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Center

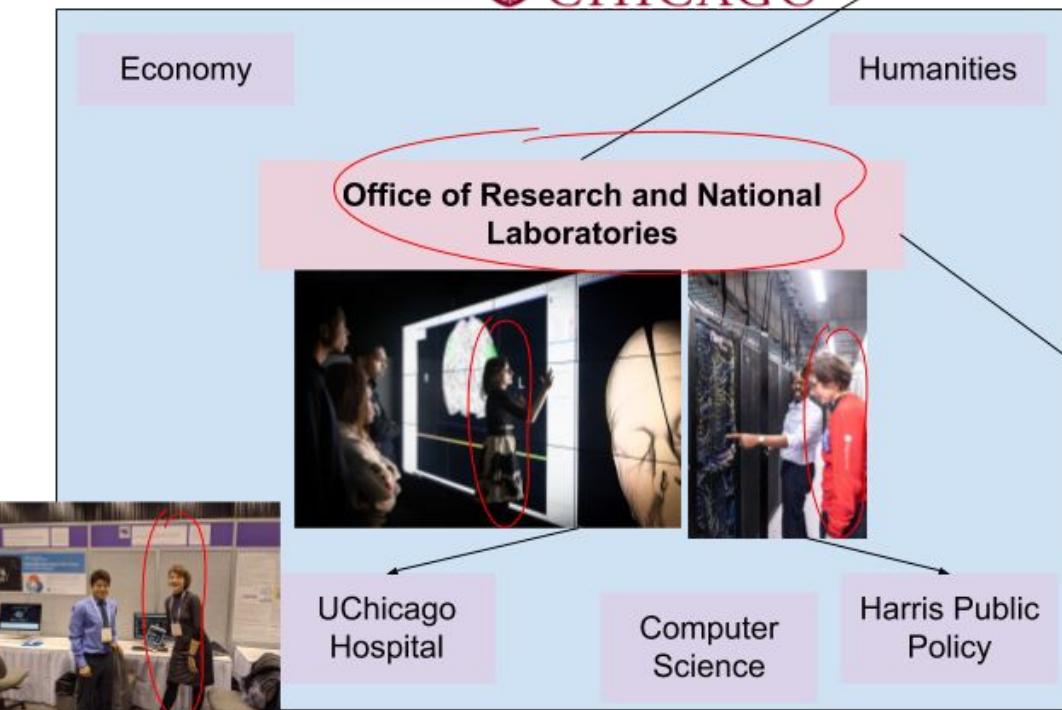
Computer Vision in Medical Imaging

Teodora Szasz, PhD
Computational Scientist
01/28/2020



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My Research World



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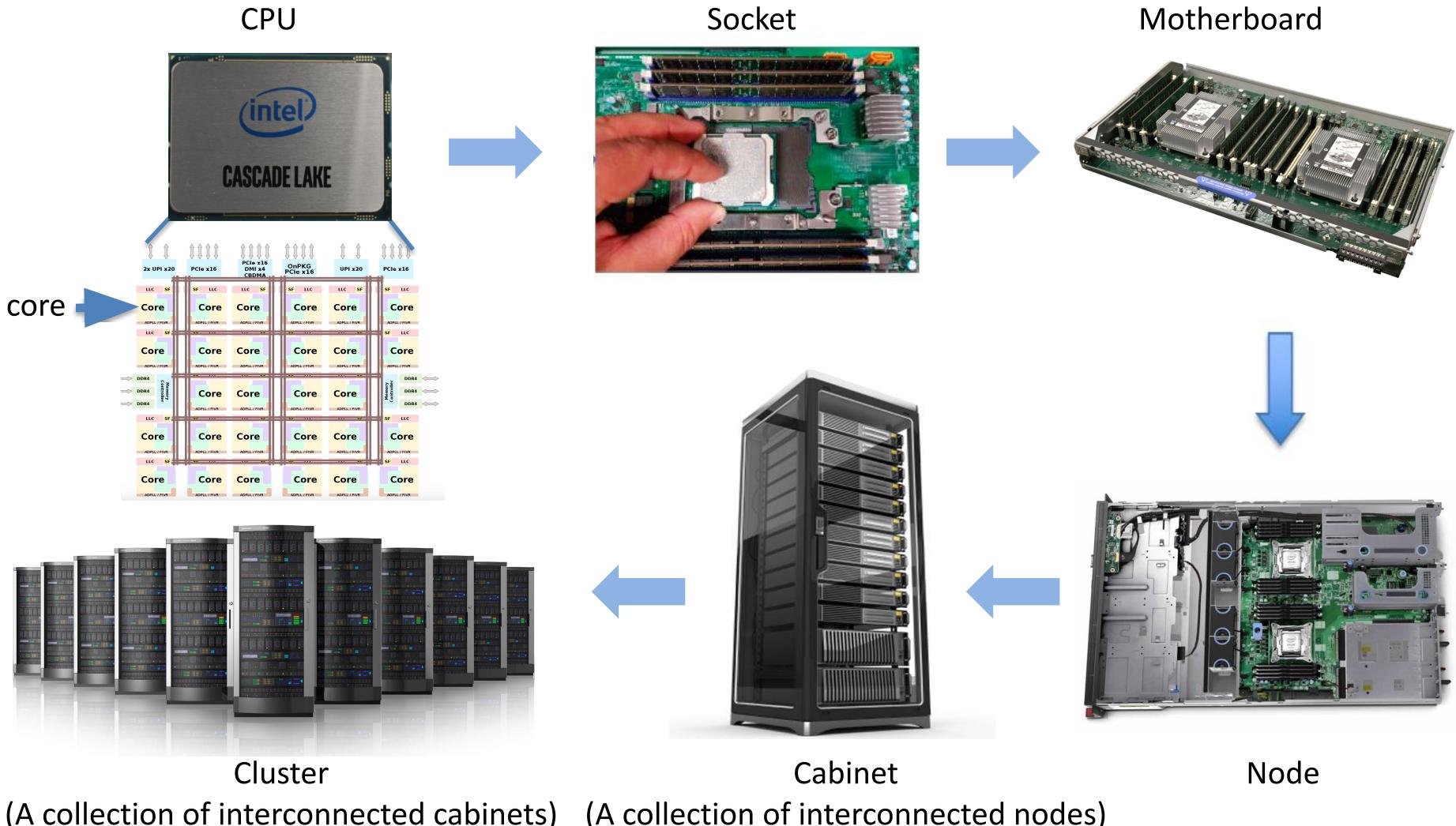
So what is a Supercomputer?



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From CPU cores to Supercomputer



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Midway (UChicago's) Supercomputer

- A heterogeneous cluster of GPU and CPU compute hardware
