




WHAT ARE SOME EXAMPLES OF SCRIPTING LANGUAGES?





- Python
- JavaScript
- Ruby
- Perl
- SQL



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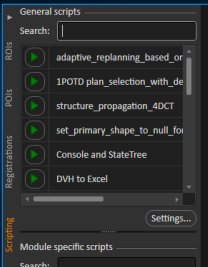
RAYSTATION SCRIPTING LANGUAGES

- **PYTHON**
 - Iron-Python
 - Leverages .Net
 - Fantastic User Interfaces
 - Above Average Multithreading
- Cpython
 - Built on C (C extensions)
 - Strong Scientific and Numeric Code support
 - Huge amount of 3rd party modules
- **C#/Net**
 - Full power of Microsoft Visual Studios
 - Compiled programs
 - LINQ



SCRIPTING INTERFACE

- Should be **clean**
- Should be **intuitive**
- Should be **accessible**
- Should be **flexible**



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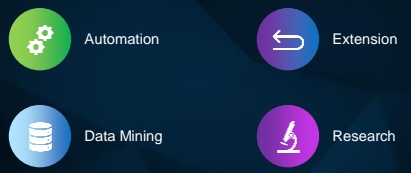
SCRIPTING INTERFACE



- Should allow **Remote Debugging**
- Should support **Command Line Interface**
- Should support **Read/Write Operations**
- Should be **Fully Documented**

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USES



- Automation
- Extension
- Data Mining
- Research

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AUTOMATION



- Protocols
- Scripted Plans
- Auto Breast
- TBI
- Machine Learning and Deep Learning

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EXTENSION – EXAMPLES



- Add compatibility with vendors that don't honor DICOM tags**
 - Re-purposed tags
 - Private tags
- New Techniques**
 - DCA
 - Proton Arcs
- Adapt to varying machine design**
 - Jaws replaced by MLDC
 - check software of R&V systems may require both X and Y Jaws
 - Leaf constraints

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DATA MINING

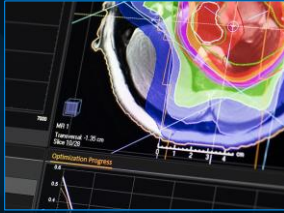


- All Aspects of the **patient** object exposed
- **Machine**
- **Machine DB**
- **Patient DB**
- All Databases should be **queryable**

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RESEARCH – EXAMPLES

- Custom/user defined optimization algorithms
- LET optimization
- Creation of new deformed or synthetic CTs



MACHINE LEARNING



MACHINE LEARNING

- Real Machine Learning
- Has the potential to create better plans than the baseline plans
- Can be pushed to be more aggressive or more conservative than baseline plans
- Should be powered by a well studied community driven platform
- TensorFlow – chosen by RaySearch
 - Google AI
 - Open-Source
 - Large adoption – over 1500 GitHub repositories reference TensorFlow
- Has the potential to automate all aspects of radiation oncology
 - Diagnosis
 - Treatment Course
 - Target Delineation
 - Organ Segmentation
 - Treatment Planning
 - Plan Evaluation
 - Delivery Evaluation



THANK YOU!