Containerizing Neural Network Apps for Medical Compute

Sprint 3

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Sprint 3 Goals

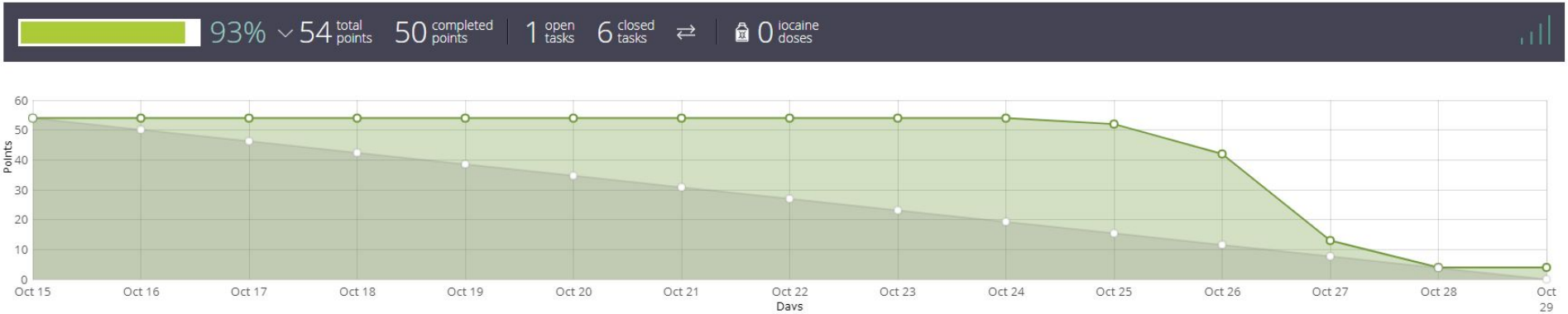
- Deploy Pman and Pfioh on MOC
- Test Pman and Pfioh using test scripts
- Work on developing the training pipeline
- Using pre-trained model for inference

Sprint 3 Accomplishments

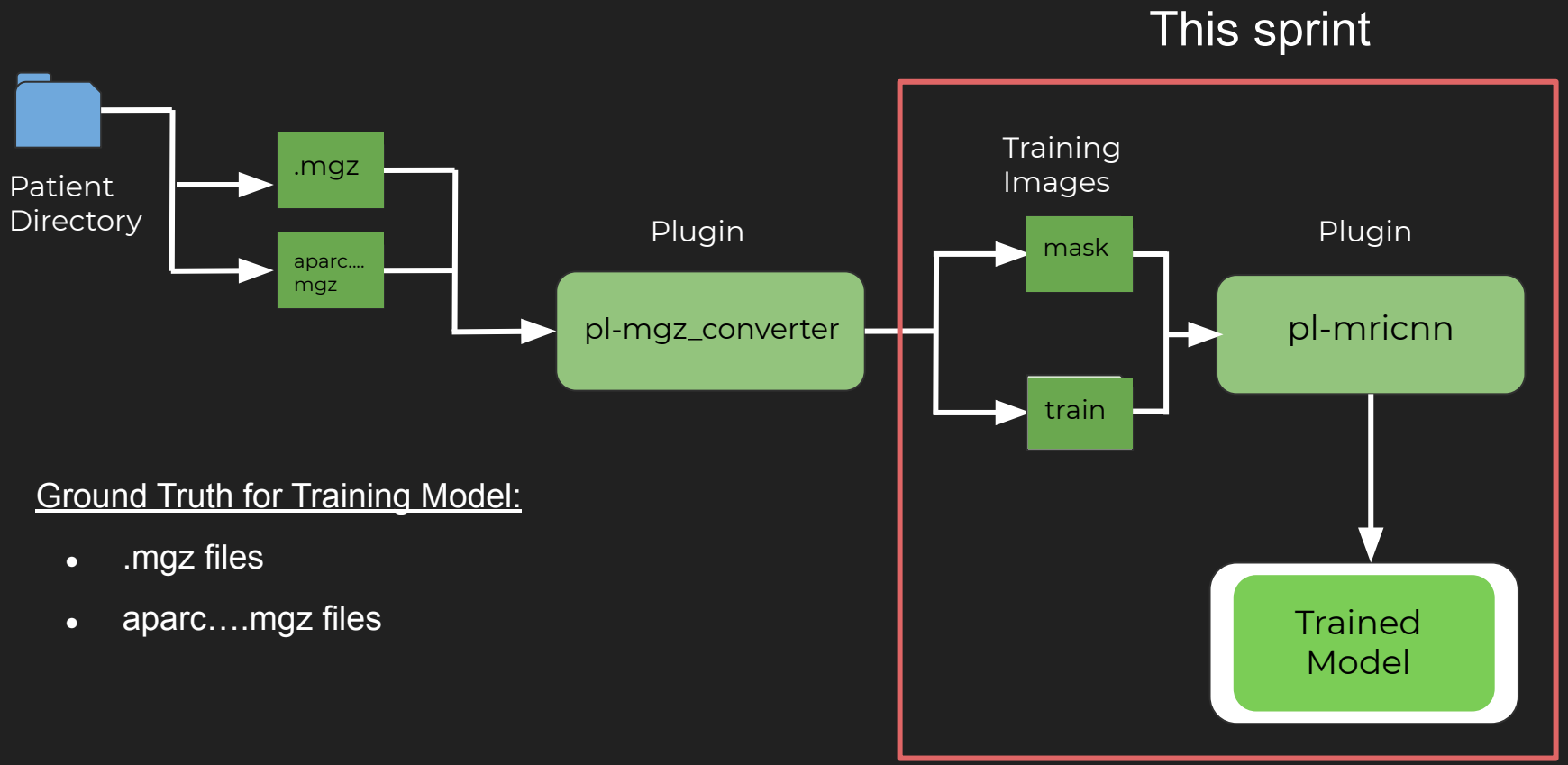
- Pman and Pfioh was deployed successfully
- Pman and Pfioh had trouble communicating with Swift Storage(will explain in further detail) so the testing with scripts are still being worked on
- Train model using large datasets
- Complete training workflow from mgz files to trained model
- Predict masks on brain images

