RayIntelligence Webinar

# Presenters

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# Overview

RayIntelligence is a cloud-based oncology analytics system. It began as a way to streamline ML model deployment (deployment is putting the model into use). It was first released in Dec. 2020. It now provides the following essential features of cloud-based analytics software:

* Automated data pipelines: You don’t want to manually refresh the data every time it is changed. Think how much of a pain my DQA spreadsheet is.
  + Data integrations (sources): RS patient DB in current release (1C), but DICOM coming in 1D (1/2022)
* Data privacy & security
* Centralized storage/data aggregation: All data is stored in same place
* Scalable computer resources: Typical RS use does not require nearly as many resources as RayIntelligence. The cloud allows automatic adjustment to real-time computing needs.
* Visualization tools w/ drill-down capabilities: Interactive visualization
* Tools for utilizing the data
* ML models & infrastructure: Interaction w/ RayMachine
  + Training data set creation
  + On-demand training
  + Batch runs for validation: instead of running a separate RS instance for each fold in cross-validation
  + Model performance monitoring: IDK if this means accuracy (e.g., correct sensitivity/specificity) or performance metrics
* Data & model sharing framework

# Architecture

RayIntelligence is composed of two modules:

* RayData: on premises
* RayAnalytics: cloud
  + Benefits of cloud vs. local are well documented, but important for us is less hospital IT work!

This may not apply to use since we don’t have RayMachine, but RayMachine will become part of RayIntelligence in the next version (1D).

1C: RayIntelligence includes RayData & RayAnalytics

1D: RayIntelligence includes RayData, RayAnalytics, & RayMachine

Best part: RayIntelligence is browser based! Also uses AWS, which our IT uses, so their familiarity could come in handy.

# Misc.

Analytics are based on plan sets, groups of plans filtered by some criteria. You can save, import, export, etc. plan sets.

DVH ranges analysis

ROI Associations associate TG-263-noncompliant names w/ TG-263-compliant names (yes, this RaySearch product uses TG-263-compliant naming!)

Clinical goals analysis

SQL using AWS Athena

Python scripting support. Configure the AWS connection w/ essentially boilerplate code. The script away.

Compare the demo’d SQL functionalities to what I have been dealing with. My ListPatients script takes forever and does one of the things RayIntelligence is designed for. RS analytics via RS Python script is slower, uses licenses, creates a load on the server, and reinvents the wheel.

# Example Use Cases

* A machine was misconfigured. Find all plans treated on that machine throughout the issue duration.
* Outlier detection. In first DVH Range screenshot above, there are clearly a couple outliers. Drill down to show individual plans. Exclude the outliers from the analysis and you can see the typical DVH ranges for your ROI.
* Create clinical goals from 75th %ile IDL.
* In last Clinical Goals Screenshot, which two clinical goals are never both met? They are likely contradictory.
* Which two clinical goals are always both met? Can we make one or both stricter?
* Import CSV results of SQL query into Excel & create a graph. Better yet, use Python to get results of an SQL query and create the graph ->
* Above pie chart: modifications by MD
* Complexity index viz. Find outliers.

# Future Features

Would be much more useful with greater data integration: MOSAIQ, Delta4, machine logs. Those are planned for future releases. Although, I wonder if the only supported OIS will be RayCare.