Deep Learning for Healthcare Image Analysis

This workshop teaches you to apply deep learning to radiology and medical imaging.The workshop starts with image segmentation which is a technique to classify each pixel into a specific class,followed by training a Convolutional neural networks (CNNs) to infer the volume of the left ventricle of the human heart from time-series MRI data and concludes by teaching techniques to use radiomics(imaging genomics) to identify the genomics of a disease.

Ideally, a student who enrolls in this course will have basic familiarity with deep neural networks, such as through the DLI Fundamentals of Computer Vision course or another online training program. Basic coding experience in python or a similar language is also useful.

Duration	8 hours
Price	$10000 for groups of up to 20 people (includes dedicated access during the course to a fully-configured GPU accelerated workstation in the cloud for each student)
Certification	Upon successful completion of this workshop, you will receive NVIDIA DLI Certification to prove subject matter competency and support professional career growth
Prerequisites	Basic familiarity with deep neural networks,Basic coding experience in python or a similar language
Languages	English, Japanese
Tools, Libraries, and Frameworks	Caffe, DIGITS, R, MXNet,TensorFlow
Collaborators	Mayo Clinic

Learning Objectives

At the conclusion of the workshop,you'll be able to apply CNNs to MRI scans and also learn how to:

- Perform image segmentation on MRI images to determine the location of the left ventricle
- Calculate ejection fractions by measuring differences between diastole and systole using CNNs applied to MRI scans to detect heart disease
- Apply CNNs to MRI scans of low-grade gliomas (LGGs) to determine 1p/19q chromosome co-deletion status

Why Deep Learning Institute Hands-on Training?

- Learn how to build deep learning and accelerated computing applications across a wide range of industry segments such as Autonomous Vehicles, Digital Content Creation, Finance, Game Development, and Healthcare
- Obtain guided hands-on experience using the most widely used, industry-standard software, tools, and frameworks
- Attain real-world expertise through content designed in collaboration with industry leaders such as the Children's Hospital of Los Angeles, Mayo Clinic, and PwC
- Earn NVIDIA DLI Certification to prove your subject matter competency and support professional career growth
- Access content anywhere, anytime with a fully configured GPU-accelerated workstation in the cloud

Content Outline

	Components	Description
Introduction (15 min)	• Welcome	Introductions, account creation, and troubleshooting
Image Segmentation (120 min)	• Extending Caffe with custom Python layers • Implementing the process of transfer learning • Creating fully convolutional neural networks from popular image classification networks	Learn the techniques for placing each pixel of an image into a specific class
Lunch (60 min)		
Image Analysis (120 min)	• Extend a canonical 2D CNN to more complex data • Use the framework MXNet through the standard Python API and through R • Process high-dimensionality imagery that may be volumetric and have a temporal component	Leverage Convolutional neural networks (CNNs) for medical image analysis to infer patient status from non-visible images. Train a CNN to infer the volume of the left ventricle of the human heart from time-series MRI data
Break (15 min)		
Image Classification with TensorFlow (120 min)	• Designing and training Convolutional Neural Networks (CNNs) • Using imaging genomics (radiomics) to create biomarkers that identify the genomics of a disease without the use of an invasive biopsy • Exploring the radiogenomics work being done at the Mayo Clinic •	Learn about the work being performed at the Mayo Clinic, using deep learning techniques to detect Radiomics from MRI imaging that has led to more effective treatments and better health outcomes for patients with brain tumors
Closing remarks (15 min)	• Wrap-up with the potential next steps and Q&A	A quick overview of the next -steps you could leverage to build and deploy your own applications and any Q&A