- Both **AMD and Intel CPU nodes**
- > **40,000 cores**
- > **10 PB of raw storage**
- Big memory nodes (**756 GB and 1.5 TB**)
- > **20 GPU nodes** (NVIDIA V100 and RTX6000 GPUs)
- All nodes are tightly-coupled (EDR 100 Gbps infiniband)
- All nodes have 960 GB SSD local disk
- Operating System: Centos 8



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Photos

Where is the CAT in this image?



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Illustrations

Where is the CAT in this image?



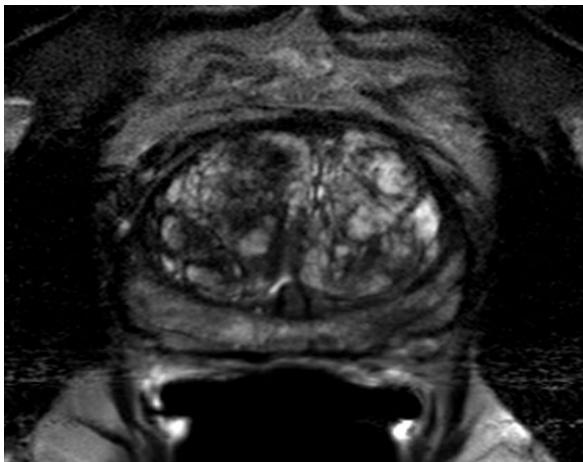
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Medical Images

