Overview of Web-based Tools to Support Imaging Based In Silico Research

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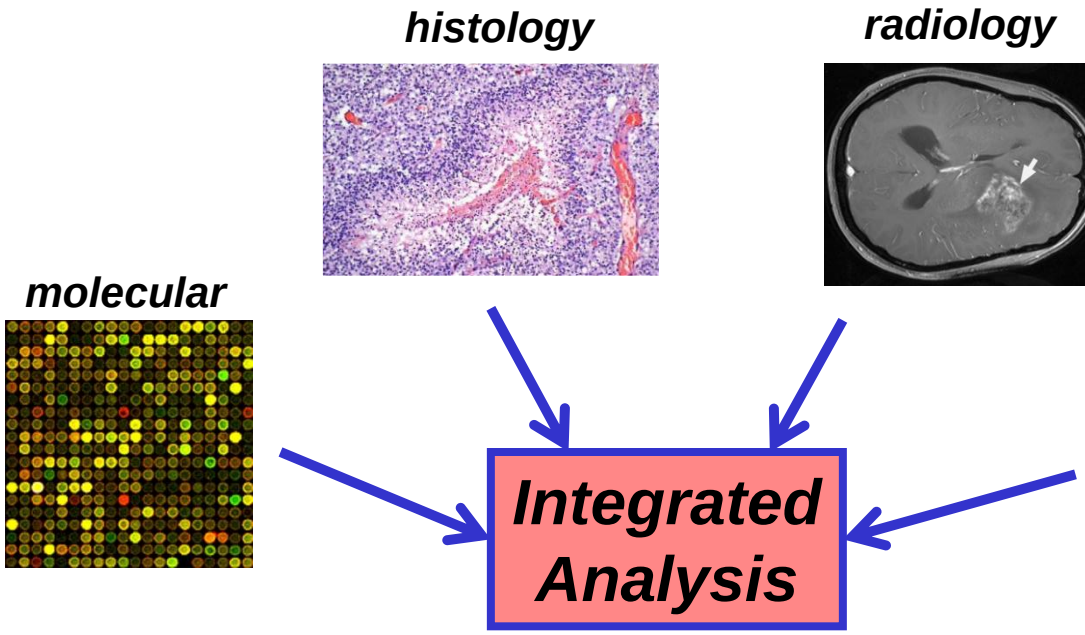
9/26/2011



	A	B	C	D	E
1	Age at Dx	Gender	Survival	Disease	
2	30-34	F	>60M	OLIGODENDRO	
3	50-54	M	--	GBM	
4	50-54	M	--	GBM	
5	50-54	F	30-36M	GBM	
6	20-24	M	--	UNKNOWN	
7	65-69	M	12-18M	UNKNOWN	
8	55-59	F	--	ASTROCYTOMA	

THE CANCER GENOME ATLAS

REMBRANDT

Brief Overview

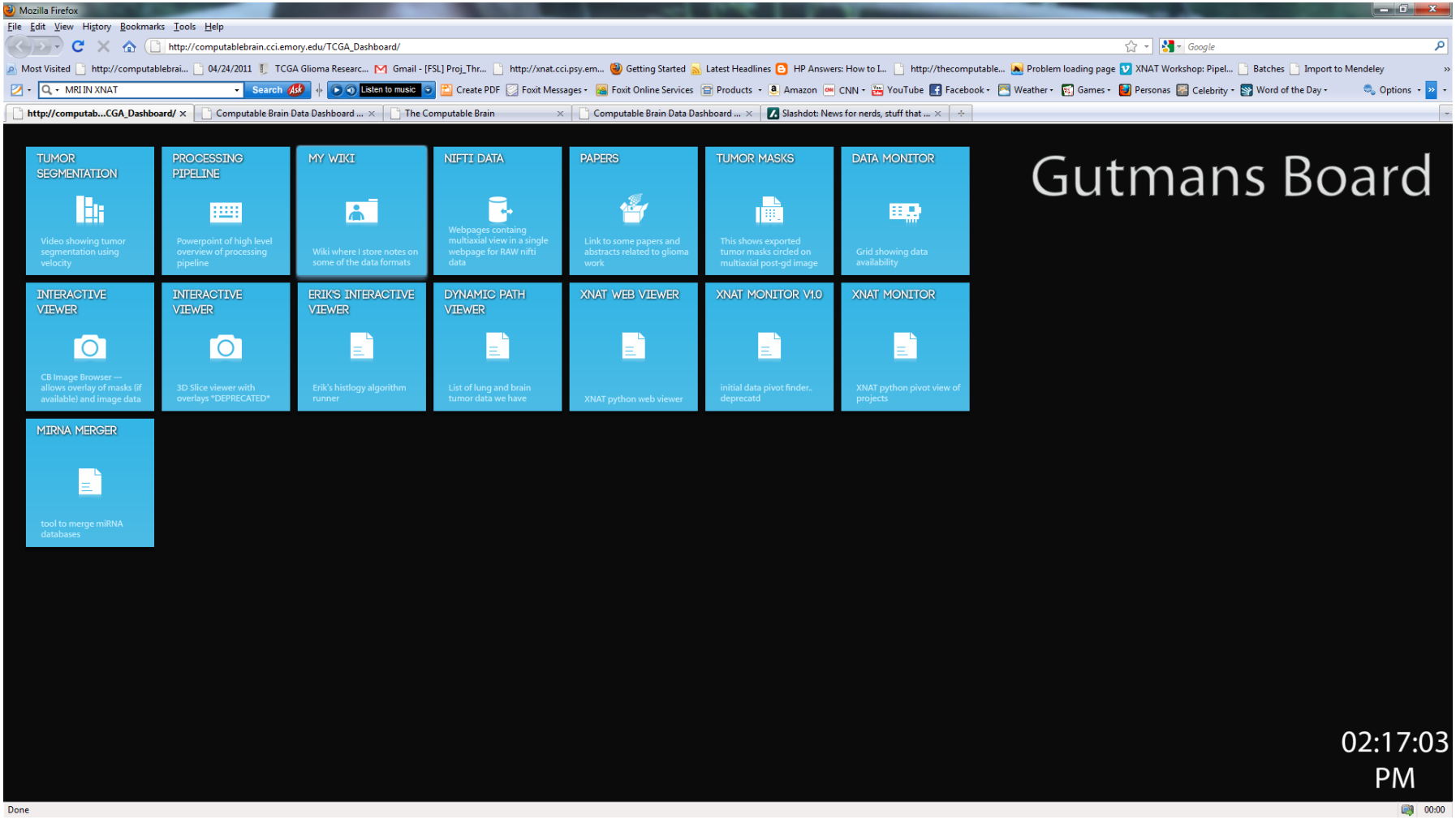
- TCGA Portal is very OMICs focused
- To support our *in silico* work we have developed a number of web-based tools to support informatics integration as well as visualization of results

- Prototypes roughly fall into 3 domains
  - Radiology workflow tools
  - Portals to find common data sets across imaging pipelines
  - Pathology image analysis work/ QA

