Title

Brain Tumor Origin Localization via Iterative Methods.

Abstract

We study the brain tumor growth with and without treatment by using the commonly used mathematical PDE models of the Reaction-diffusion type. The models describe tumor cell density change over time due to cell proliferation, diffusion and applied treatment dose.

We discuss the non linear conjugate gradient method for tumor origin localization and treatment parameter reconstruction based on mathematical models of the reaction diffusion type. In this approach, we recover the tumor source $u(x,0) = \varphi$ and then the treatment parameter $\alpha(x,t)$ given knowm later information obtained majorly from image scans.

This work involves 3 dimensional simulations of the tumor in time on MRI-T1 weighted brain scan obtained from the Internet Brain Segmentation Respository (IBSR).The simulations are achieved using the standard finite difference discretisation of space and time derivatives. Synthetic images show accuracy of our approach in tumor source recovery and treatment parameter recovery.

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