and the other sparsely sampled. The output is the rigid transformation that best matches them. The algorithm starts by finding the best matching between each direction vector in the sparse transform and the corresponding direction vector in the dense transform. It then solves the system of linear equations derived from the direction vector pairs. Our method can be used to register two CT scans and to register a baseline scan to the patient with reduced-dose scanning without compromising registration accuracy. Our preliminary simulation results on the Shepp-Logan head phantom dataset and a pair of clinical head CT scans indicates that our 3D Radon space rigid registration method performs significantly better than image-based registration for very few scan angles and comparably for densely-sampled scans.

2013


Volumetric measurements of plexiform neurofibromas (PNs) are time consuming and error prone, as they require the delineation of the PN boundaries, which is mostly impractical in the daily clinical setup. Accurate volumetric measurements are seldom performed for these tumors mainly due to their great dispersion, size and multiple locations. This paper presents a semiautomatic method for segmentation of PN from STIR MRI scans.

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