SYLLABUS DEL CORSO

Signal and Imaging Acquisition and Modelling in Healthcare

2223-1-F9102Q016

Aims

The aim of the course is to provide the physical principles and processing methods underlying biomedical signal and image acquisition systems for the development of artificial intelligence models applied to that support medical decision-making in the prevention, screening, diagnosis and therapy of patients at risk of complex multifactorial diseases.
Theoretical lessons are integrated with practical exercises in the classroom during which datasets of biomedical signals and images will be provided to apply the theoretical principles in the development of artificial intelligence models to support medical decision.

Contents

Physical principles and processing methods of biomedical image and signal acquisition systems for the development of trustworth and explainable artificial intelligence models that support medical decision.

Theoretical lessons integrated with practical exercises in the classroom for the development of artificial intelligence models to support medical decisions.

Detailed program

- Biomedical signals: Electrocardiography / Electroencelography / Electromyography / functional NIRS
- Machine learning and deep learning systems for signal-driven personalized predictive medicine
- Biomedical imaging: ultrasound / radiography / computed tomography / mammography / MRI, mpMRI, fMRI / positron emission tomography / hybrid systems
- Biomedical imaging in image-guided radiotherapy

- Biomedical imaging for lesion detection and semantic segmentation
- Radiomic / radiogenomic modeling for screening and diagnosis
- Radiomic / radiogenomic modeling for treatment
  -Machine learning and deep learning systems for explainable image-guided personalized predictive medicine (supervised / unsupervised learning)

Prerequisites

Medium-High level of programming in Matlab or Python

Teaching form

Lectures and classroom exercises

Textbook and teaching resource

Notes, software, data and scientific articles provided to students during the course.

Semester

First semester.

Assessment method

The exam consists of an oral and 2 tests through classroom exercises aimed at verifying the student's level of knowledge of the topics covered during the course.
During the Covid-19 emergency period, the exams will either be telematic only. They will be carried out using the WebEx public platform and on the e-learning page of the course a link will be shown for access to the exam of possible virtual spectators.

Office hours

At the end of the classroom lesson the teacher is available to receive students for 1 hour

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING