MS Thesis Defense

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Title: *Computational Methods for Radiation Therapy Planning*

Abstract

This thesis discusses the problem of computerized tomography (CT) and related radiation therapy planning. In CT, the objective is to estimate the unknown density distribution inside an object based on observed attenuation of X-rays traversing the object, using a model in which the attenuation can be expressed by an integral over the line of sight. In the radiation therapy planning, it is assumed that an estimate of the density distribution is available, and the problem is, in dual to the CT problem, in the sense that a target radiation level needs to be delivered to cancerous tissue, while keeping the radiation level under a safe threshold in healthy tissue. As discussed in this thesis, mathematically the problems have a common ground. The solution of the CT problem based on the Algebraic Reconstruction Technique (ART) is discussed, and an ART based iterative algorithm is proposed to solve the radiation therapy planning problem. Both parts are elucidated by computed examples.