Apps are available online… Brief descriptions on following slides

http://computablebrain.cci.emory.edu/TCGA_Dashboard/

Has a general base link… number of active sites are here

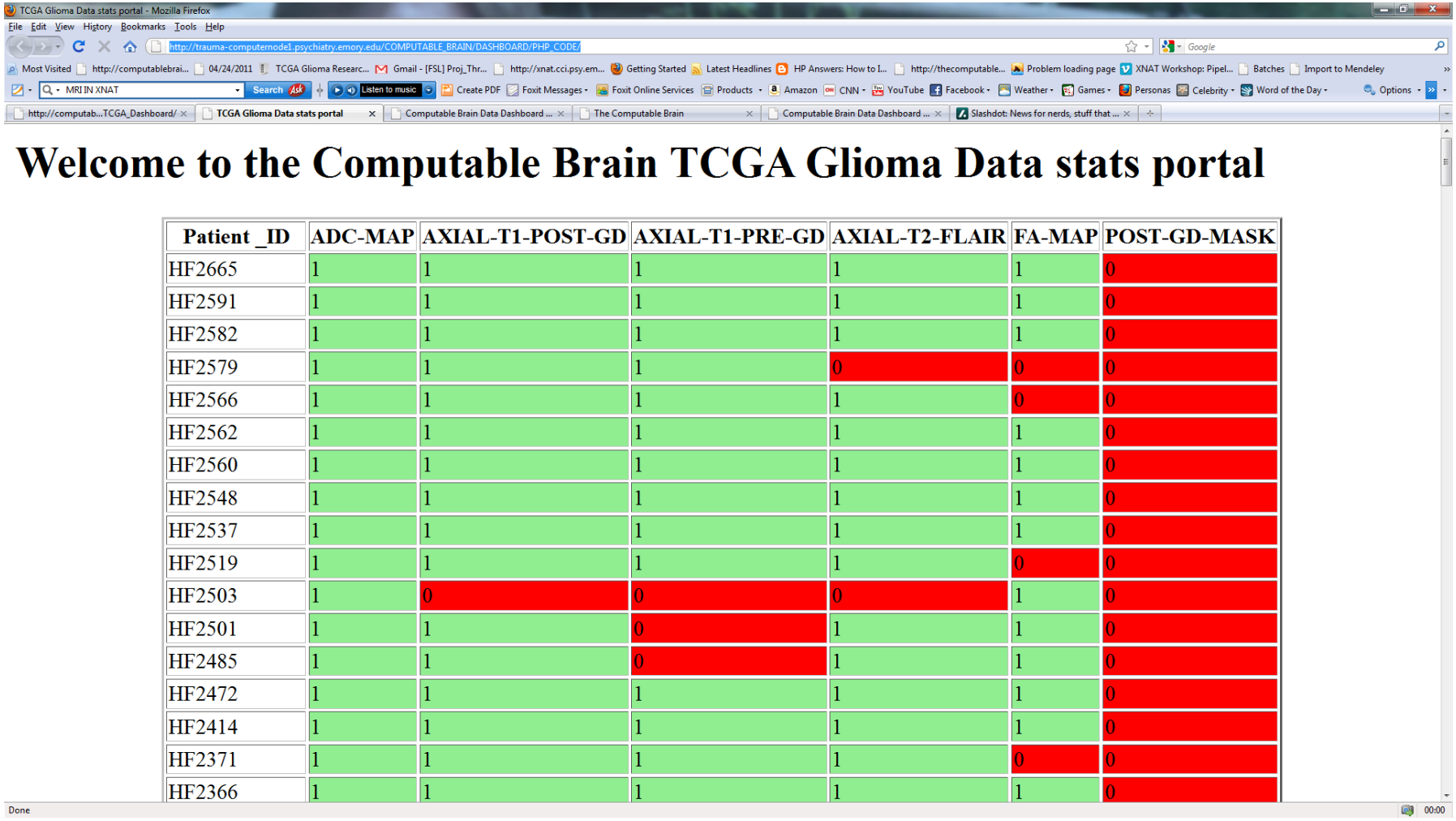


http://thecomputablebrain.com/DASHBOARD/DASHBOARD_IMAGES/

Can quickly view summary images of data belonging to a given image type (i.e. see all the images labeled AXIAL T1 PRE GD)

http://trauma-computernode1.psychiatry.emory.edu/COMPUTABLE_BRAIN/DASHBOARD/PHP_CODE/

Basic Portal helps me figure out which patients have which imaging data

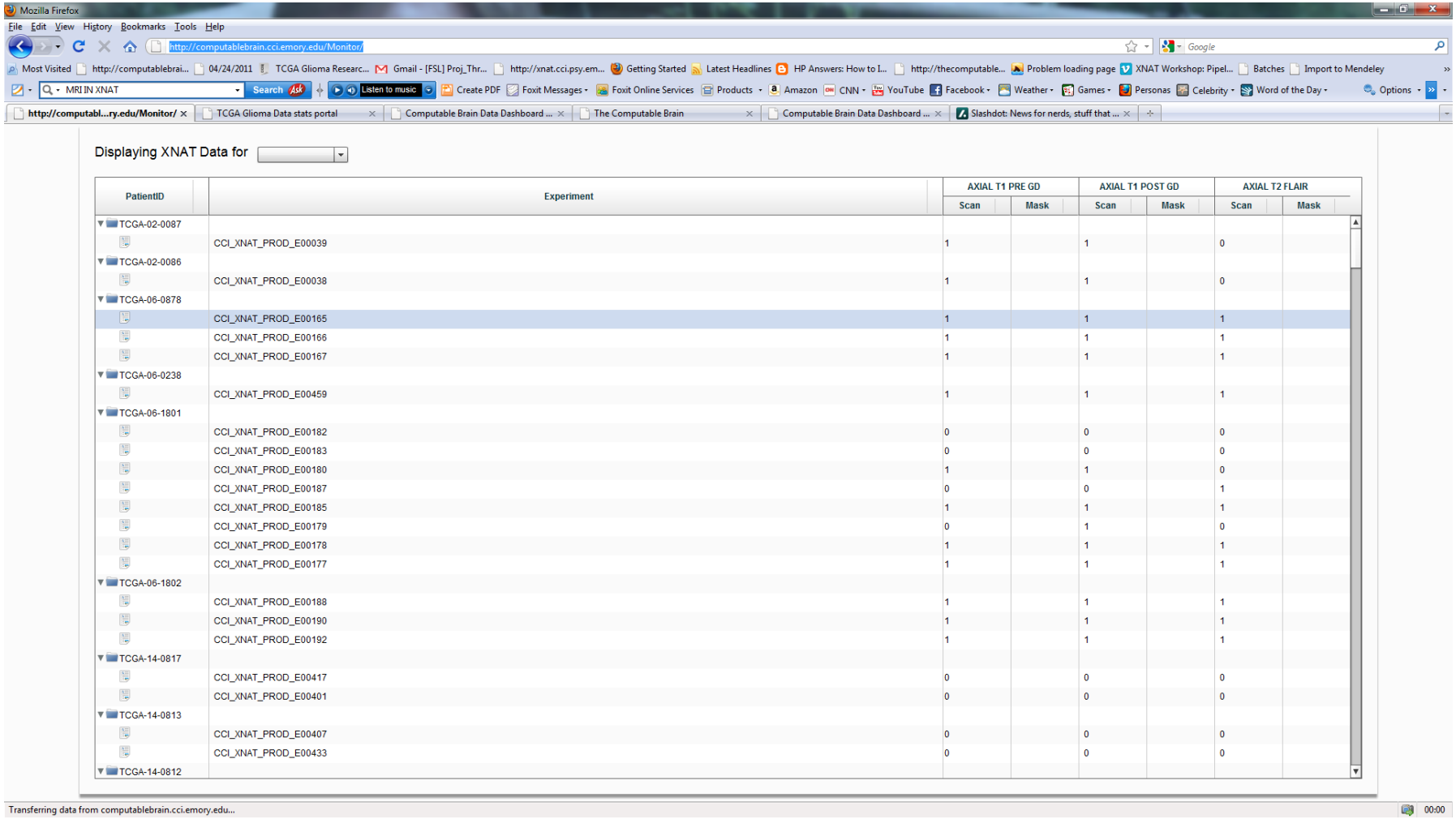


Welcome to the Computable Brain TCGA Glioma Data stats portal

Patient _ID	ADC-MAP	AXIAL-T1-POST-GD	AXIAL-T1-PRE-GD	AXIAL-T2-FLAIR	FA-MAP	POST-GD-MASK
HF2665	1	1	1	1	1	0
HF2591	1	1	1	1	1	0
HF2582	1	1	1	1	1	0
HF2579	1	1	1	0	0	0
HF2566	1	1	1	1	0	0
HF2562	1	1	1	1	1	0
HF2560	1	1	1	1	1	0
HF2548	1	1	1	1	1	0
HF2537	1	1	1	1	1	0
HF2519	1	1	1	1	0	0
HF2503	1	0	0	0	1	0
HF2501	1	1	0	1	1	0
HF2485	1	1	0	1	1	0
HF2472	1	1	1	1	1	0
HF2414	1	1	1	1	1	0
HF2371	1	1	1	1	0	0
HF2366	1	1	1	1	1	0

http://computablebrain.cci.emory.edu/Monitor/

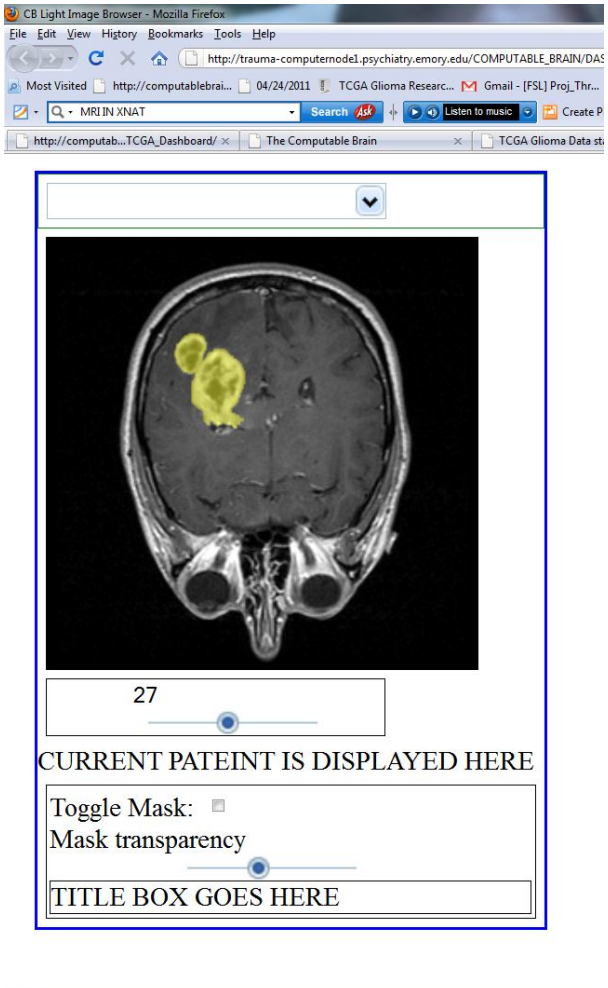
Previous version was static--- this one pulls data directly from local XNAT instance I have up and running

