

## Cloud-Based Automatic Image Segmentation for Radiotherapy Treatment Planning

- Implement a cloud-based automatic image segmentation algorithm as part of a cloud-based radiotherapy treatment optimization system.
- **What Students Will Do:**
  - Implement and evaluate a pre-trained neural network for image segmentation on the Microsoft Azure Machine Learning cloud platform, then build on the pre-trained network to improve segmentation using fine-tuning or other techniques. They may also develop web-based tools for post-segmentation contour integrity checking, automatic detection of contours that may need refinement, and/or manual contour adjustment. They will work with mentors from JHU, Oncospace, Inc., and Microsoft's Project InnerEye.

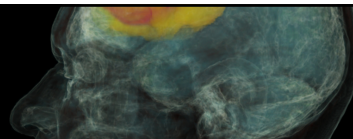


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1

## Project InnerEye – Democratizing Medical Imaging AI



JAMA Network | **Open.**

### Original Investigation | Health Informatics Evaluation of Deep Learning to Augment Image-Guided Radiotherapy for Head and Neck and Prostate Cancers

Ozan Oktay, PhD; Jay Naravati, MS; Anton Schwaighofer, PhD; David Carter, PhD; Melissa Bristow, MS; Ryutaro Tanno, PhD; Rajesh Jena, MD; Gill Barnett, MD; David Noble, MD; Yvonne Rimmer, MD; Ben Glocker, PhD; Kenton O'Hara, PhD; Christopher Bishop, PhD; Javier Alvarez-Valle, MS; Aditya Nori, PhD

Figure 1. Qualitative Evaluation of Expert and Autogenerated Contours on Head and Neck Computed Tomography Scans

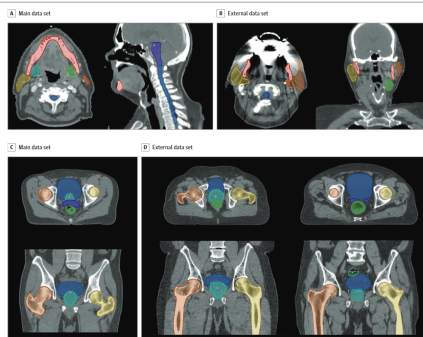
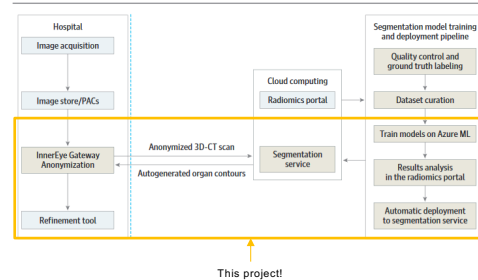


Figure 3. Integration of the Proposed Segmentation Models Into Radiotherapy Planning Workflow



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2

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- **Deliverables:**
  - Minimum: Cloud-based implementation of pre-trained neural network and successful segmentation of test CT volumes
  - Expected: Minimum AND use of fine-tuning or other techniques to improve segmentation accuracy with a training CT set OR web-based tools for contour integrity checking, irregularity detection, and refinement
  - Maximum: Minimum AND both options from expected
- **Size group:** 2-3
- **Skills:**
  - Medical image analysis
  - Python
  - Deep learning (tensorflow, pytorch, etc.)
  - Optional: Microsoft Azure, Javascript, web-based image visualization tools (VTK, ITK, OpenGL)
- **Mentors:** Dr. Todd McNutt ([tmcnutt1@jhmi.edu](mailto:tmcnutt1@jhmi.edu)), Julie Shade ([julie.shade@oncospace.com](mailto:julie.shade@oncospace.com)), Pranav Lakshminarayanan ([pranav.lakshmi@oncospace.com](mailto:pranav.lakshmi@oncospace.com))

