

**Data Science and Image Processing for Healthcare**

**Course Number:** PYTH-152
**Duration:** 3 days

**Overview**

This live, online Data Science and Image Processing for Healthcare training course teaches attendees how data science is used to extract innovative and actionable insights from healthcare-related datasets and medical imaging. Participants learn how predictive modeling is used to assess outcomes, needs, and potential interventions. This class also explores medical image analysis which has become an inherent part of medical technology.

**Prerequisites**

Students must know basic Python programming.

**Materials**

All Data Science and Image Processing for Healthcare training students will receive comprehensive courseware.

**Software Needed on Each Student PC**

* Any Windows, Linux, or macOS operating system
* Python 3.x installed (Anaconda bundle recommended)
* An IDE with Python support (Jupyter Notebook, Spyder, or PyCharm Community Edition)

**Objectives**

* Install Anaconda on a personal computer
* Prepare and explore healthcare-related datasets using the primary tools for data science in Python, including NumPy, Pandas, Matplotlib, and Scikit-learn
* Examine many of the unique qualities and challenges of healthcare data
* Understand how data science is impacting medical diagnosis, prognosis, and treatment
* Use a data science approach to evaluate and learn from healthcare data, such as behavioral, genomic, and pharmacological
* Use deep learning and TensorFlow to interpret and classify medical images
* Perform feature extraction, segmentation, and quantitative measurements of medical images
* Understand the increasing importance of data science and image processing in healthcare

**Outline**

* Overview of Data Science in Healthcare
* The Data Science Process
* How Data Science is transforming the healthcare sector
* Essential Python Data Science Libraries
	+ NumPy
	+ Pandas
	+ Matplotlib
* Data Exploration
	+ Line Chart
	+ Scatterplot
	+ Pairplot
	+ Histogram
	+ Density Plot
	+ Boxplot
	+ Customizing Charts
* Performing Exploratory Data Analysis of Healthcare Datasets
* Using Scikit-learn to Apply Machine Learning to Healthcare Questions
* Introduction to Deep Learning for Medical Image Analysis
* Digital Image Processing
* Contrast and Brightness Correction Edge Detection
* Image Convolution
* Using TensorFlow to Interpret and Classify Medical Images
* Structured Activity/Exercises/Case Studies
	+ Perform Exploratory Data Analysis of Healthcare Datasets
	+ Use Scikit-learn to Apply Machine Learning to Healthcare Questions
	+ Use TensorFlow to Interpret and Classify Medical Images
* Conclusion