Burn Down Chart

We had issues with Taiga like the other groups, we solved it halfway through sprint 3



Training Pipeline Revisited

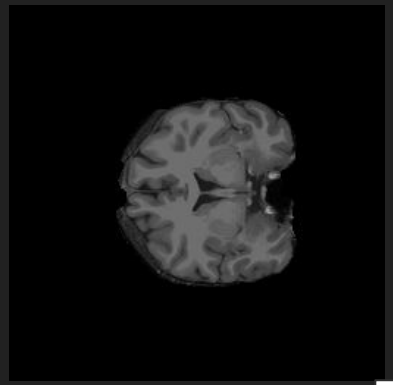


Ground Truth for Training Model:

- .mgz files
- aparc….mgz files

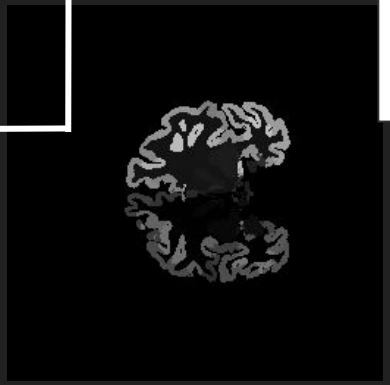
pl-mricnn Plugin

Input



Training Images (.png)

Masks (.png)