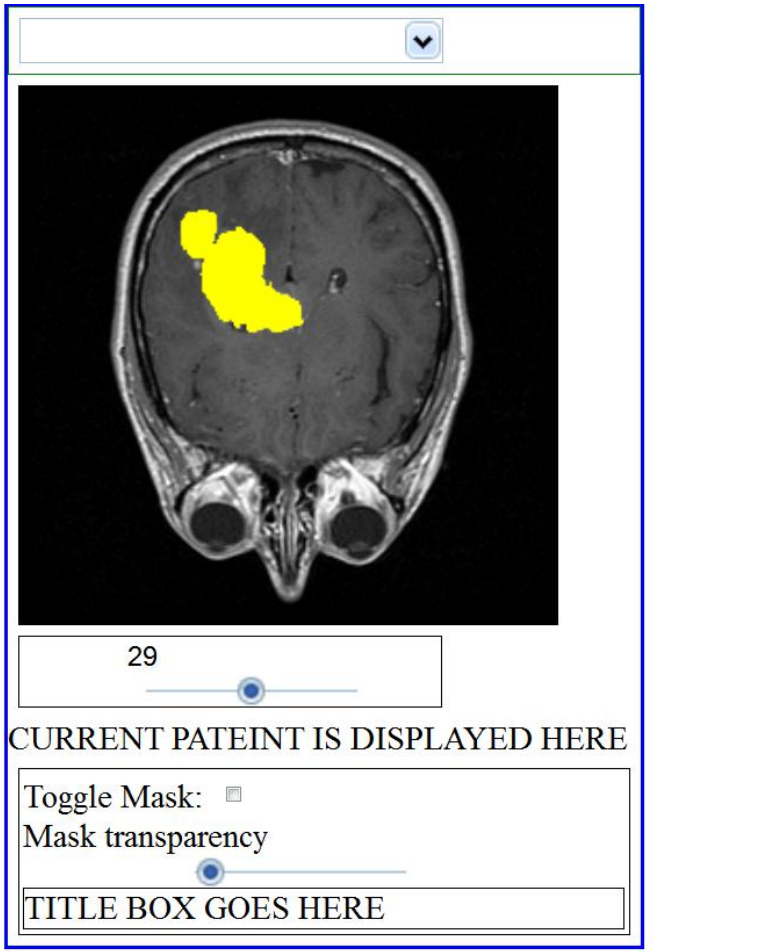


PatientID	Experiment	AXIAL T1 PRE GD		AXIAL T1 POST GD		AXIAL T2 FLAIR	
		Scan	Mask	Scan	Mask	Scan	Mask
TCGA-02-0087							
	CCI_XNAT_PROD_E00039	1		1		0	
TCGA-02-0086							
	CCI_XNAT_PROD_E00038	1		1		0	
TCGA-06-0878							
	CCI_XNAT_PROD_E00165	1		1		1	
	CCI_XNAT_PROD_E00166	1		1		1	
	CCI_XNAT_PROD_E00167	1		1		1	
TCGA-06-0238							
	CCI_XNAT_PROD_E00459	1		1		1	
TCGA-06-1801							
	CCI_XNAT_PROD_E00182	0		0		0	
	CCI_XNAT_PROD_E00183	0		0		0	
	CCI_XNAT_PROD_E00180	1		1		0	
	CCI_XNAT_PROD_E00187	0		0		1	
	CCI_XNAT_PROD_E00185	1		1		1	
	CCI_XNAT_PROD_E00179	0		1		0	
	CCI_XNAT_PROD_E00178	1		1		1	
	CCI_XNAT_PROD_E00177	1		1		1	
TCGA-06-1802							
	CCI_XNAT_PROD_E00188	1		1		1	
	CCI_XNAT_PROD_E00190	1		1		1	
	CCI_XNAT_PROD_E00192	1		1		1	
TCGA-14-0817							
	CCI_XNAT_PROD_E00417	0		0		0	
	CCI_XNAT_PROD_E00401	0		0		0	
TCGA-14-0813							
	CCI_XNAT_PROD_E00407	0		0		0	
	CCI_XNAT_PROD_E00433	0		0		0	
TCGA-14-0812							

Quick sanity check… part of workflow is to mask the tumor region--- below allows web based overlay of mask on base image (can adjust opacity so can see underlying structure as well)

http://trauma-computernode1.psychiatry.emory.edu/COMPUTABLE_BRAIN/DASHBOARD/PHP_CODE/PNG_DEPOT/cb_light_image_viewer.php

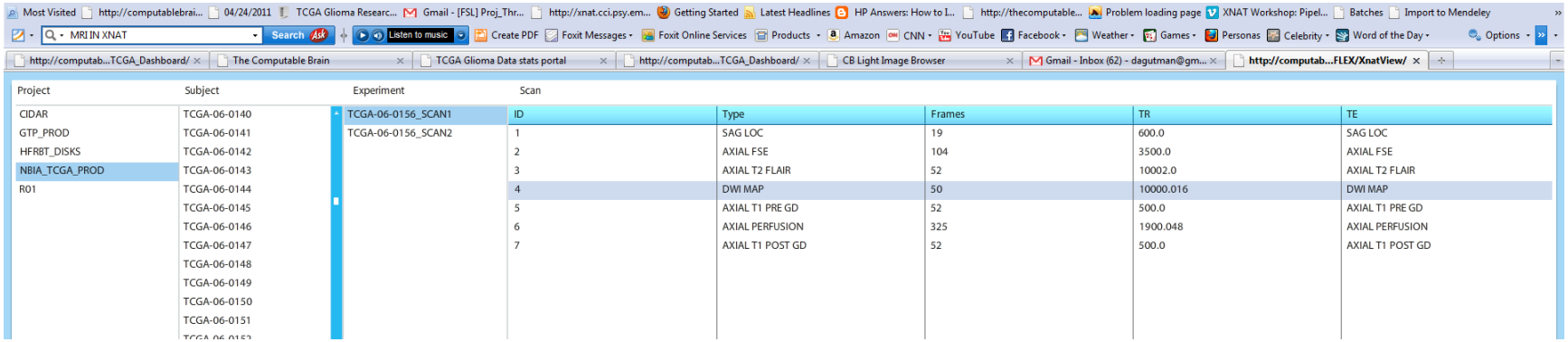




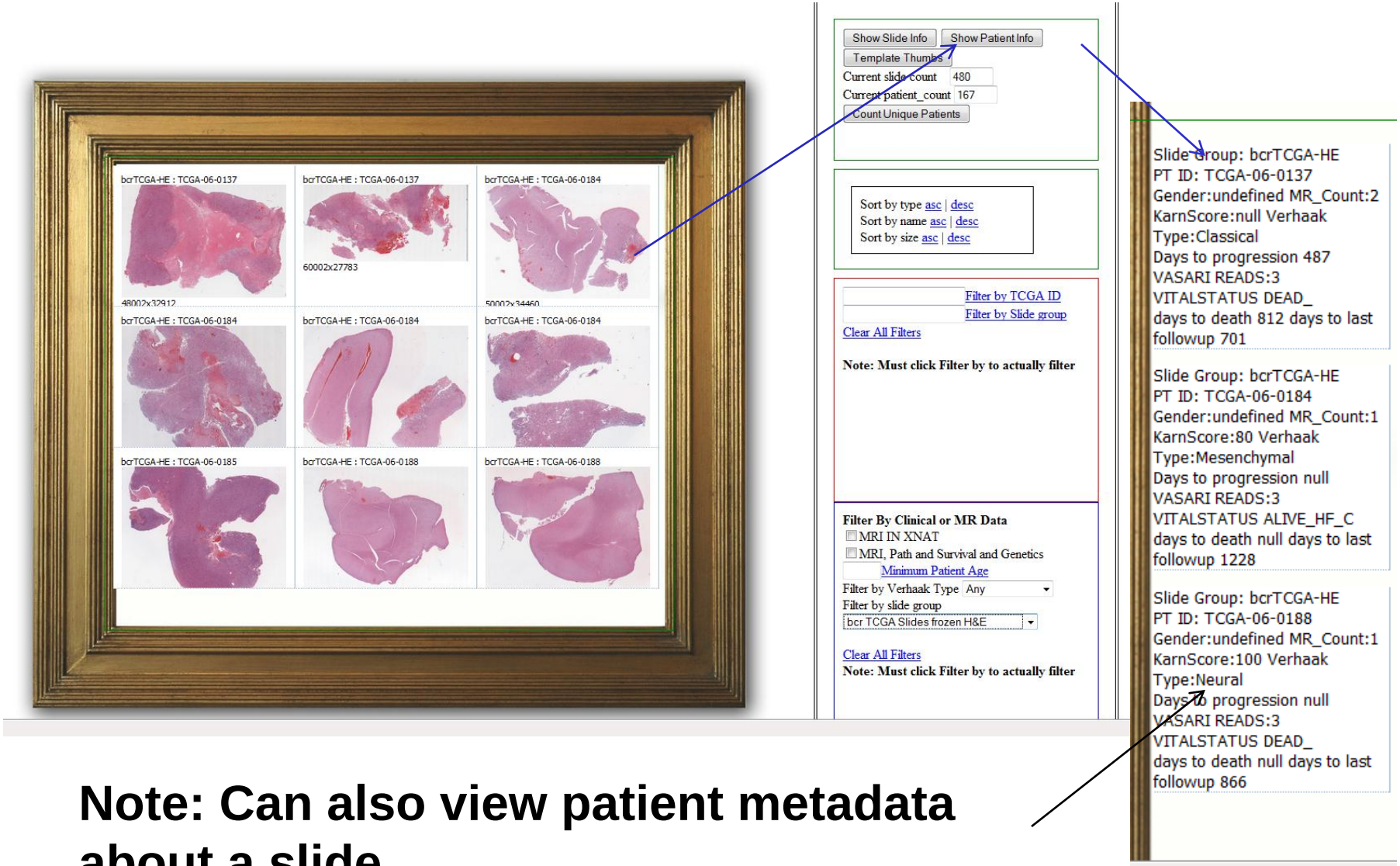
Want to visualize data based on Scan Tags..

