Containerizing Neural Network Apps for Medical Compute

Sprint 2

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Clarifications From Last Presentation

What is Chris really:
ChRIS is a general-purpose, open source distributed data and computation platform

With that being said we showed a lot of Chris UI last demo but **Chris UI isn't our project**, only the interface that clinical users will be using. Our Project delves only with backend!

Sprint 1 Accomplishments Summary

1. Setting up Chris on our local computer to get familiar with its deployment

2. Understand the details of what a chris plugin is

3. Experiment with several existing ChRIS plugins

Sprint 2 Goals

1. Detail which plugins and what steps are taken to create both a training model and an inference model pipelines

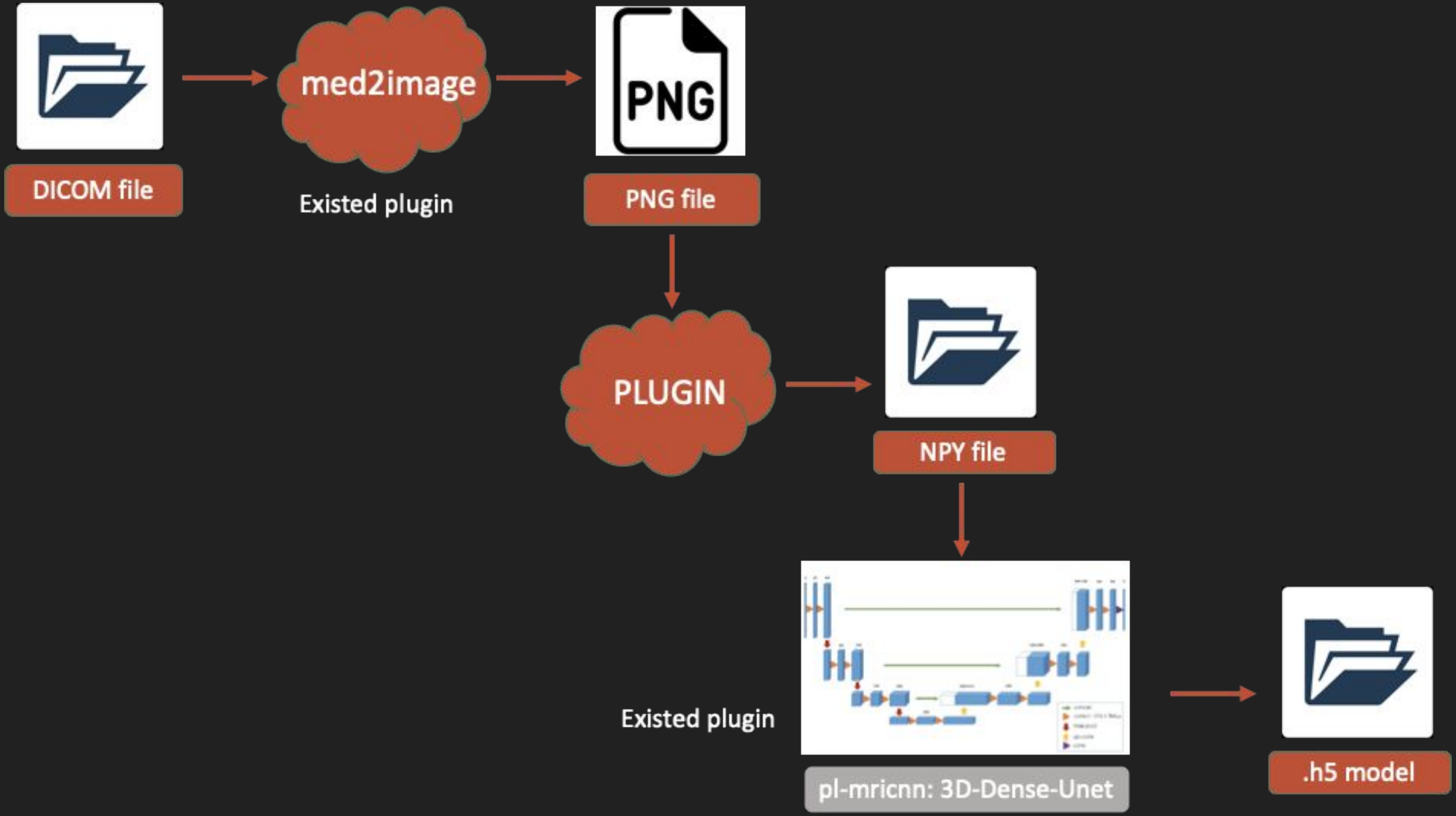
2. Detail the deployment of our Chris pipeline on MOC (assuming the pipelines to be finished)

3. Finally to start working on the pipelines and deployment

Plugins that we found useful:

