# Walk-Through of CERR Capabilities

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#### CERR: Computational Environment for Radiological Research

- CERR (pronounced 'sir') provides a platform to prototype algorithms for Radiotherapy and Radiomics. (e.g. IMRT, Outcomes research, Image features etc)
- Open source, free: GNU GPL copyleft
- Developers: James Alaly, Aditya Apte, Divya Khullar, Yu Wu and Joseph O. Deasy

# **CERR:** Introduction

- Written in Matlab. – Source and Compiled versions are available
- Import and display treatment plans from a wide variety of commercial or academic treatment planning systems.
- Provides a common filetype for Research

   E.g: creation of multi-institutional treatment plan databases for various types of research studies, including dose-volume-outcomes analyses ,IMRT treatment planning comparisons and Radiomics.

# Documentation | Support | Community

- Wiki:
  - http://cerr.info/wiki
- Forum: <u>http://groups.google.com/group/cerr-forum</u>
- Download:
   <u>http://cerr.info/download.php</u> (GitHub)
- Citations
  - 261 Web of Science, 379 Google Scholar (June 2015)

#### Outline

- CERR Viewer
  - Dose Distributions
  - Images
  - Structures
  - DVHs
- CERR data structure
- Use Cases
  - IMRTP Research
  - Radiotherapy outcomes modeling
  - Radiomics
- Advanced visualization and analysis tools

































Select Operation	Existing Structures Pg	1 Intermediato Pg.
$ \underbrace{\bigcirc A \land B} \\ \bigcirc A \cdot B \\ \bigcirc A + 1 \text{ cm} \\ \bigcirc 2D \\ A + 1 \text{ cm} \\ \bigcirc 2D \\ A + 1 \text{ cm} \\ \bigcirc 2A + 1 \text{ cm} \\ \bigcirc 2A + 1 \text{ cm} \\ \bigcirc 3D \\ 10 \\ \hline 3D \\ 10 \\ \hline 3D \hline \hline $	CD / Lime         CD / CD / Lime           CD / Lime         CD / Lime     <	THE RECORD & LE ROUT
Fill Slice Gaps	Sendt Structures followed by Viale Internetiate' (Male Internetiate) Fage through structures () ()	Mate Struct Quit + + +









#### CERR Viewer

### Default Settings: CERROptions.m

- Sinc upsampling
- PET SUVs
- Plastimatch command file
- Sagittal/Coronal display of Structures



Transverse slice of a PET scan at original resolution of 128x128 Sinc-upsampled slice at resolution of 512x512





r	
	function testBrainStemMeanDose
Unit	<pre>ttestBrainStemMeanDose: Unit test for mean dose to brain stem in H4N pl % % APA, 06/07/2013</pre>
<b></b>	
Testing	<pre>% Expected Mean Dome to BrainStem expected_mean_dome = 14.0871;</pre>
runCERRtests	• Calculated Mean Dose to BrainStem
	% Get HAN FileName and Path
	CERRPath = getCERRPath;
	CERRPathSlashes = strfind(getCERRPath,filesep);
	topLevelCERRDir = CERRPath(1:CERRPathSlashes(end-1));
	<pre>HNfileName = fullfile(topLevelCERRDir,</pre>
	'Unit_Testing', 'data_for_cerr_tests',
	.CERE Diaus.', uesd ueck ext SousAolust.ust.ust.lt
	& Load Han File
	<pre>planC = loadPlanC(HNfileName, tempdir);</pre>
	forceSaveFlag = 0; % do not force save
	<pre>planC = quality_assure_planC(HNfileName, planC, forceSaveFlag);</pre>
	* Call the mean dose calculator
	structNum = 2;
	doseNum = 1;
	calculated_mean_dose = meanDose(planC, structNum, doseNum, 'Absolute');
	Compare expected and calculated mean dome
	assertTOL = 1e-5;
	assertAlmostEqual(calculated_mean_dose, expected_mean_dose,assert30L);

































