Planning App User Guide

Overview

The .decimal Astroid Planning App is used for treatment planning of proton radiation therapy treatments. The Astroid Planning App is an interactive end user application that leverages the existing .decimal Dosimetry App functions for device creation, dose calculation, and optimization to facilitate efficient development of proton radiation treatment plans.

Purpose

The purpose of this document is to provide guidance on the setup, access, and usage of the Astroid Planning App.

Getting Started

The Instructions for Use outlines the general usage principles and limitations of the Astroid Planning App. Users must read and understand these instructions before operating the system for clinical use. Refer to each section below for complete details:

- **Overview**
- **User Responsibilities**
- **Warning**
- **User Profile**
- **Indications for Use**
- **Intended Use**
- **Product Features**
    1. Function Access and Data Storage
    2. Proton Dose Calculations
    3. Proton Aperture Designs
    4. Proton Range Compensator Designs
    5. Patient Specific Data Model
    6. Proton Treatment Delivery Machine Model
- **Data Model**

Precautions

It is the responsibility of those utilizing this application to ensure all that all usages of this product relating to patient treatments are performed by trained and qualified personnel only and that such personnel is aware that the quality of any generated treatment plans is highly dependent on the quality

and correctness of the input data; therefore if any questions or uncertainties exist regarding the quality, units, or identification of input data arise, they must be investigated and resolved before the data are used.

Keyboard and Mouse Controls

Astroid utilizes keyboard shortcuts to help streamline many commonly used functions and display controls. A complete listing of these shortcuts along with a full description of the mouse controls is located at the Keyboard and Mouse Controls page.

Tutorials

Task Descriptions

The following task descriptions are thorough guides providing complete information about each task within the Astroid Planning Application.

- Launching the Astroid Planning App
- Uploading a DICOM Patient
- Importing Patient Data
- Courses, Intents, and Directives
- Patient Models
- Creating a Plan
    - Structures
    - Dose Grid
    - PBS Beams
        - Defining an Aperture
    - Fraction Groups
    - Defining Constraints
    - Setting Objectives
    - Astroid Optimization
        - Feasibility & Constraints
        - Running the Optimizer
        - Dose Normalization
        - Navigating the Solutions
    - Using the Plan History
    - Publishing a Plan
- More coming soon ...

End-to-End (Plan) Walkthroughs

The following walkthroughs will take you through the process of creating complete treatment plans in the

Astroid Planning App. They provide detailed steps so that any user can begin using the software. Each guide covers a specific type of treatment plan, and although some walkthroughs share certain steps, each has been written as a self-contained unit so that you may begin with whatever guide is the most useful.

- Prostate Plan Walkthrough

System Usage

Improper System Usage

When using the Astroid Planning App, as with any complex program, there is the potential for misuse. The various Astroid Apps comprise a suite of radiotherapy treatment planning tools that are intended to be used by experienced and knowledgeable professionals working in the field of radiation therapy.

Known Application Limitations

Below are listed the known application limitations, defects, or inconsistencies.

1. The Astroid Planning App is pre-510(k) at this time and has not been validated for use in actual patient treatments
2. When changing a structure type from a TARGET, whether at the Patient Model or Plan level, if that structure was an existing optimization constraint or objective with maximize options selected, those options will continue to be selected and will unable to be changed in the UI. They can be viewed in the optimization constraint and objective summaries, but will not be editable unless the structure type is changed back to TARGET.
    1. This can result in you having constraints or objectives that might not be ideal for this type of structure. Always double check the constraint/objective summaries if you need to change a structure type from TARGET after you've added optimization parameters to that structure.
3. When importing a new patient, the default physician will be set from the DICOM file. When this physician selection is changed, either during import or later in the Patient Overview, there is no way to re-select the original from DICOM physician.
4. Structures that are expanded in the axis of the CT image slices will have the expansion distance limited by the CT image spacing. So the expansion distance may appear to be an incorrect distance.
5. When creating a new target for a PBS beam via the Create subtask from the Geometric Target drop down, you are able to create a non target structure and have it be selected in this drop down. This is only possible when the Create subtask automatically populates the dropdown upon finishing, and you will not be able to select this target manually if you change the selection.
6. Astroid uses only IEC 61217 coordinate systems (i.e. machine based coordinate systems are NOT available at this time)

See Thinknode Errors for common problems that occur during usage of the Planning app.

Should you discover or suspect any additional errors or limitations not noted above, please contact the .decimal Astroid Planning App development lead, Kevin Erhart, at kerhart@dotdecimal.com with details of your concerns. All concerns will be addressed as quickly as possible and follow up with the submitter will occur throughout the inquiry and correction process.

Results API

The results API is provided to facilitate a controlled and consistent means for accessing necessary treatment plan details and information. From the results API treatment plan data can be accessed, including (but not limited to): patient geometries, prescriptions, beam information, spot placements, and plan dose results.

Most Planning Results API functions must be called using Thinknode meta requests. Because of this added complexity, an example function call has been added for end user convenience.

Available Functions

For a comprehensive list of available Planning Results API functions, please refer to the Results API Function List.

Example

In the .decimal astroid-script-library there is a script called *planning_results_api_example.py* that provides a basic example in calling and accessing the results API meta functions.

In this particular example the *generate_plan_summary_request* is the API function being called by the generator and meta function.

==== Date and Time ==== Fix Me!

The date and time notification in Astroid should match current Windows OS date and time. (note: Astroid may display in 24 hour format, while Windows displays in am/pm).

Add- how to set time in Astroid

==== Unit Conventions ==== Fix Me!