EDUCATION IN MEDICAL IMAGING

Specialization Course in Radiomics

From medical images to predictive modeling

Develop a complete Radiomics workflow from scratch using computed tomography images: preprocessing, feature extraction and predictive model development.

13	13	4	45
lessons	workshops	modules	hours

CERTIFICADO POR CCEL Center of Education and Leadership

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learnradiomics.com

An applied learning pathway

LEARNING OBJECTIVES

01 Learn the basic principles of medical image properties that enable quantitative analysis.

02 Understand the essential steps in a Radiomics project.

03 Develop a complete Radiomics project from scratch using computed tomography images.

04 Acquire core skills to use Python for image preprocessing, feature extraction, database consolidation and cleaning, variable selection, and predictive model development.

05 Build, optimize, and evaluate Machine Learning models to solve a Radiomics problem.

WHO IS THIS COURSE FOR?

This course is designed for clinical and non-clinical professionals involved in the development and application of quantitative medical image analysis tools to address Precision Medicine problems. This includes radiologists, general physicians and specialists, medical students, medical technologists, dentists, project managers, administrative teams, decision-makers, engineers, and data science professionals.

METHODOLOGY AND ASSESSMENT

This course combines theoretical and practical learning. It includes a total of 13 theoretical lessons and 13 practical workshops. The workshops focus on the acquisition of technical skills using data science tools and Python programming. The course assessment includes 4 quizzes with 15 questions at the end of each module. Passing requires 80% correct answers. Estimated academic workload: 45 total hours.

MODULE 1 / 04

Introduction to Radiomics and Medical Image Properties

This module introduces the foundations of Radiomics and the medical image properties that enable reproducible quantitative analysis.

Lesson 1	Introduction to Radiomics.
Workshop 1	Introduction to Python programming - part one.
Workshop 2	Introduction to Python programming - part two.
Lesson 2	Medical image properties.
Workshop 3	Basic image operations in Python.
Workshop 4	Medical image processing in Python.
Lesson 3	Feature analysis.
Assessment	Module 1 assessment.

MODULE 2 / 04

Preprocessing and Feature Extraction

This module develops the Radiomics workflow, including preprocessing, segmentation, and feature extraction with specialized tools.

Lesson 4	Radiomics workflow.
Lesson 5	Image preprocessing.
Lesson 6	Medical image segmentation techniques.
Workshop 5	Semi-automatic segmentation of medical images.
Workshop 6	Automatic segmentation with Deep Learning.
Workshop 7	Feature extraction with PyRadiomics.
Assessment	Module 2 assessment.

MODULE 3 / 04

Statistical Modeling

This module focuses on database construction, data cleaning, exploratory data analysis, and variable selection for Radiomics projects.

Lesson 7	Statistical modeling - part one.
Lesson 8	Statistical modeling - part two.
Workshop 8	Database consolidation and construction.
Workshop 9	Data cleaning.
Lesson 9	Variable selection techniques.
Workshop 10	Exploratory data analysis and variable selection - part one.
Workshop 11	Exploratory data analysis and variable selection - part two.
Assessment	Module 3 assessment.

MODULE 4 / 04

Machine Learning in Radiomics

The final module addresses predictive model development, the role of Deep Learning, and the principles of reproducibility and transparency.

Lesson 10	Foundations of Machine Learning applied to Radiomics - part one.
Lesson 11	Foundations of Machine Learning applied to Radiomics - part two.
Workshop 12	Building Machine Learning models for Radiomics - part one.
Workshop 13	Building Machine Learning models for Radiomics - part two.
Lesson 12	Deep Learning in Radiomics.
Lesson 13	Reproducibility and transparency.
Assessment	Module 4 assessment.
Closing	Course closing.