1. Dicom converter: .dcm files -> .png/.jpg
2. U-Net (mricnn)
3. mgz-converter

Training pipeline -- One classifier that does everything



DICOM file

med2image

Existed plugin

PNG file

PLUGIN

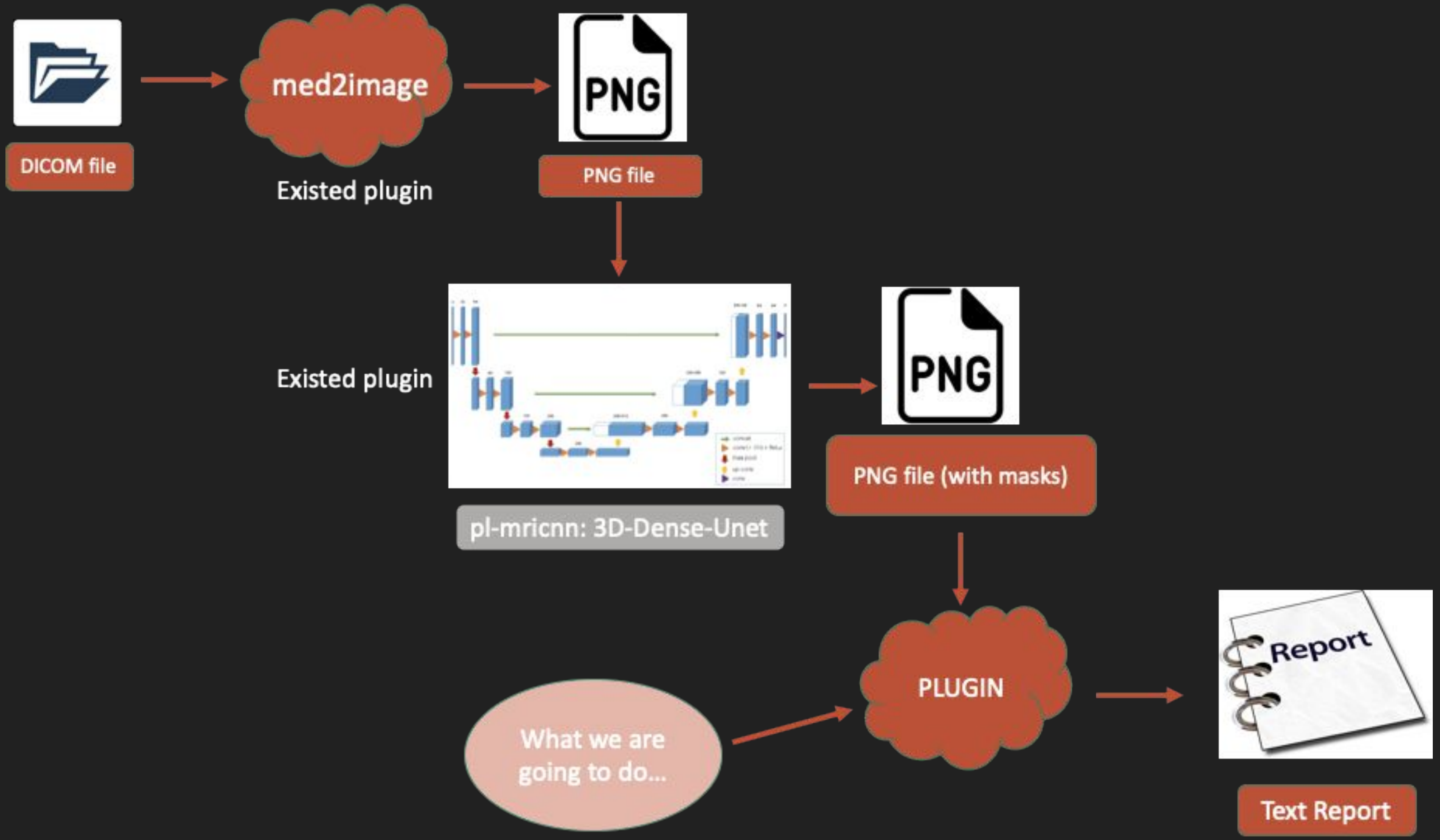
NPY file

Existed plugin

pl-mricnn: 3D-Dense-Unet

.h5 model

Inference Pipeline with One Classifier



DICOM file

med2image

Existed plugin

PNG

PNG file

Existed plugin

pl-mricnn: 3D-Dense-Unet

PNG

PNG file (with masks)

What we are going to do...