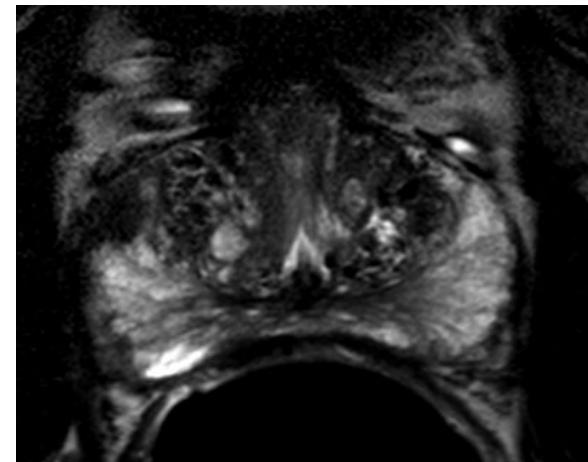
Where is the CANCER AREA in this image?

Normal Prostate



T2-W

Prostate with Cancer



T2-W

ADC map



ADC map



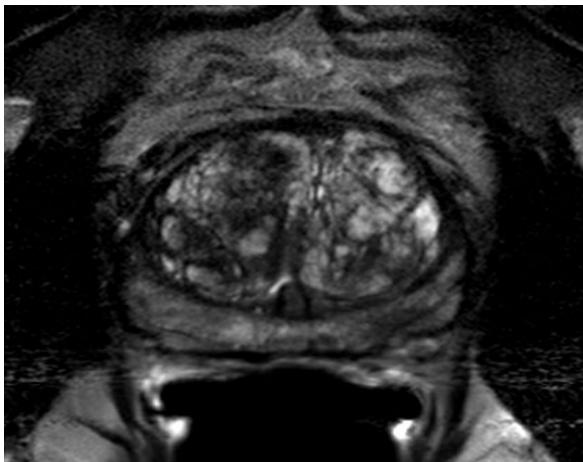
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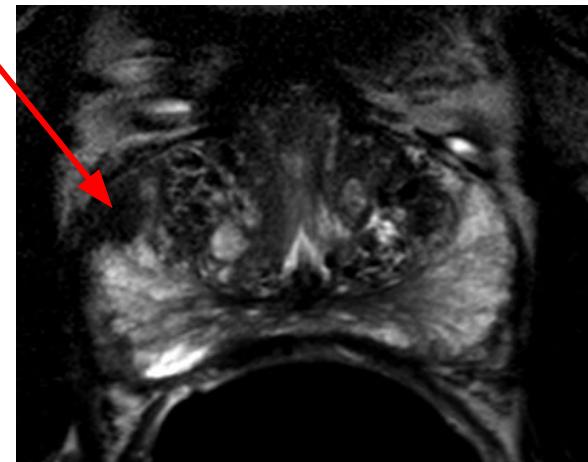
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Normal Prostate



T2-W

Prostate with Cancer

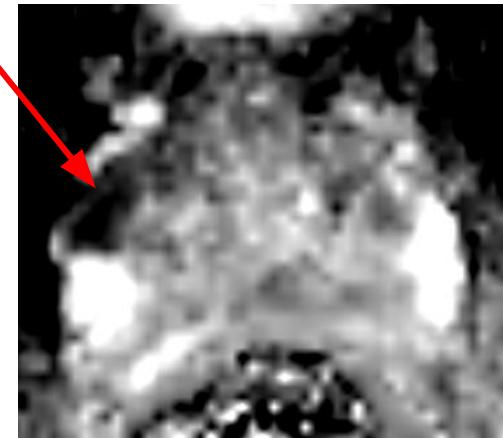


T2-W

ADC map



ADC map



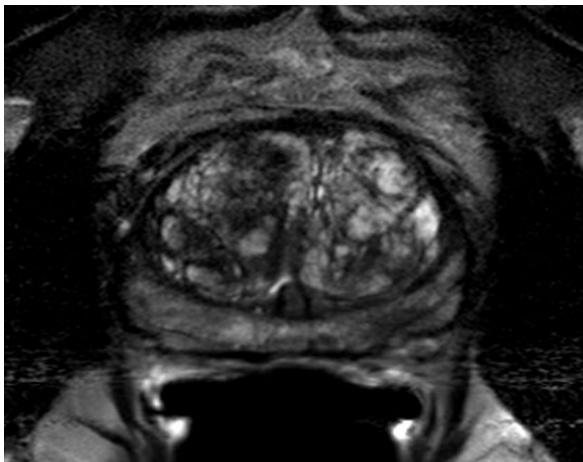
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Medical Images

