STRIDES CUSTOM COURSE SERIES

Introduction to Biomedical Data Science on Amazon Web Services

1 Day, Instructor-Led Virtual

In this one-day, virtual course, you'll learn how to use Amazon Web Services (AWS) tools and capabilities for healthcare and life sciences to process biomedical data at scale. This course includes guided, hands-on labs where you'll learn in live cloud environments.

This course is part of a series of custom courses that STRIDES, NIH's cloud adoption initiative, developed in partnership with commercial cloud service providers to meet the unique training needs of NIH's scientific community. To learn more about other custom trainings, visit the STRIDES Custom Course Series SharePoint folder.

Who Should Take This Course

This training is intended for biomedical computational researchers and research IT staff with some experience in the cloud.

What You'll Learn

Introduction to AWS Cloud Infrastructure
This topic will provide a quick refresher of the basic infrastructure that makes cloud computing work. It provides a brief overview of how data centers, EC2 instances, load balancers, and autoscaling work together to create the computational backbone that is cloud computing. This topic is the foundation for understanding the services you'll learn about in this course.

Have questions about this course? Contact the STRIDES team at STRIDES@nih.gov.

Developing Storage Solutions with Amazon S3

This topic will introduce you to the Amazon Simple Storage Service (Amazon S3) – AWS' fundamental service for storing data in the cloud. You'll learn how to upload data using S3 buckets, manage data access using S3 access points, and use tools for data compliance, security, and storage management.

Data Preparation with Amazon Athena

Once you've pooled your data together in an S3 bucket for storage, you may want to query that pooled data as if you were interacting with a traditional database. Amazon Athena is an interactive, serverless, query service that makes it easy to prepare unstructured data for import into a database. In this lab, you'll learn how to use Amazon Athena for data preparation, ingest, and initial structuring for a database.

Training and Evaluating a Model with SageMaker

This topic will demonstrate how to use Amazon SageMaker to build, train, and deploy a machine learning model. You'll build a predictive model using a breast cancer diagnostic data set to predict if a breast mass image indicates a benign or malignant tumor.

Suggested Prerequisites

We recommend that you complete these optional prerequisites before joining the course.

- Basic understanding of cloud computing

- Completion of AWS Technical Essentials or AWS Cloud Practitioner Essentials course *(please contact your IC Cloud Training POC to see if your IC offers this course)*

- Experience with Python & Jupyter Notebook

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STRIDES CUSTOM COURSE SERIES

Medical Imaging Suite and Image Machine Learning on Google Cloud

1 Day, Instructor-Led Virtual

In this one-day, virtual course, you'll learn how to use Google Cloud Medical Imaging Suite, AI-powered tools, and various cloud-based applications to process images and perform advanced image analysis. This course includes guided, hands-on labs where you'll learn directly in a cloud environment and use Imaging Data Commons (IDC) data.

This course is part of a series of custom courses that STRIDES, NIH's cloud adoption initiative, developed in partnership with commercial cloud service providers to meet the unique training needs of NIH's scientific community. To learn more about other custom trainings, visit the STRIDES Custom Course Series SharePoint folder.

Who Should Take This Course

This training is intended for biomedical computational researchers and research IT staff who work with imaging systems such as cameras, microscopes, MRI, CT, and ultrasound.

What You'll Learn

Getting Started with Google Cloud

This topic will introduce you to the Google Cloud environment, including the console, Cloud Shell, and Cloud Shell Editor. You'll learn about the Cloud SDK, a set of tools for interacting with Google Cloud products and services, and Google Cloud Skills Boost (Qwiklabs), a

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Google Cloud learning environment. Additionally, this topic will provide a high-level overview of artificial intelligence, machine learning, and how to run Jupyter Notebook.

Introducing Google Cloud Medical Imaging Suite and Jupyter Desktop

This topic will introduce you to Google Cloud Medical Imaging Suite and its components in Google Cloud. This topic will demonstrate how to:

- Use the Jupyter Desktop environment to run 3DSlicer and OHIF Viewer
- Use 3DSlicer, OHIF Viewer, MONAI Label, BigQuery, Looker and Healthcare API to load, annotate, visualize, classify, and segment images
- Upload images from Google Cloud Storage into Google Cloud's Digital Imaging and Communications in Medicine (DICOM) store

Introducing Google Cloud Medical Imaging Suite (Continued)

In this lab you'll enable Healthcare API and DICOM API, install the tools needed to use Google Cloud MIS, and ingest a chest X-ray image into the MIS.

Ingesting Image Data to Google Cloud Medical Imaging Suite

In this lab you'll:

- Load images for pneumonia from Imaging Data Commons into the MIS using 3DSlicer in Jupyter Desktop
- Use OHIF Viewer to inspect DICOM images
- Export the DICOM metadata to BigQuery
- Use MONAI Label to annotate the DICOM images
- Build a segmentation view in BigQuery and a custom dashboard in Looker to monitor when segmentations are created
- Use OHIF Viewer to inspect annotations

Introducing Image Machine Learning and Convolutional Neural Networks Models

This topic will introduce you to artificial intelligence and image machine learning using Convolutional Neural Networks models. This topic will provide an overview of layers, neural networks, convolutional filters, and model training.

Have questions about this course? Contact the STRIDES team at STRIDES@nih.gov.

Training an Image Machine Learning Model in Google Cloud AutoML on Vertex AI

Machine learning models use training data to learn how to infer results for data that the model was not trained on. Google Cloud [AutoML](#) on Vertex AI lets you build a code-free model based on the training data that you provide. In this lab, you'll train a Vertex AI Vision AutoML Machine Learning model using labeled images to predict pneumonia.

Suggested Prerequisites

We recommend that you complete these optional prerequisites before joining the course.

- Experience working with medical imaging data

- Basic understanding of cloud computing

- Basic understanding of machine learning or read [Magician's Corner: How to Start Learning about Deep Learning](#) and [Magician's Corner: 2. Optimizing a Simple Image Classifier](#)

- Familiarity with Google Cloud or watch [this 6-minute video](#)

Have questions about this course? Contact the STRIDES team at STRIDES@nih.gov.