Introduction to Scripting in RayStation

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How to Get Started

- Read RaySearch documentation (brief)
- Watch video tutorial on scripting on RaySearch website or YouTube
- Use “record” function
- Read up on basic Python code syntax
- Try to modify the recorded scripts and insert your own variables
- Try to use IronPython functions outside of RayStation

Try Not to Get Discouraged

- “unscriptable action” => Not always true (Actually this is mostly not true)
- Look for workarounds
- Dig through the "StateTree" / "StateViewer" and try to understand all of the structures as to where data is kept and what functions are there to modify that data
- Try to mirror the syntax used in the recorded scripts, but also, do try to change things and re-run
Script Header

• Typically a version of this will auto-generate when recording the script
• But this is also the place to import additional functionality (libraries) to IronPython that you wish to use

Example 1

Automatically extract a set of dose-volume statistics and display in terminal

• Assumes plan is finished, just wish to see a specific dose statistic, for example V-60Gy to the brain
• Useful for internal reporting, clinical trials, faster than clicking around with a mouse on a DVH curve

Example 2: Automatically Create Treatment Plans

Scripted:
• Add proton fields and set gantry angles
• Specify target and dose prescription
• Perform robust optimization for each field to ensure adequate margins for proton range uncertainty
Example 3: Simulate scanned proton treatment during patient respiration

- Auto-compute deformation vectors for 4DCT
- Compute (warped) state doses
- Part of proton field that is irradiated in each respiratory phase
Limitations
There are some limits to what can be scripted, for example

- “Plan Approval” status for treatment cannot be automated
- Manual contouring (but auto-segmentation can be scripted)

How to Get Better

- Trial/error and explore the StateTree (now called StateViewer, I think)
- Quarterly training courses offered by RaySearch staff
- General practice with Python ... perhaps those motivated will try to connect IronPython to Python (which supposedly is possible)

Summary

- Don’t believe “action is unscriptable”, keep trying
  - This just means it cannot be recorded by the script recorder
- The StateTree / StateViewer is extremely helpful to find the functions and data structures
  - The official documentation was scarce (at the time of my learning)
- RayStation seems to allow access and modification of nearly all aspects of treatment planning and patient data via the scripting interface
- The IronPython scripting capabilities allow a full, real-time link between the internals of the TPS and the rest of your computing system