http://computablebrain.cci.emory.edu/CB_FLEX/XnatView/

Can also see/view TR/TE/ other scan parameters to really find ideal data set; want to eventually integrate ability to see masks overlaid as well.. Can also pull data from other PACS if we wanted



http://thecomputablebrain.com/PATH_VIEWER/
Allows me to filter/find patients matching given criteria and with path



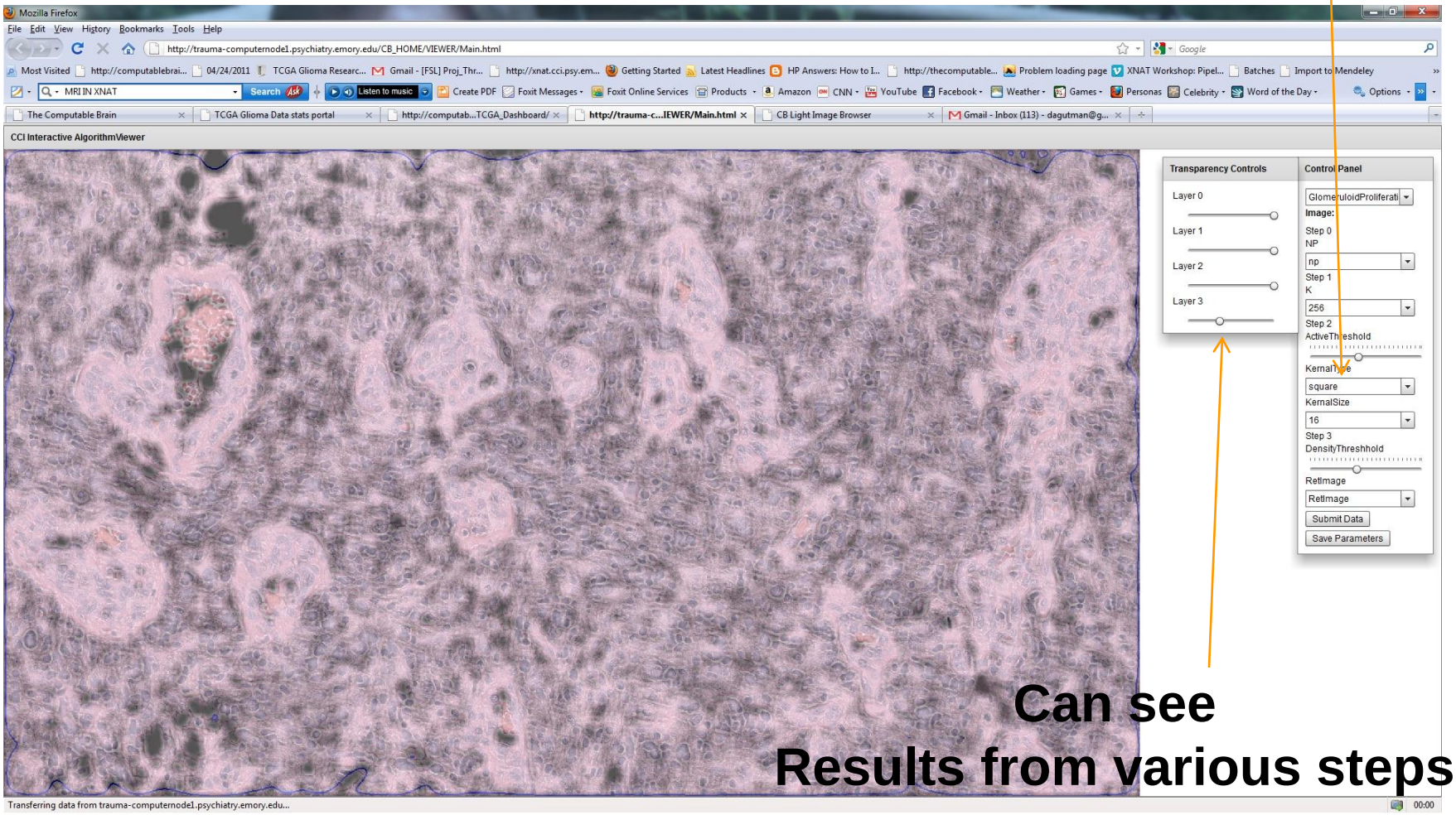
Note: Can also view patient metadata about a slide