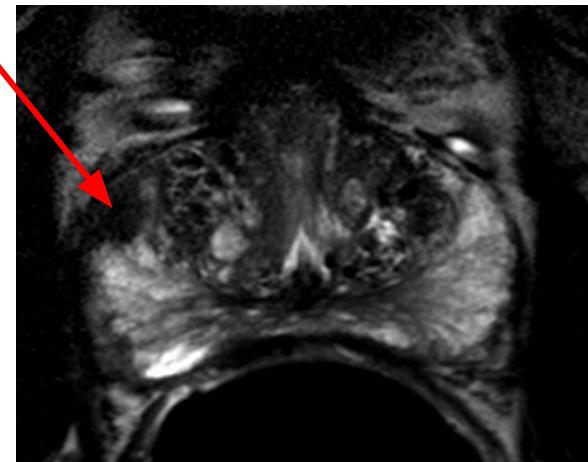
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Normal Prostate



T2-W

Prostate with Cancer

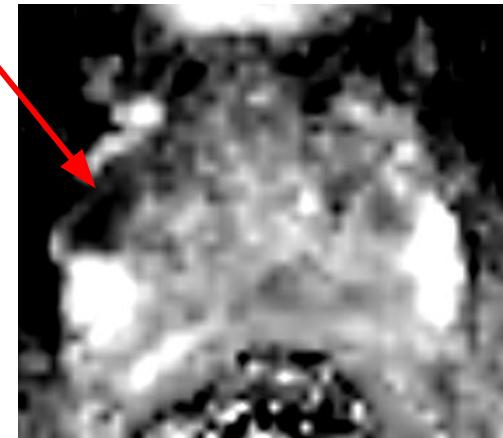


T2-W

ADC map



ADC map

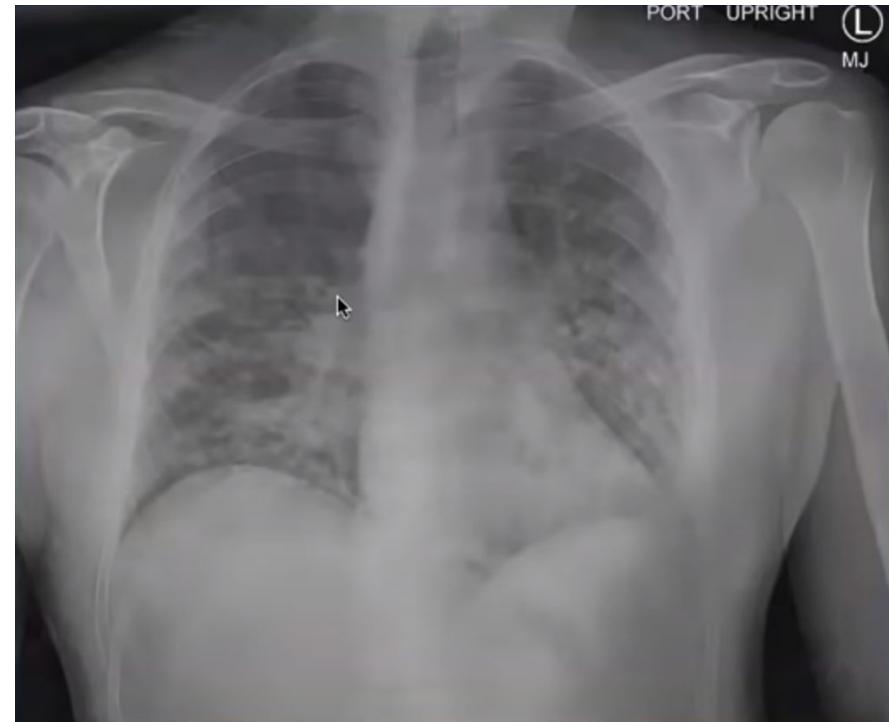
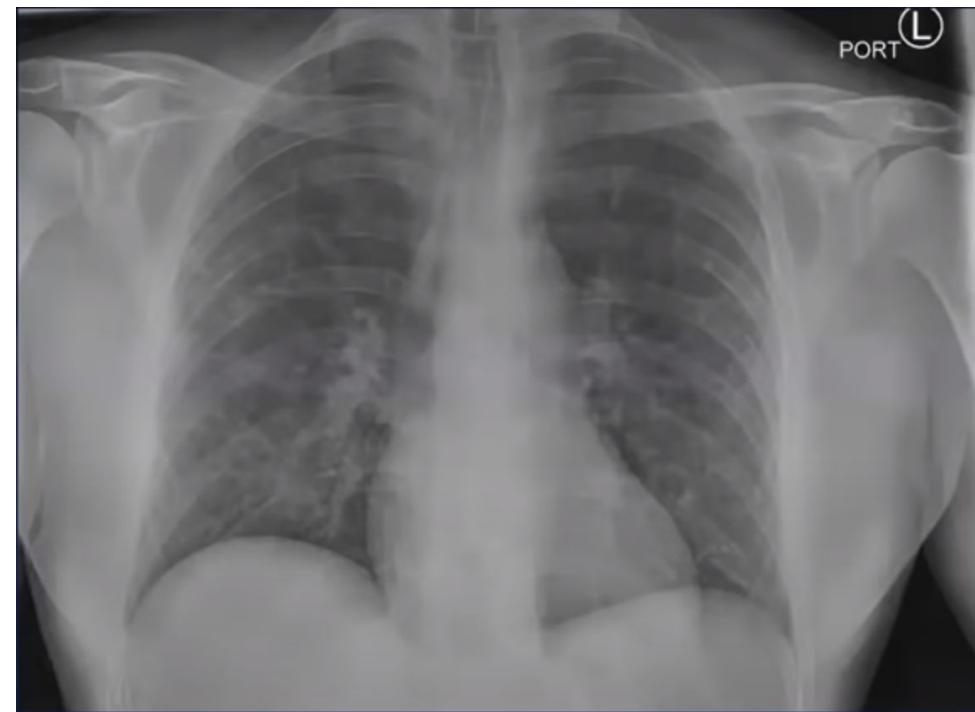


