

AbstractID: 12748 Title: An Integrated Software Environment for Image Guided Adaptive Radiation Therapy Research

Purpose: Modern research in Image Guided Adaptive Radiation Therapy (IGART) generates very large quantities of imaging data, as it is no longer uncommon to collect upwards of 200GBytes of imaging data, stored as thousands of files, per research patient. Such proliferation of data requires new software infrastructure which can handle collection, anonymization, indexing and automated processing of data. Software infrastructure, in support of NIH sponsored research program on IGART, had to be developed, ab initio, at our institution.

Materials and Methods: Patient data is initially collected by networked Personal Computers provided by vendors of imaging equipment. Disk synchronization software is used to create a UNIX disk mirror of data bearing disks, which is hosted on EMC Clariion networked storage devices supported by the university computing group. Automated Patient Accumulator (APA) application extracts data from the mirror, accumulates data for selected patients, and performs initial tests of data integrity. Automated Database Builder (ADB) application monitors accumulated data, creates anonymized copy of newly acquired data, and organizes anonymized data into the Reference Data Database (RDD). A customized interface to Philips Pinnacle Treatment Planning System (TPS) supports dynamic building of TPS patients from RDD images, as well as saving of image segmentation and treatment planning data back into the RDD. A dedicated C++ library, called Research Computing Framework (RCF), supports programmatic access to RDD data, building of automated data processing pipelines, and storage of derived research data into temporary research databases. Data visualization is based on the AVS Express toolkit, combined with the RCF library as means of converting research data types into AVS data types.

Results: A comprehensive software infrastructure to support IGART research has been built, ab initio, at our institution. This infrastructure is currently being used to perform IGART research.

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