Interactive Algorithm Runner, can run and tune multi-step algorithm

Note: This is particularly buggy

http://trauma-computernode1.psychiatry.emory.edu/CB_HOME/VIEWER/Main.html

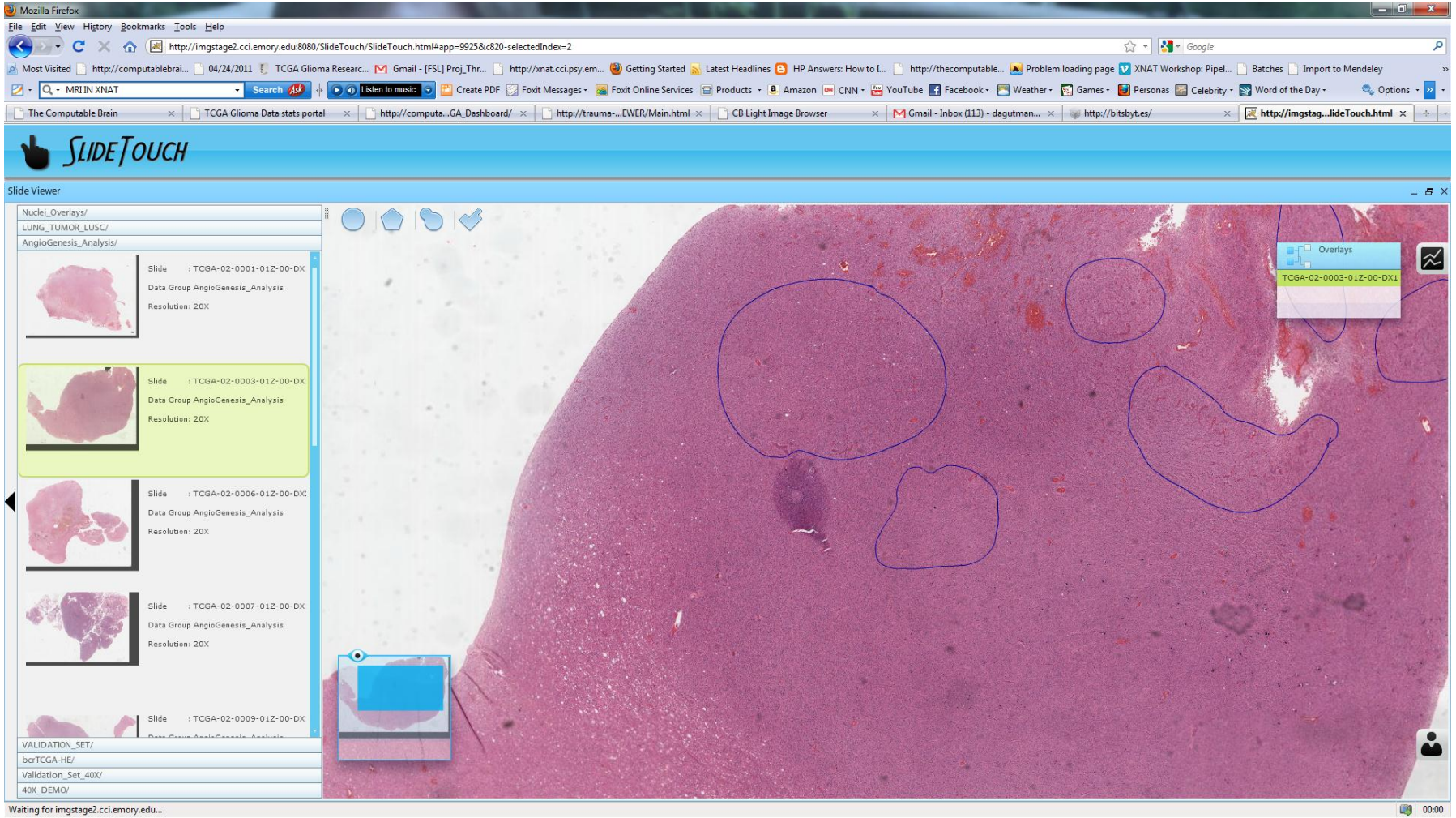
Select params



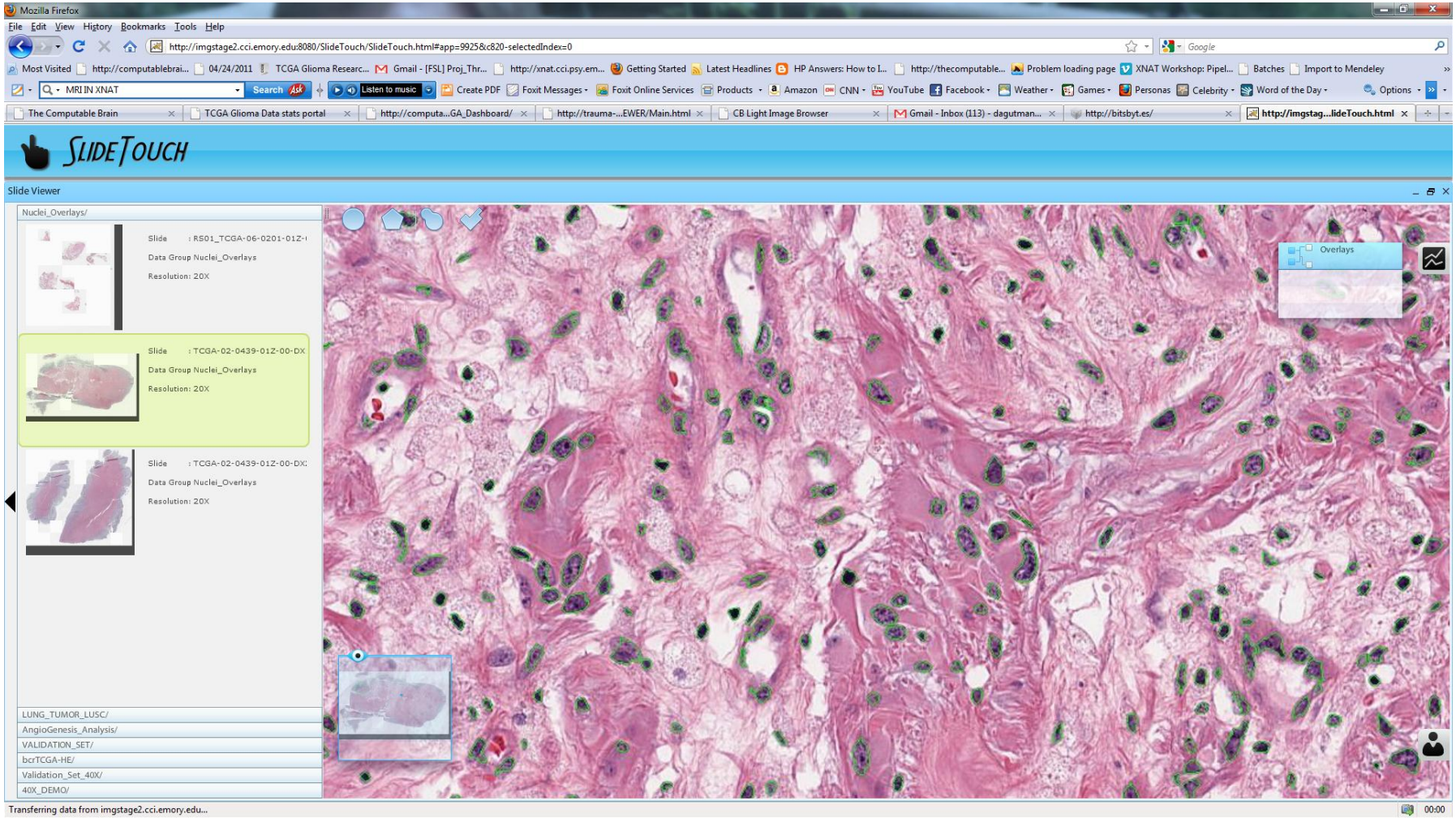
Can see Results from various steps

Whole Slide Viewing app showing ROI selected

http://imgstage2.cci.emory.edu:8080/SlideTouch/SlideTouch.html#app=9925&c820-selectedIndex=2



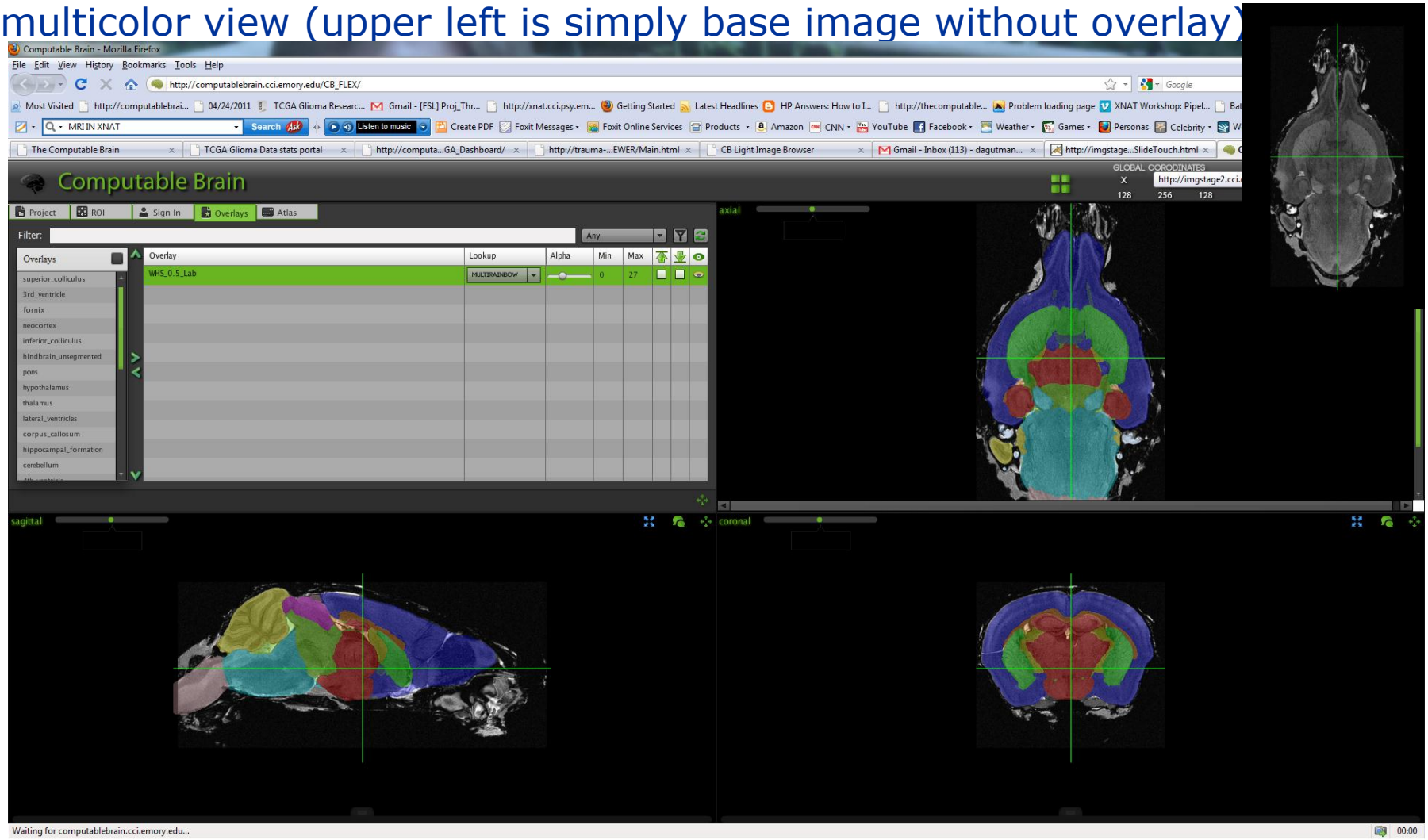
Can also visualize analysis results (nuclei circled in green)