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Medical Images

COVID-19 Progression



3 days later



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Medical Imaging Modalities



X-Ray



CT



MRI

Ultrasound



...

...



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Medical Imaging



Collections

Exploration

Discourse

Documentation

Sign In

Get started today! Contact us about setting up your own Google Cloud Platform Project with [free cloud credits](#)

Exploration

Collections

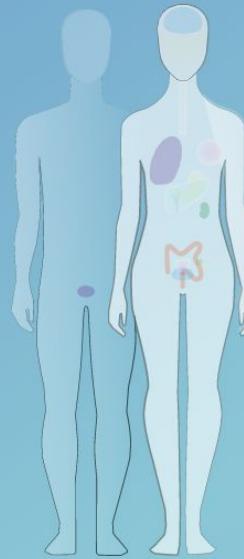
RADIOLOGY



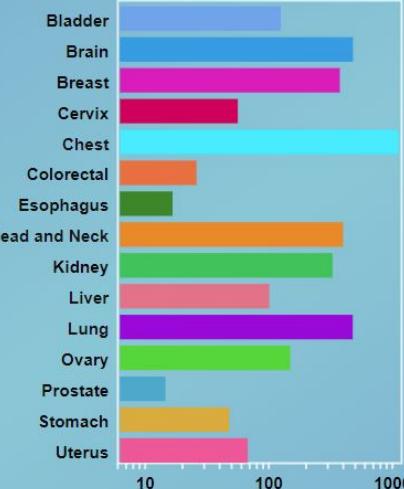
Computed
Tomography (CT)

Magnetic
Resonance (MR)

Positron Emission
Tomography (PET)