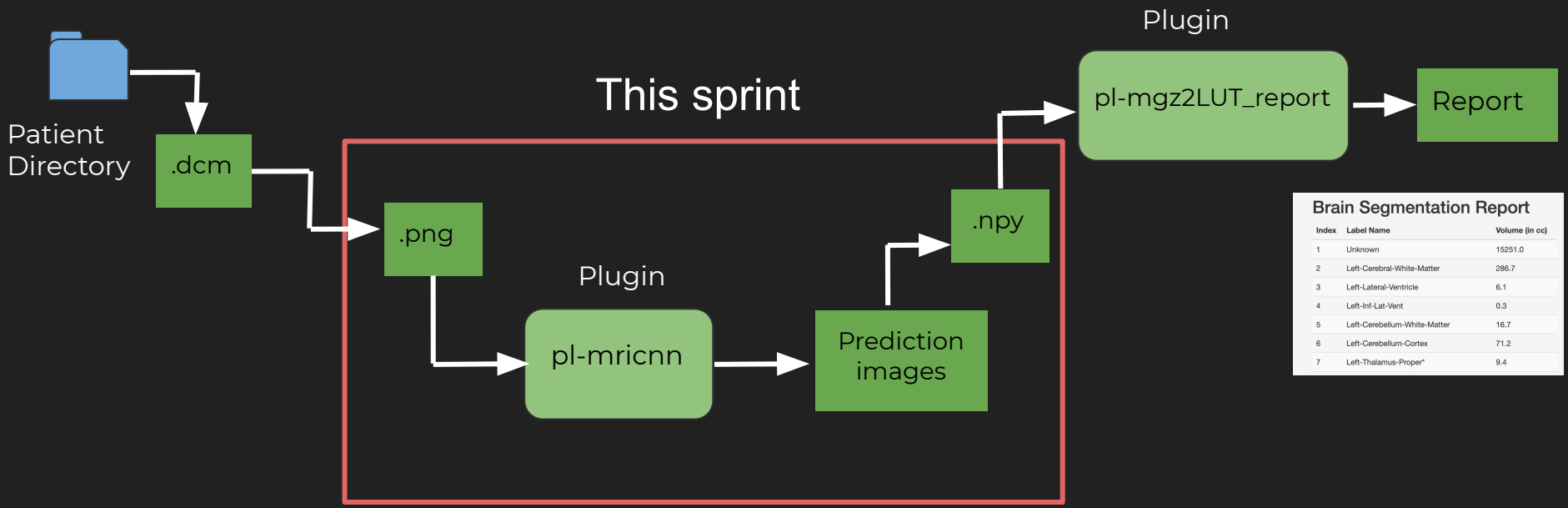
Neural Network

- Trains on low contrast brain images
- 3D-Dense Unet for Training
- Good dataset is 20-30 subjects with epoch of 50.

Output

3d-Dense-Unet.h5

Inference Pipeline Revisited

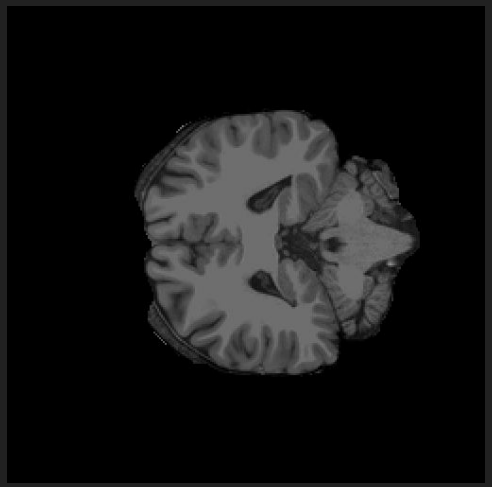


Brain Segmentation Report

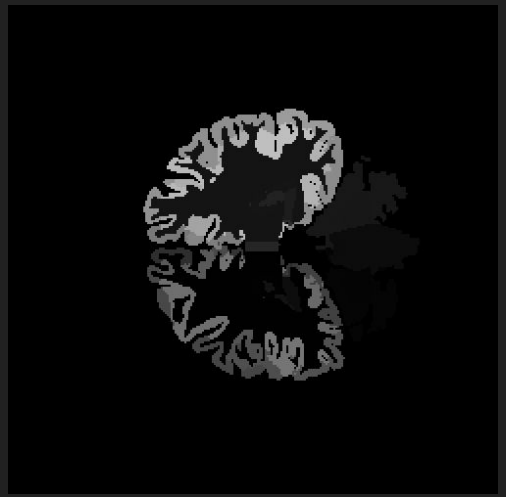
Index	Label Name	Volume (in cc)
1	Unknown	15251.0
2	Left-Cerebral-White-Matter	286.7
3	Left-Lateral-Ventricle	6.1
4	Left-Inf-Lat-Vent	0.3
5	Left-Cerebellum-White-Matter	16.7
6	Left-Cerebellum-Cortex	71.2
7	Left-Thalamus-Proper*	9.4

Results (Grayscale segmentation)

Original



Ground truth

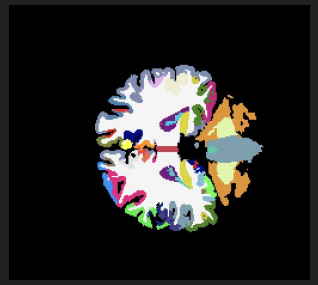


Prediction

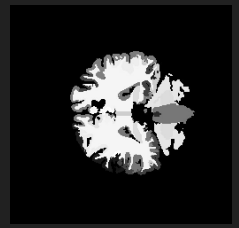
Results (RGB segmentation)