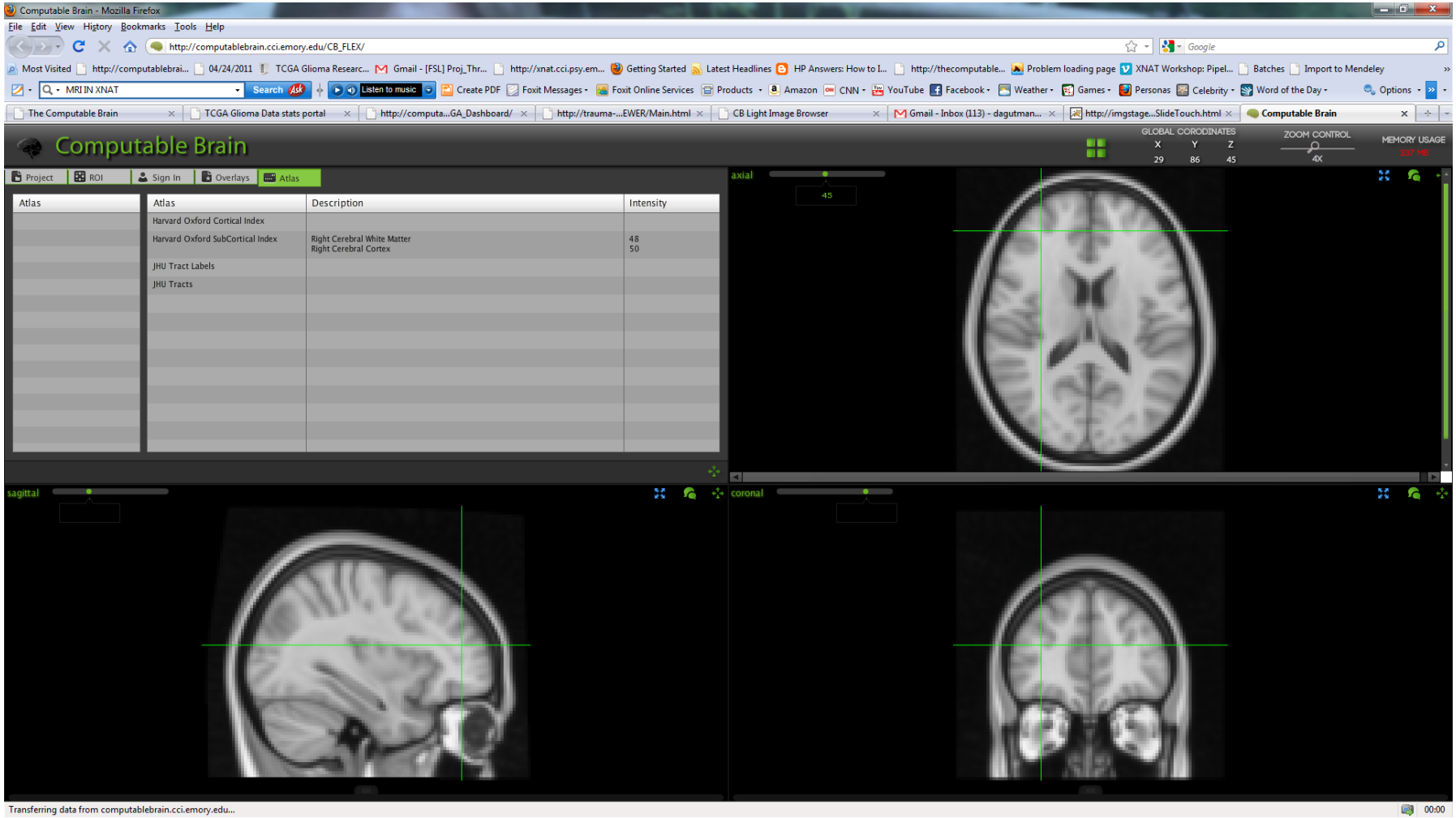
Other pet project: Computable Brain

Can store imaging results online, as well as overlays/processed intermediates/etc

Showing canonical mouse atlas with atlas based ROI's shown in multicolor view (upper left is simply base image without overlay)



Also supports atlas lookups--- so can register "my" data to a reference space and do lookups to help figure out what local anatomy I am looking at

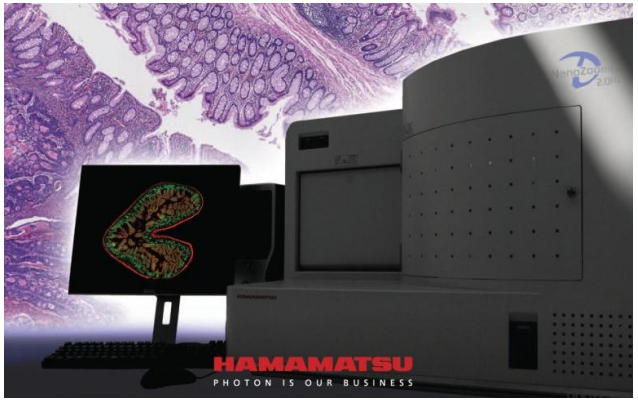


Other slides from presentation—

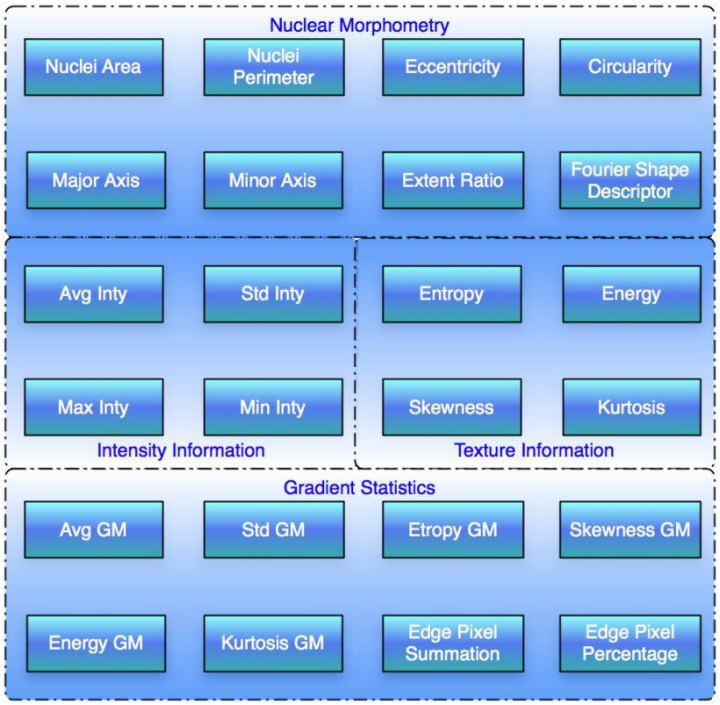
Basically our group is interested in human generated And computer generation annotations and using that For correlative analysis of outcome… as well as building Tools and pipelines to assist this process.