Cases by Major Primary Site



Data Portal Summary
Data Release 1.0 October 06, 2020

28
Collections

3,652
Cases

1.04 TB
Data Volume

51,247
Image Series

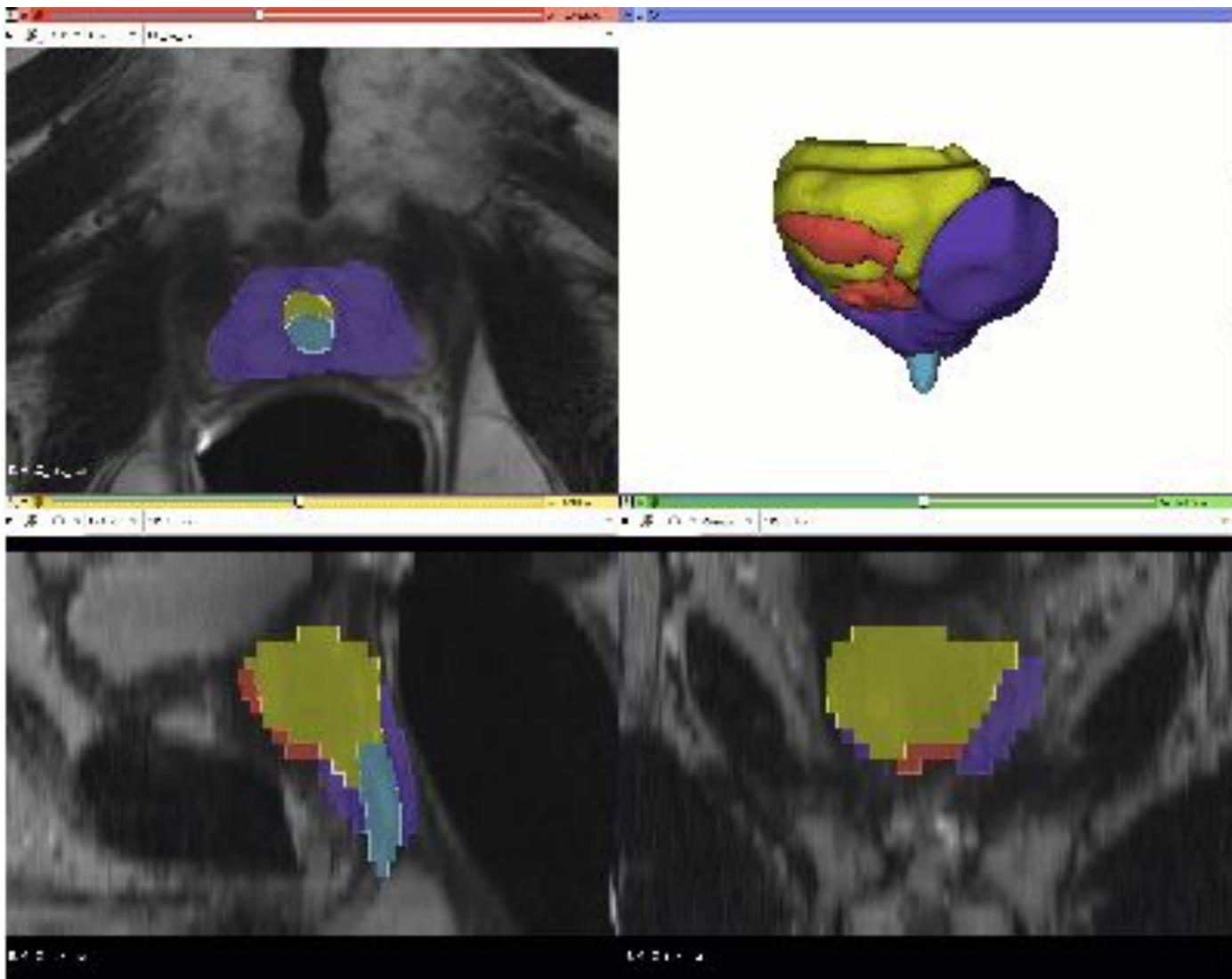
<https://portal.imaging.datacommons.cancer.gov/>