Ground truth

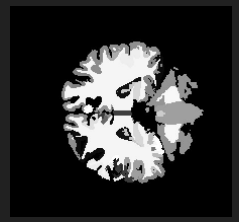
256 x 256 x 3



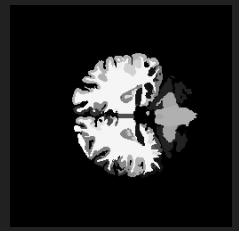
256 x 256



R

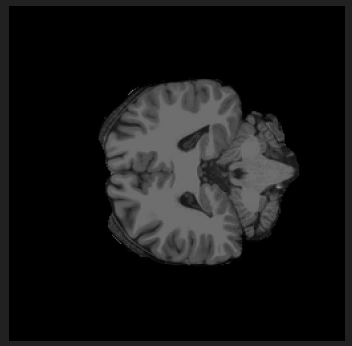


G



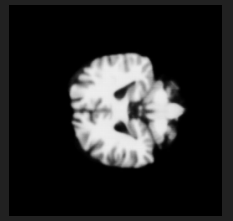
B

Original

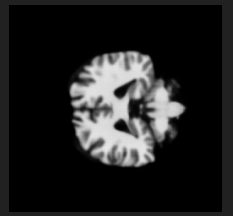


Prediction

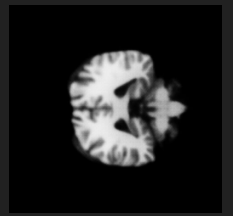
R



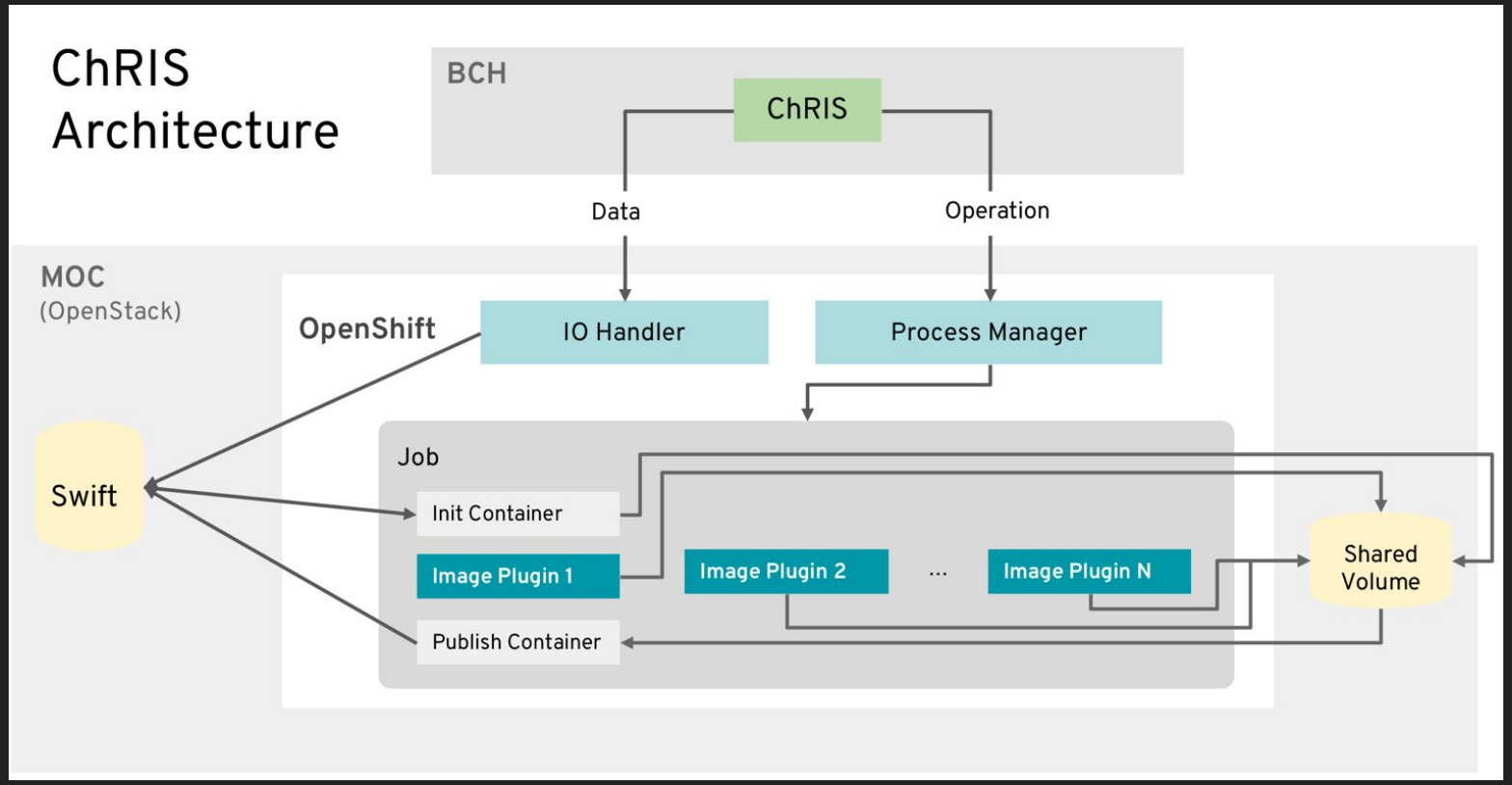
G



B



MOC Deployment Architecture



System Components

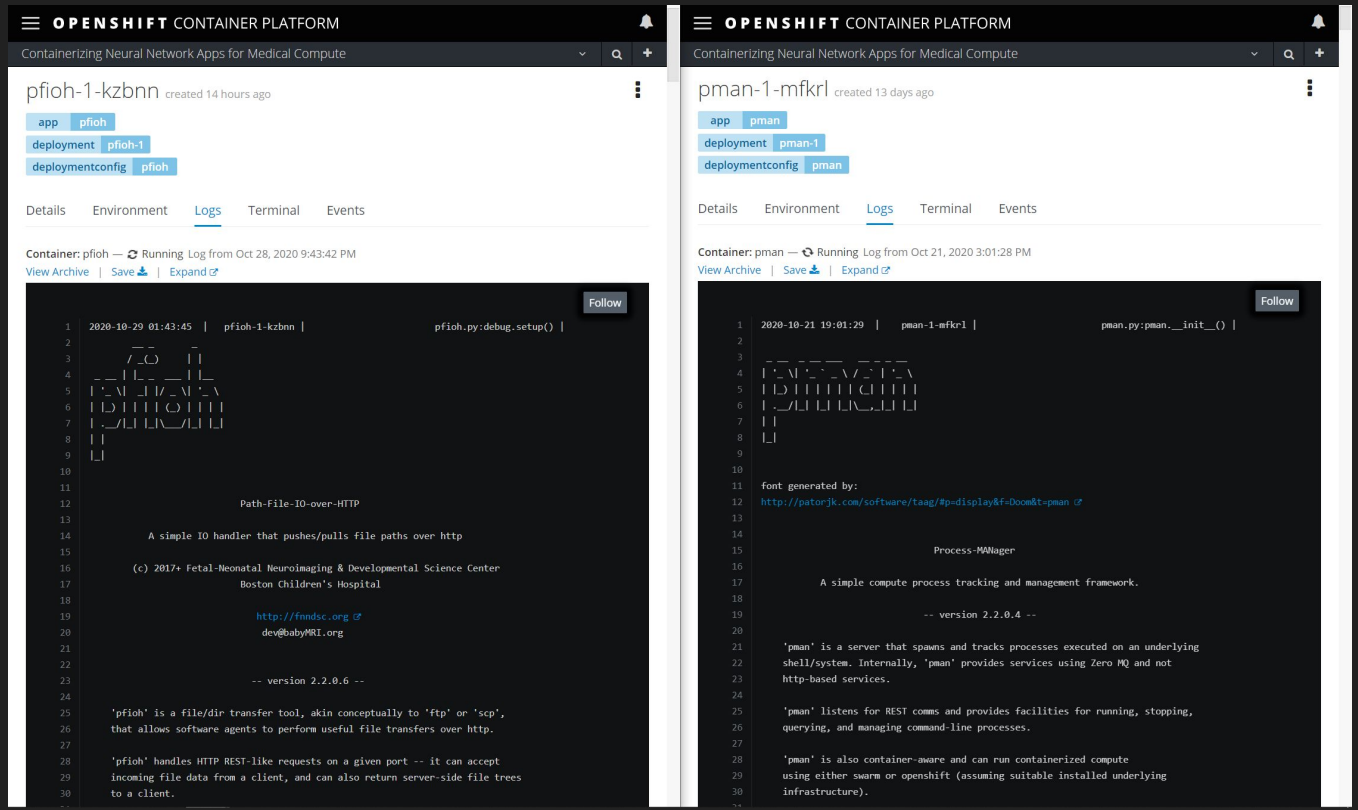
Pfioh is a service that pushes/pulls files and directories between different locations

Pman manages processes, i.e. programs or applications that are run by an underlying system. Typically, these processes are command line applications. Pman is used to execute programs via https

Pfurl is a wrapper about pycurl , its used to send http-based messages to remote services (typically pman and pfioh)

Swift is the object storage for openstack. You can store files, containers etc...

OpenShift Pods



Problems Connecting with Swift Object Storage

- We had authentication issues with swift while using pfioh and pman.

- Therefore we were not able deploy test pods onto openshift to demo the test scripts. This will be continued in next Sprint.

Next

- Segmented images to report
- Build classifiers for specific parts of brain
- Solve issues with Swift storage
- Deploy test pods to openshift using test scripts

Thank you!