

VARIAN DEVELOPER WORKSHOP

July 29 – 30, 2016 | Washington D.C.



Eclipse Scripting Hands-on Breakout Session Details (Friday July 29th)

Instructions: For each session, choose a ‘kata’ to work on based on your skill level. Your goal is finish the exercise without peeking at the answer. Answers and more instructions are found on your cloud Eclipse workstation in folder “C:\temp\katas”. Example: if working on Newbie.1, consult “c:\temp\katas\newbie.1\kata.txt” as your starting point.

ESAPI Scripting : DVH Analysis	5 minute Ninja Demo : <i>Minsong Cao (UCLA)</i> - Plan Quality Metrics	
	Kata Skill Level & Number	Problem Description
	Newbie.1	Extract and display relevant DVH metrics for your loaded case using either an ESAPI script or Visual Scripting. Write the results as a table in a CSV file.
	Newbie.2	Edit goals in existing TextDVHMetrics script to evaluate prostate case.
	Intermediate.1	Extract the DVH for the Bladder for your loaded case and write it to a CSV file.
	Intermediate.2	Write a plug-in script for (simple version)plan quality check that will extract Mean/Max dose from CTVs and OARs, test if planning goal are met, then generate report in CSV file.
	Advanced.1	Write a plug-in script to output bio-corrected DVH metrics for a plan (best practice: write the analysis as a class library so it can be shared and re-used).
	Proton.1	<p>Create a script that extracts the plan and the uncertainty plan DVH curves for the structure "CORD" into a list of objects.</p> <ul style="list-style-type: none"> Extract the maximum dose value in cGy from each curve. Display in a message box, the Min, Max and Average Maximum-DVH dose for the collection. <p>Patient “ABDOMEN, TG244” has a proton plan called “Proton Uncert” in course “C2” that can be used for testing and solution verification.</p>

ESAPI Scripting : Reporting	5 minute Ninja Demo: <i>Jason Hu (MSKCC)</i> – Structure volume and dose index trending	
	Kata Skill Level & Number	Problem Description
	Newbie.3	Create a treatment plan report listing the field names, jaw settings, couch angle, gantry angle, and collimator angle for the currently loaded plan.
	Newbie.4	Extract and display MLC control point information for beam 1 of the first Planning Approved plan.
	Intermediate.3	Write a plug-in script that will go through each of the courses and display the plans, prescriptions, and status of the plans (like a “treatment history” report).
	Intermediate.4	Create an ESAPI data mining script that finds the normal structure with the largest volume for all patients in Eclipse.
	Advanced.3	Create a standalone WPF script that iterates through control points to calculate and report for each beam in the plan the number of leaf, jaw, collimator angle and table positions. Then create a binary script that does the same and use the Plugin Tester to run.

ESAPI Scripting : Automation	5 minute Ninja Demo: <i>Markus Varsta (Varian)</i> –Eclipse Automation Demo	
	Intermediate.5	Program an ESAPI automation script that creates a new QA course, a new set of verification plans for the selected clinical plan (1 composite and 1 verification plan per beam), and calculates dose for all of the new verification plans.
	Advanced.5	Create script that creates and optimizes VMAT plan for prostate and nodes <ul style="list-style-type: none"> • Nodes and prostate to different dose levels • Requires creation of dose limiting annuli, segmented optimization PTVs, buffer structures • Evaluate set DVH metrics for bladder, rectum, PTVs. Specify set in TG-263 syntax
	Proton.4	Create a custom proton post processing script: go through all the layers of a proton spot scanning plan and implement energy-dependent minimum and/or maximum spot MU limits. The energy-dependence can be whatever you like, for example you can give the values for 70 and 250 MeV and interpolate the intermediate ones. Because this script uses writing features, it needs to be a Binary plug-in.
	Advanced.6	Create two optimization structures: split a normal structure into two: a part close to the target, and a part that is away from the target. (depending on the shape of the normal structure, these may include several separate volumes).

ESAPI Scripting : Analysis, Data Extraction, and Data Mining	5 minute Ninja Demo: <i>TJ Whitaker (Mayo)</i> - Protons – Find High Weighted Scanning Spots in a Layer	
	Newbie.5	Write a plug-in script that shows the target structures for each opened plan or plan sum.
	Intermediate.7	Get the mean CT number within a structure.
	Intermediate.8	Write a plug-in script to calculate the volume at different isodose levels and display results in message box or export to CSV file. This can be extended to a standalone application for multiple patient plans calculation.
	Intermediate.9	Program an ESAPI script that extracts planar dose for the first beam of the selected verification plan and writes it out as a CSV file (or bitmap, or MapCheck2 format, or Matrixx file format).
	Intermediate.10	Calculate distance from isocenter to couch structure. Calculate minimum distance from external contour to gantry face.
	Advanced.7	Plugin: Calculate Conformity index (CI), Gradient index (GI), Heterogeneity index (HI) for a plan and display the information in a message box. a. CI: V100/TV b. GI: V50/V100 c. HI: Dmax/Dp
	Advanced.8	With 4DCT image set, use registration objects to report coordinates and HU of a pixel on the untagged image, then navigate to corresponding position on one of the phases to report the coordinates and HU of that pixel.
	Proton.2	Starting from the point of completing the Proton.1 task. Write a function that gets the dose at a given volume from the Plan and Uncertainty plan curves. You should use GetDoseAtVolume as a guide. Then for the structure "CTV_5200" use that function to display the Min, Max and Average D95%[cGy] for the plan and uncertainty plans collection. Patient "ABDOMEN, TG244" has a proton plan called "Proton Uncert" in course "C2" that can be used for testing and solution verification.
	Proton.3	Create a script that goes through all the layers of a proton spot scanning plan and reports the lowest and highest MU per spot for each layer. This script can be a Single-file plug-in or a Binary plug-in.