Morphological subtypes study: cellular features

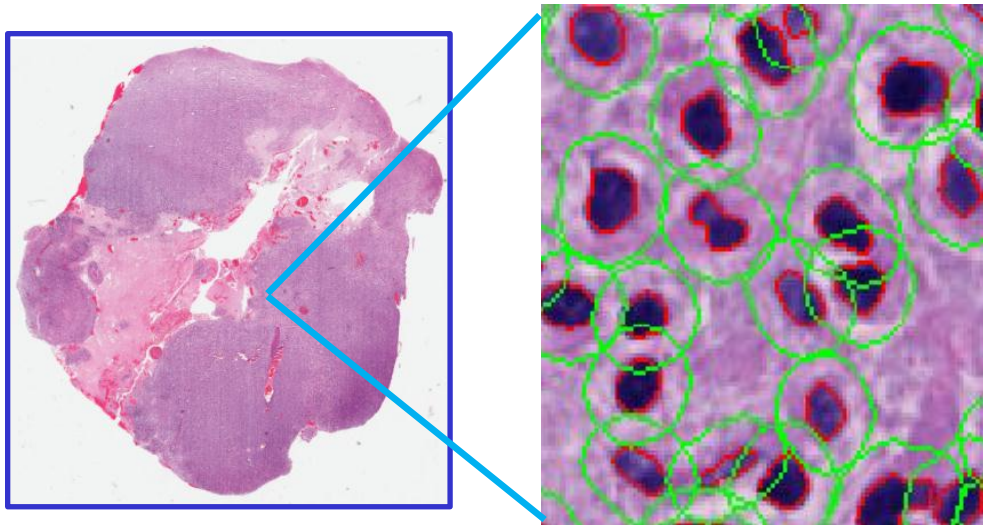
Whole Slide Imaging



Cellular Features



Nuclei Segmentation



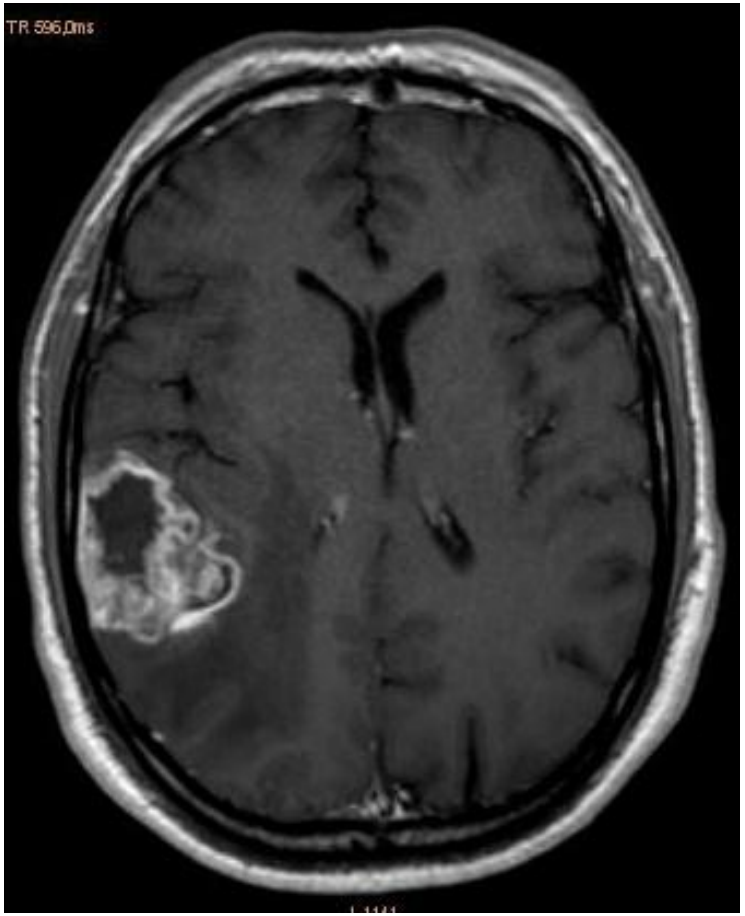
Jun Kong

Mechanisms Underlying Glioma Progression

Diagnostic Improvement

Molecular Classification

Predictors of Progression



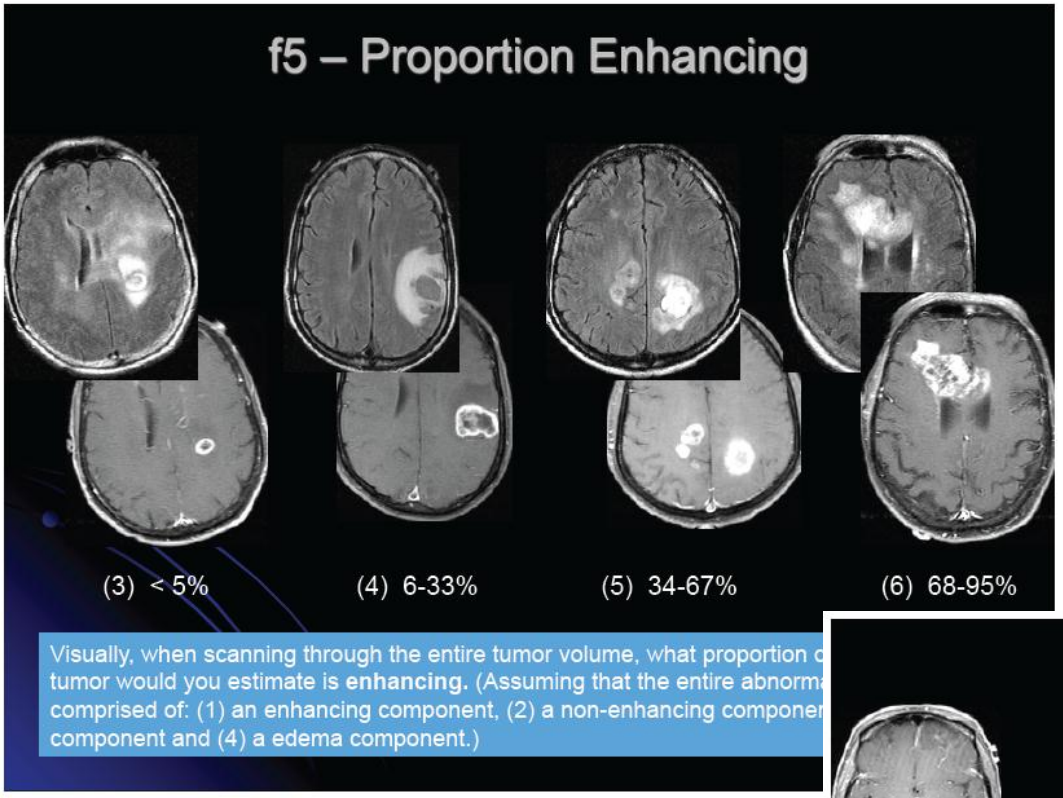
TCGA and REMBRANDT Datasets

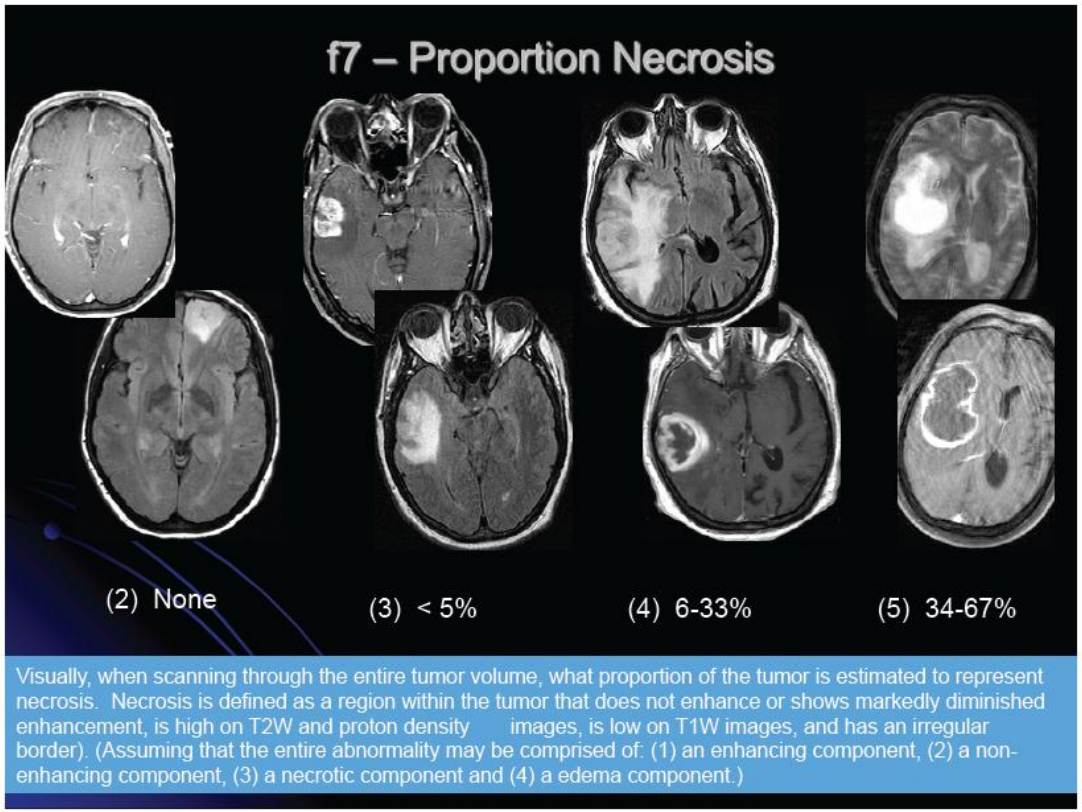
University/Project	Modality	# Patients	Total # of slides
TCGA Public Repository	20X Digital Slide	167	480
EMORY TCGA Cases	40X Digital Slide	52	195
Henry Ford TCGA Cases	40X Digital Slide	*,**70	198
Henry Ford REMBRANDT Cases	40X Digital Slides	**199	335
TJU Rembrandt Cases	40X Digital Slides	***63	230

*Some overlap with TCGA main repository but rescanned at 40X
** Data obtained by generosity of Lisa Scarpace/Tom Mikkelsen @ HF
***Thanks to Adam Flanders/Mark Curtis @ TJU