PLUGIN

Report

Text Report

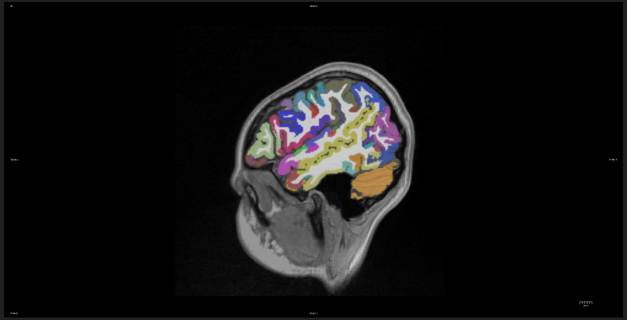
Inference Pipeline

DICOM directory → text report on volumes of brain structures

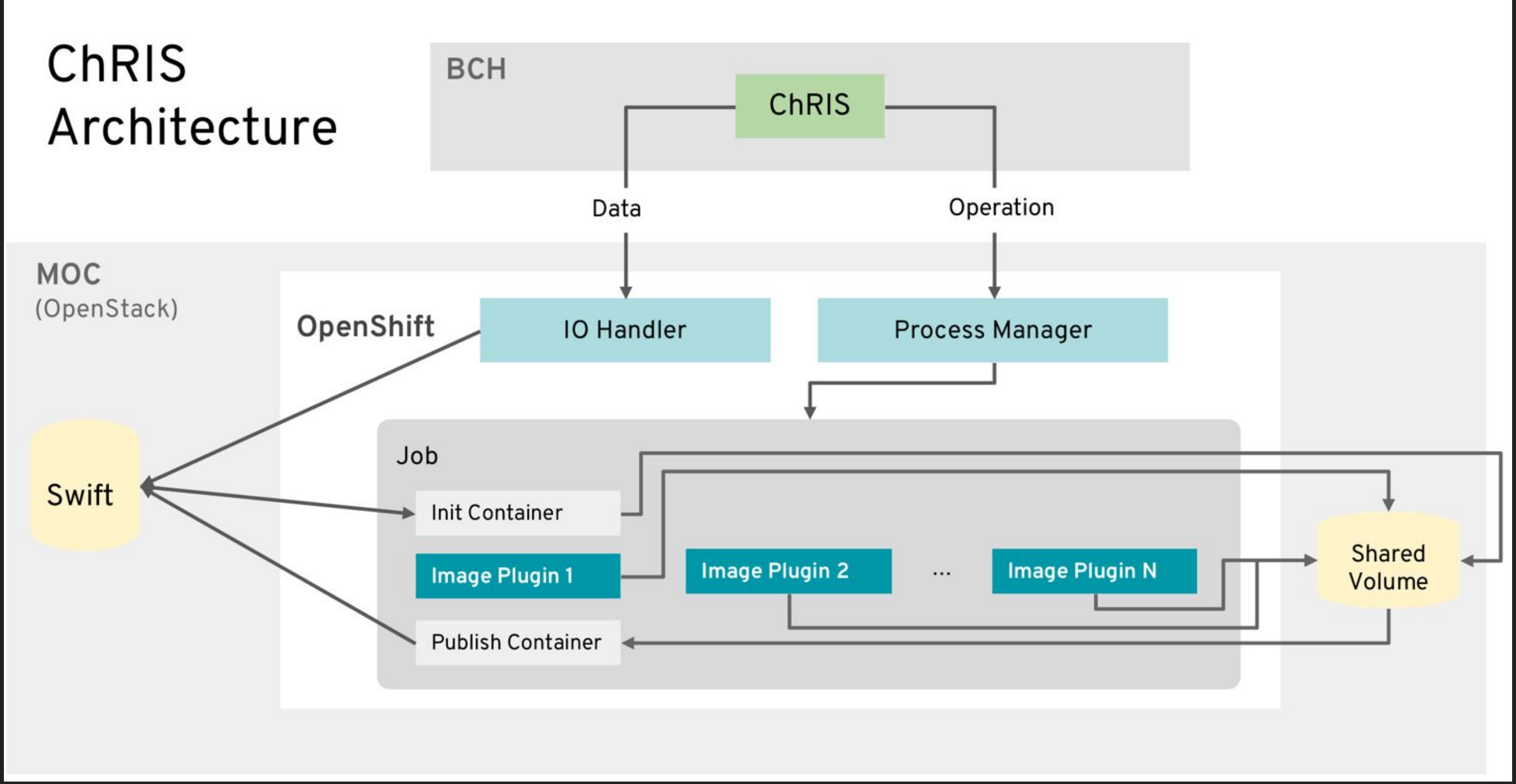
Step 1: Input: DICOM directory   Output: png files   Plugin: med2img

Step 2: png files into a classifier (only finds specific region) and output is segmented brain

Step 3: plugin that reads in png and outputs text report based on volume by voxels



Deployment on MOC



Steps We Have Taken So Far

Install OC Libraries on your system (Done)

Create Secrets in Openshift using CLI commands (Done)

Deploying Pfioh on MOC (Currently Working)

Deploying Pman on MOC (Currently Working)

Run a test plugin (Haven’t started Yet)

Pfioh - Input Output Handler

PMan - Process Manager

Difficulties and Uncertainties:

1. Data compatibility with the neural network

2. Acceptability of the prediction of 3D U-Net (need tests)

3. Conversion from segmented images to volume report (future task)

Next steps:

1. .png -> .npy (for training)
2. Train and predict on DICOM files using 3D U-Net
3. Test if the result of U-Net prediction is usable (for report generating)
4. Deploy Pman and Pfioh and run test scripts on MOC

Thanks!

Total Project Deliverables

2 working pipelines for two different types of classifiers (covered last demo).

2 Phases of Each Pipeline

Training :

Train models using two different types of classifiers (one classifier to identify multiple parts of the brain, the other to utilize multiple classifiers to identify specific parts of the brain)

Infererence

Use models to infer data about brain structure volume and output text report.

Have these pipelines work on MOC

Think about parallel working flow.