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Tools for Imaging

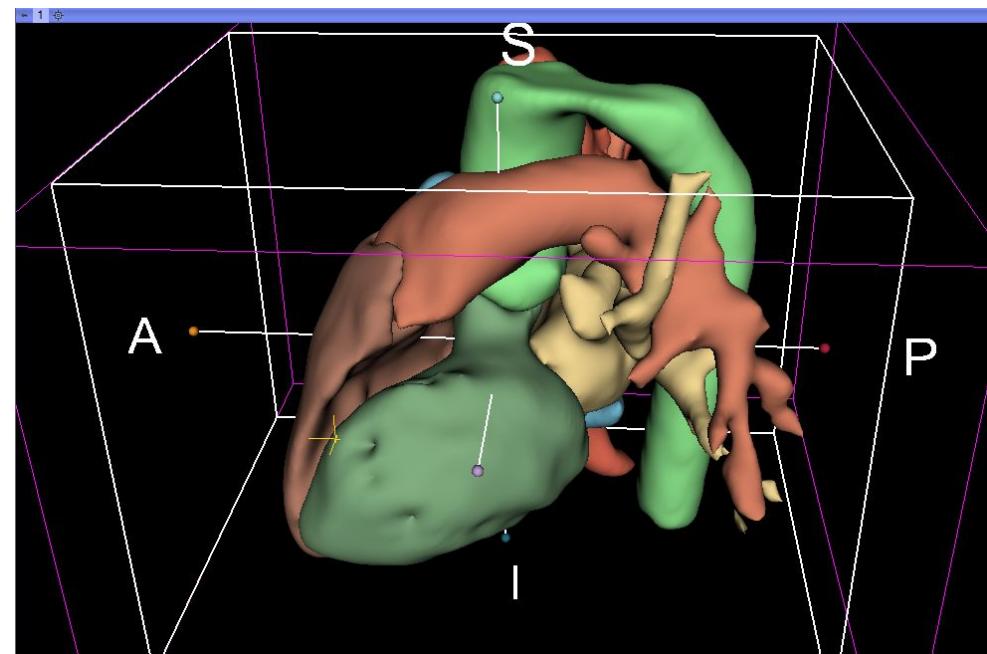
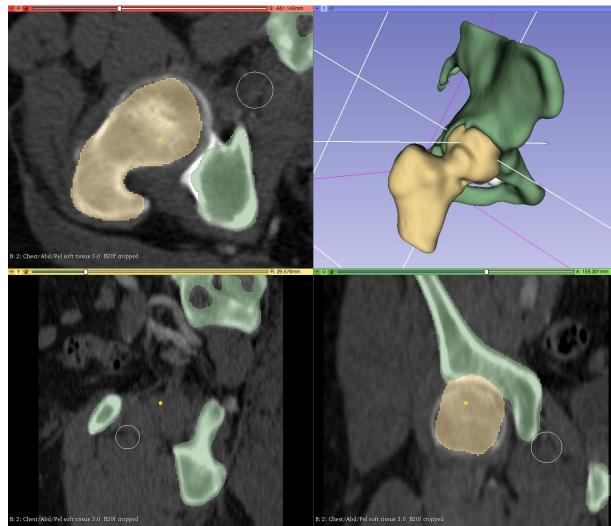


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Handouts of Segmentation Medical Imaging

- Femur Head and Pelvis Segmentation
- Entire Heart Segmentation



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Segmentation using AI

- Prostate zones segmentation:

<https://ieeexplore.ieee.org/document/8363549>

- Entire prostate segmentation:

<http://www.deepinfer.org/>



Build a simple AI model for COVID/Pneumonia Detection

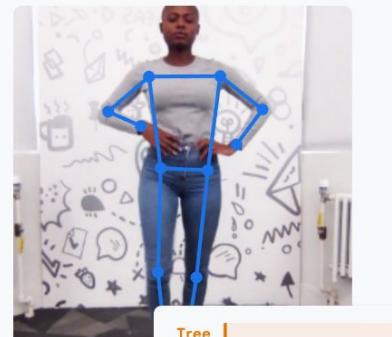
<https://teachablemachine.withgoogle.com/>

Teachable Machine

Train a computer to recognize your own images, sounds, & poses.

A fast, easy way to create machine learning models for your sites, apps, and more – no expertise or coding required.

[Get Started](#)



What is Teachable Machine?



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Build a simple AI model for COVID/Pneumonia Detection

Link to the dataset:

<https://drive.google.com/drive/folders/18E06laivCKZBbxldIxezXxAqVF5xPqt?usp=sharing>



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Tools for Medical Images

- **3D Slicer (Kitware)**
 - <https://www.slicer.org/>
- **PCa-Finder (RCC - UChicago)**
 - <https://pca-finder.rcc.uchicago.edu/>
- **Learn-Radiology (RCC-UChicago)**
 - <https://learn-radiology.rcc.uchicago.edu/>
- **OHIF**
 - <https://ohif.org/>