EMORY UNIVERSITY

VASARI Feature Set





Center for Compre

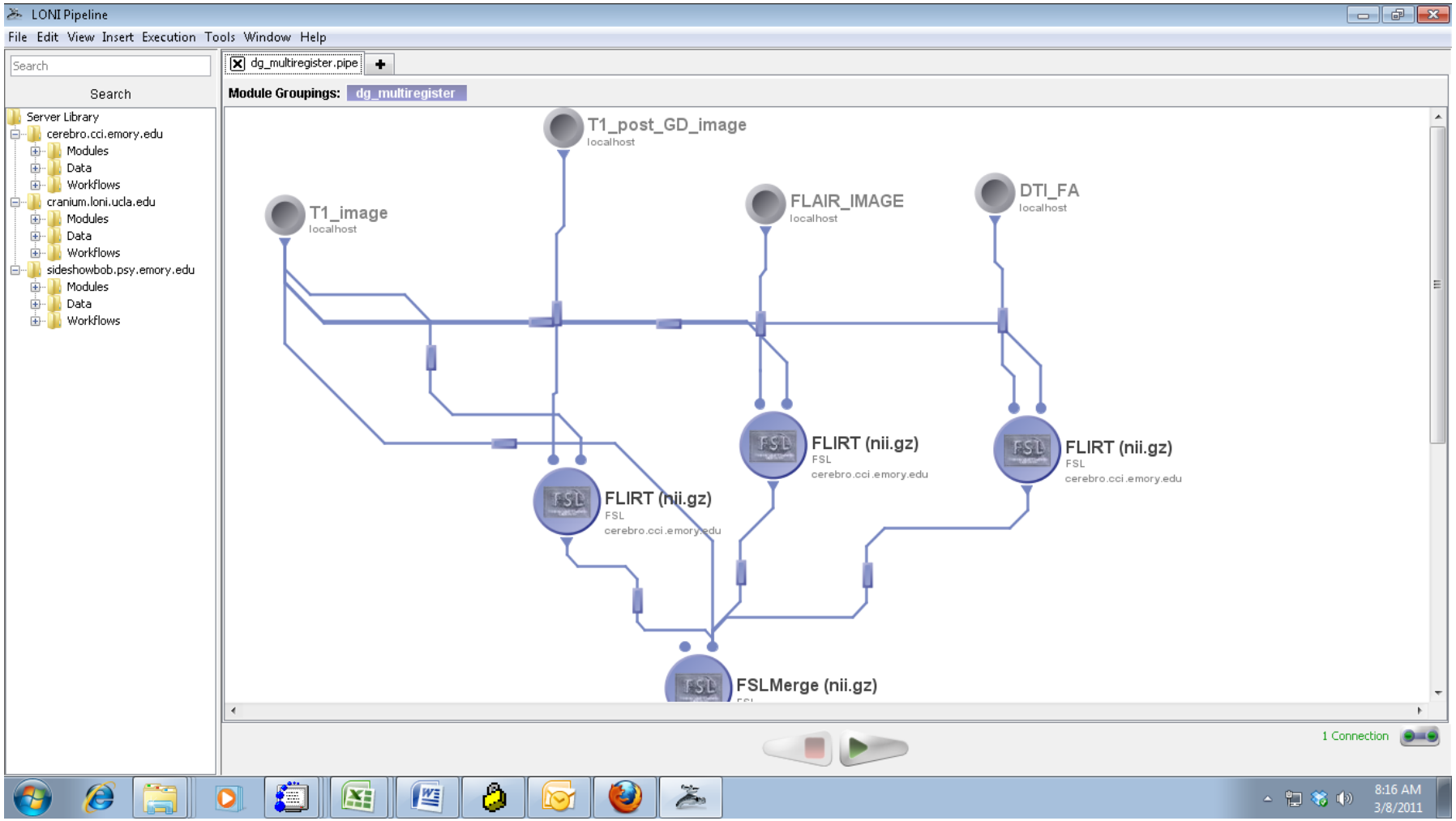
Chad Holder
Scott Hwang
Adam Flanders

Molecular and Pathologic Correlates of MR Features

MRI of 75 TCGA GBMs reviewed by 3 neuroradiologists using VASARI feature set

MR Features compared to TCGA Neuropathology Classes, Transcriptional Classes, Genetic Alterations

Automated feature extraction pipeline also being developed for MRI



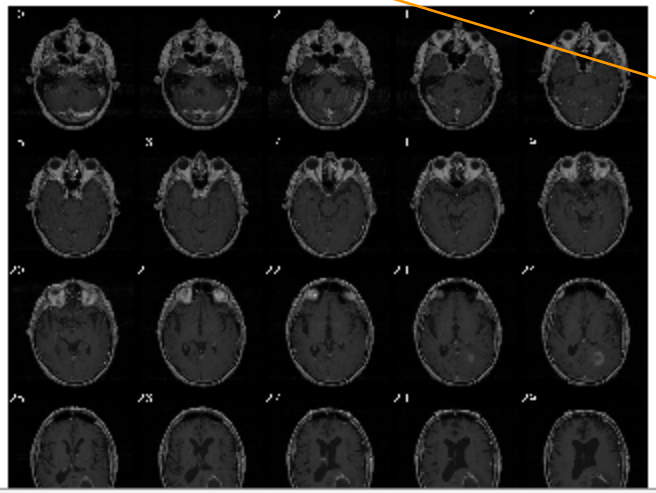
Notes:

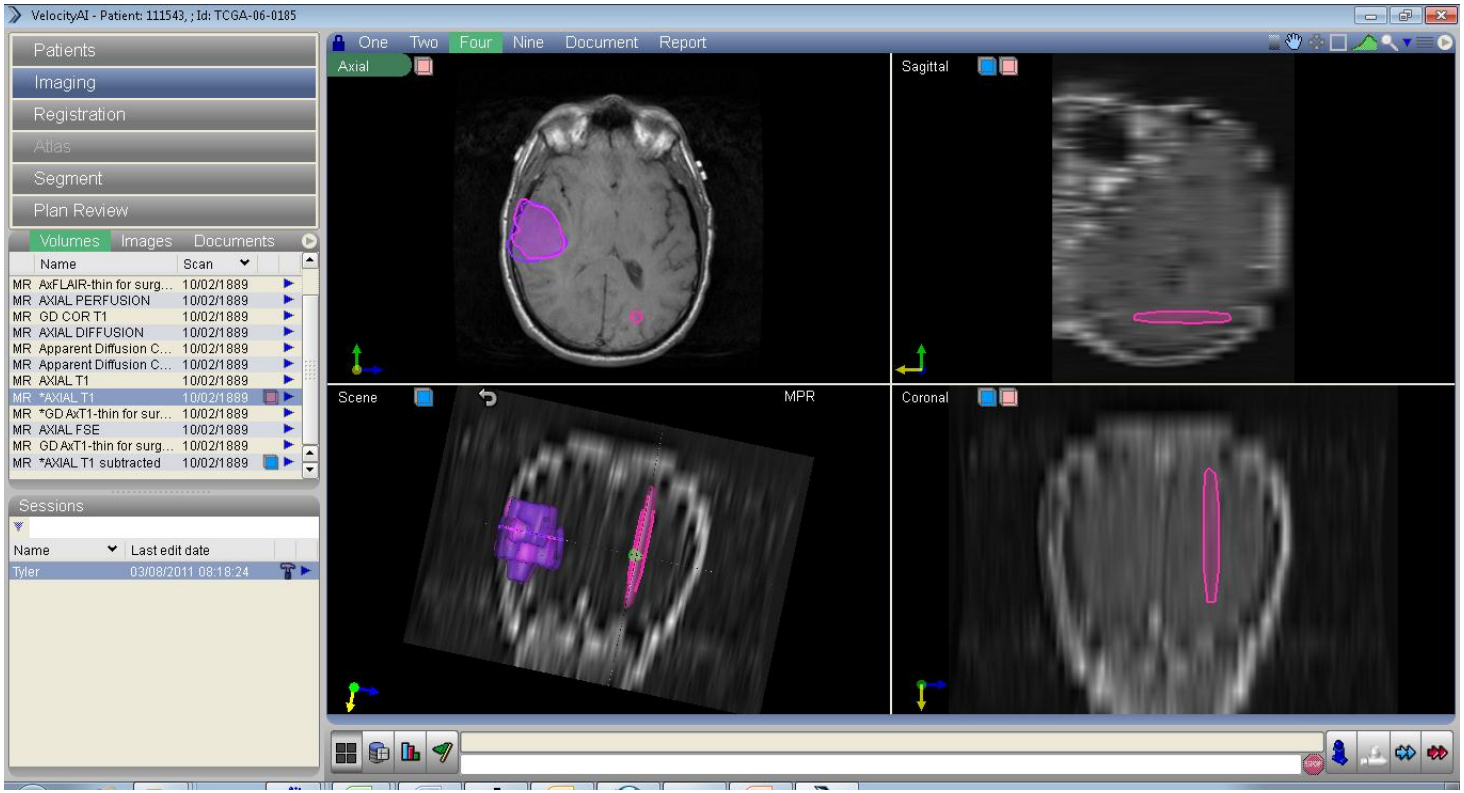
Basically the desciptions are often duplicated or nonsensical-- to parse this we need to manually tag the sequences from within a given MRI session

Scans

Scan	Type	Usability	Files	Note
⊞ 1	SAG LOCAL	usable	Show Counts	
⊞ 2	AXIAL FSE	usable	Show Counts	
⊞ 3	AXIAL T2 FLAIR	usable	Show Counts	
⊞ 4	DWI MAP	usable	Show Counts	
⊞ 5	AXIAL T1 PRE GD	usable	Show Counts	
⊞ 6	AXIAL GRE	usable	Show Counts	
⊞ 7	AXIAL T1 PRE GD	usable	Show Counts	
⊞ 8	NEW AXIAL PERFUSION/20S DELAY	usable	Show Counts	
⊟ 9	AXIAL T1 POST GD	usable	Show Counts	

Image




VelocityAI - Patient: 111543, ; Id: TCGA-06-0185
Patients
Imaging
Registration
Atlas
Segment
Plan Review
Volumes
Images
Documents
Name
Scan
MR AxFLAIR-thin for surg... 10/02/1889
MR AXIAL PERFUSION 10/02/1889
MR GD COR T1 10/02/1889
MR AXIAL DIFFUSION 10/02/1889
MR Apparent Diffusion C... 10/02/1889
MR Apparent Diffusion C... 10/02/1889
MR AXIAL T1 10/02/1889
MR *AXIAL T1 10/02/1889
MR *GD AxT1-thin for sur... 10/02/1889
MR AXIAL FSE 10/02/1889
MR GD AxT1-thin for surg... 10/02/1889
MR *AXIAL T1 subtracted 10/02/1889
Sessions
Name
Last edit date
Tyler 03/08/2011 08:18:24
One
Two
Four
Nine
Document
Report
Axial
Sagittal
Scene
MPR
Coronal